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О. Экономическое развитие, инновации, технологические изменения и рост
O. Economic Development, Innovation, Technological Change, and Growth

ТЕХНОЛОГИИ РАЗРАБОТКИ ПРОМЫШЛЕННОЙ ПОЛИТИКИ СТРАНЫ

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Аннотация. Представляется комплексный методический инструментарий для разработки промышленной политики страны. Приводятся доказательства значимости названной политики для успешного промышленного развития страны. Анализируются современное состояние и проблемы развития промышленного сектора Беларуси. Уникальность данного исследования заключается в изучении механизма разработки промышленной политики с использованием конкретных авторских показателей промышленного развития страны: степени индустриализации (DI) и индекса конкурентоспособности промышленности (CIP). На основе этих показателей определяются этапы промышленного развития страны и делается вывод об алгоритме исследования промышленной политики. Предлагается несколько методических инструментов для анализа промышленного развития страны: матрица DI – CIP для определения текущего состояния промышленного развития страны и матрица Sc – Dev для выбора инструментов промышленной политики. В соответствии с позицией страны в матрице DI – CIP вводится тип соответствующей промышленной политики, и появляются основания для рассмотрения пути дальнейшего промышленного развития. Матрица Sc – Dev обеспечивает научный подход к обоснованию дифференциации промышленной политики по группировке видов экономической деятельности исходя из значимости и эффективности ее осуществления. Определяются наиболее подходящие для каждой группы видов экономической деятельности инструменты промышленной политики. Предлагаются рекомендации по совершенствованию промышленной политики Беларуси.

Ключевые слова: промышленное развитие; промышленная политика; экономический рост; индустриализация; Беларусь.

TECHNIQUES OF INDUSTRIAL POLICY FORMATION

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Abstract. The article presents a complex methodology of industrial policy investigation. Pieces of evidence of industrial policy significance for a successful country's industrial development are mentioned. The current state of industrial sector development in Belarus is analysed. The main failures and problems in the industry sector and industrial policy design in

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Belarus are identified. The uniqueness of this study lies in the investigation of the mechanism for industrial policy design using specific authors' metrics for a country's industrial development: degree of industrialisation (DI) and competitive industrial performance index (CIP). Based on these metrics, stages of industrial development of a country are identified and an algorithm for industrial policy investigation is concluded. Several methodological instruments for the country's industrial development analysis are proposed: matrix DI – CIP for determining the current state of the country's industrial development and matrix Sc – Dev for industrial policy tools selection. According to the position of a country in the matrix DI – CIP, a type of appropriate industrial policy is introduced and a path for further industrial development could be considered. Matrix Sc – Dev provides a scientific approach to the justification of industrial policy differentiation according to the economic activities grouping based on the significance and efficiency of their performance. The most appropriate industrial policy tools for each of the economic activities' groups are determined. Recommendations for the improvement of the industrial policy of Belarus are proposed.

Keywords: industrial development; industrial policy; economic growth; industrialisation; Belarus.

Introduction

Debates about industrial policy. Industrial policy tends are one of the most discussed by scholars and politicians economic categories. Many controversial aspects of industrial policy lay in the sphere of finding arguments to certain its necessity and significance. While liberalists [1; 2] are standing against any government intervention in the economy, giving as the main agreement ability of a market to allocate resources by its «invisible hand», today more scholars [3–9] are giving the idea about market failures that could not be overcome without government penetration. Thus, D. Rodrik [10] emphasises three types of market failures: coordinating externalities (it is associated with the need for significant investments for new activities' development), informational externalities (new industries are not always fully appreciated by investors) and externalities associated with the training of the workforce (underinvestment in advanced training programmes leads to a limitation of possible technological flows). J. E. Stiglitz and J. Y. Lin [8] say about six areas, where government enrolment is important for market efficiency: ensuring a competitive environment, production of public goods, reducing negative effects from the economic agents' activities, the existence of incomplete markets, imperfect information, curbing unemployment and inflation.

Today, industrial policy is widely implemented by countries targeting to support their industrial development. But not all results and outcomes of its implementation could be considered sufficient. As a result, a thesis about governmental failures as an argument against the industrial policy has appeared. According to D. Rodrik, debates in these policy areas are rarely ever about whether the government should be involved; they are about how the government should go about running its policies. The question is not about whether, but about how [11]. W. Naudé stands that debate should be more vigorously concerned with the content and the application of the industrial policy [12].

In this case, there is a necessity of submitting the mechanism of industrial policy investigation.

Current state of industrial development of Belarus. Nowadays, the industry sector in Belarus provides about 28.3 % of GDP (2022) with 23.8 % of total employment (2022) and 93.6 % of total export (2022). Structurally, in 2022 the industry sector of Belarus consisted of mining (1.4 %); manufacturing (89.5 %); electricity, gas, steam and air conditioning and water supply (9.1 %) [13]. Main economic activities in the industry sector are presented in table 1.

Table 1

Top 5 industry economic activities in Belarus in 2011, 2017 and 2021 by total output

Year	Economic activity	Share in total industrial output, %
2011	Manufacture of coke and refined petroleum products	21.47
	Food production (including beverages and tobacco)	17.91
	Manufacture of chemicals and chemical products	11.65
	Manufacture of machinery and equipment n. e. c.	8.0
	Manufacture of rubber and plastics products	7.95
2017	Food production (including beverages and tobacco)	24.58
	Manufacture of coke and refined petroleum products	14.02
	Electricity, gas, steam and air conditioning supply	9.07
	Manufacture of chemicals and chemical products	8.87
	Manufacture of rubber and plastics products	7.59

Ending of the table 1

Year	Economic activity	Share in total industrial output, %
2021	Food production (including beverages and tobacco)	25.90
	Manufacture of coke and refined petroleum products	11.30
	Electricity, gas, steam and air conditioning supply	8.80
	Manufacture of chemicals and chemical products	8.0
	Manufacture of rubber and plastics products	7.10

Note. Developed on the basis of the data of the Statistical Commitee of the Republic of Belarus[1].

Despite the industry sector and manufacturing could be considered «growth-driven» sectors in Belarus, the following general weaknesses of their performance are identified:

- high level of unprofitable enterprises (17.8 % of total number in 2022);
- high material and energy intensity of industry (76.6 % in 2021),
- low labour productivity (20.8 % of the level of EU countries in 2019);
- high concentration of production in large production enterprises (0.8 % of organisations provide 60.0 % of output) with an insufficient level of small business sector development;
- lack of technological cooperation;
- low innovative activity and the share of innovative products in output (17.7 % in 2022) [14];
- inefficient technological structure due to the predominance of low-tech (36.8 % in 2022) and medium-tech (lower level) (25.8 % in 2022) types of economic activities [13].

Materials and methods

The purpose of the research was to develop a procedure that would allow developing and justifying country's industrial policy and investigate the tools of its implementation.

To achieve the goal, we set the the following tasks:

- to develop a mechanism for a country's industrial policy investigation;
- to suggest methodological instruments for the algorithm's stages implementation;
- to test the proposed algorithm on the example of industrial policy design for Belarus.

Belarus was selected as an object of the research which was conducted in three stages following the defined tasks. The research was based on analyses of two main indicators: degree of industrialisation (DI) and competitive industrial performance index (CIP). DI is the authors' indicator representing the relationship between value-added in industry and value-added in agriculture and is used as a quantitative measure of industrialisation. CIP is an indicator developed by the UNIDO and is used as a qualitative measure of industrial development.

According to the authors' approach, the process of a country's industrial development goes through certain stages: early industrialisation, mature industrialisation, and late industrialisation with their specific characteristics (table 2) [13].

Table 2

Characteristics of the industrial sector in different stages of industrialisation

Parameters	Stage of industrialisation		
	Early	Mature	Late
Share of industry in GDP, %	Less than 30	More than 30	More than 30
The ratio of the share of people employed in industry to the share of people employed in agriculture	Less than 1	More than 1	More than 1
Share of manufacturing in industry, %	Less than 30	30–90	More than 90
Share of capital-intensive industries in the industrial sector, %	Less than 15	15–50	More than 50
Labour productivity in industry to labour productivity in agriculture ratio	Less than 1	More than 1	More than 1
Labour productivity in industry to GDP per capita ratio	Less than 1	Less than 1	More 1
Gross capital formation in industry to the gross value-added in industry ratio, %	Less than 10	10–25	More than 50

[1]Industry of Belarus : stat. booklet / Nat. Stat. Commitee of the Repub. of Belarus. Minsk, 2023. 34 p. (in Russ.).

Ending of the table 2

Parameters	Stage of industrialisation		
	Early	Mature	Late
Dominant industries in the industrial sector technological structure or industrial exports by technological level	Low	Middle	High
CIP	[0; 0.03)	[0.03; 0.3)	[0.3; 1]
DI	[0; 1]	(1;15]	(15; ∞)

The early stage of industrialisation is associated with the formation of its industrial sector. The purpose of this stage is to accelerate the industrial potential for further qualitative transformation of a country's industrial sector. The industrialisation process proceeds through the development of «primary» industries: raw-intensive or (and) labour-intensive, not requiring significant investment and capital formation. The industry is mostly low-tech.

In the mature stage, industrialisation is focused on capital-intensive manufacturing industries development as a country has accumulated enough capital at the early stage of industrialisation. The main targets of this stage are to increase the technological level of production and the depth of technological processing.

The late stage of industrialisation today is the highest phase of industrial development. The goal of this stage is to provide growth of the value-added in the industry through the technological transformation and to develop knowledge-intensive economic activities with high value-added.

With a long process of deindustrialisation, the country may lose reached stage of industrial development and move to the previous stages.

Thus, industrial development is proposed to be considered as a sequence of stages (early industrialisation, mature industrialisation, late industrialisation), within the framework of which a qualitative transformation of a country's industrial sector is carried out and its importance in a country's economy increases.

Supposed that the target of a country's industrial development is to reach the late stage of industrialisation.

Results

The process of industrial policy development. The process of industrial policy development is proposed to be held by going through several stages (fig. 1) aimed to recognise the priority targets of a country's industrial development.

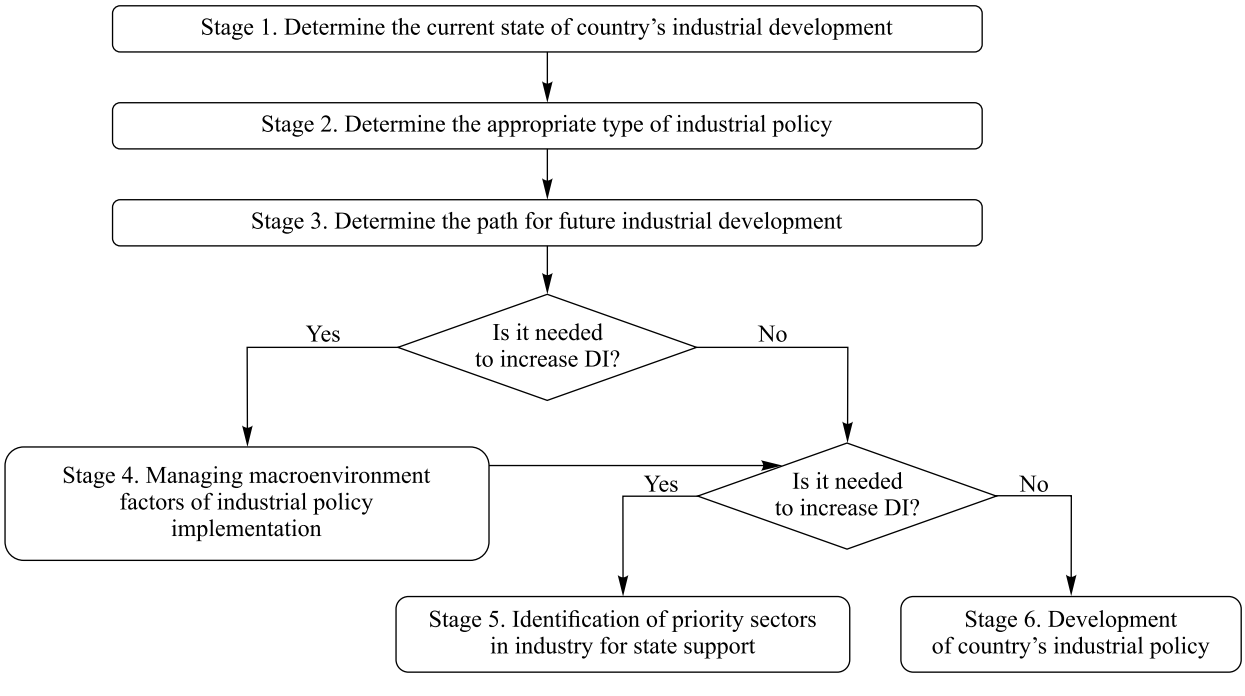

Fig. 1. Algorithm of industrial policy development

The algorithm makes it possible to conduct a comprehensive analysis of the current state of a country's industrial developments, identify industries (sectors) that require specific support, and create macroeconomic

conditions for the implementation of industrial policy. The result of using this mechanism will be the achievement of the goals of developing the country's industry, increasing its efficiency and competitiveness, as well as more efficient and effective use of industrial policy resources. To implement the stages of the industrial policy management algorithm, appropriate methodological tools have been developed: a method for identifying the level of industrial development of a country and choosing the type of industrial policy, a method for choosing industrial policy instruments and selecting priority economic activities for governmental support.

Determining the level of a country's industrial development and justifying the type of industrial policy. Evaluation of the current level of a country's industrial development is made based on the meaning of DI and CIP. The possible combinations of these parameters for related stages of industrial development are aggregated into the matrix DI – CIP, which provides 12 levels of industrial development (fig. 2) [14]. Quadrants 3, 7, 10 are representing impossible states. Based on the assessment of DI and CIP, the current stage of the country's industrial development could be identified.

DI	CIP for industrialisation stages			
	Early stage	Mature stage		Late stage
		Beginning phase	Final phase	
	[0; 0.03)	[0.03; 0.15)	[0.15; 0.3)	[0.3; 1]
(15; ∞)	3 –	6 TI	9 NI/ReI	12 NI
(1; 15]	2 TI	5 TI	8 NI/ReI	11 NI
[0; 1]	1 TI	4 TI	7 –	10 –

Fig. 2. Matrix DI – CIP
(TI is targeting industrialisation, NI is neoindustrialisation, ReI is reindustrialisation)

The path through quadrants $1 \rightarrow 5 \rightarrow 8 \rightarrow 12$ is considered the most efficient for a country and should be taken as a target in industrialisation decision-making.

Based on the examination of industrial policies held by the industrialised countries and assessing their effectiveness, the most appropriate type of industrial policy for each level of industrial development is suggested (table 3).

Table 3

Features of industrial policy types

Characteristic	Type of industrial policy			
	TI	Deindustrialisation	ReI	NI
Drivers of economic growth	Industry	Service	Industry	Industry
Goal	Growth of production output in the industry based on supporting chosen primer economic activities and their leadership in industrial structure	Investigation special entrepreneur environment to provide flexibility and competitiveness of enterprises	Stimulating the creation and revival of industrial enterprises by providing various benefits and subsidies, transforming the production and sectoral structure in favour of high-tech industries, carrying out deep technological modernisation	Structural transformation towards high-tech production
Object	Priority industries or economic activities	Operating environment	Priority industries or economic activities and operating environment	Priority industries or economic activities and operating environment
Types of instruments	Vertical	Horizontal	Vertical and horizontal	Vertical and horizontal
Style	Hard	Soft	Complex (hard and soft)	Complex (hard and soft)

Assessment of the industrial development level of Belarus from 1995 to 2021 (table 4) shows that it suits quadrant 5 (see table 2). The preferable industry policy for this state is targeting industrialisation.

Table 4

Values of DI and CIP for Belarus in 1995–2021

Indicator	Year					
	1995	2000	2010	2016	2019	2021
DI	2.11	2.76	4.26	4.48	4.76	5.41
CIP	0.05	0.05	0.08	0.06	0.06	0.05

Note. Developed on the basis of CIP databases and the World Bank[2].

Dynamic analyses of DI and CIP ratios show that there is a negative tendency for CIP to decrease, while DI tends to slow growth. The fall in CIP could indicate the problems in industry performance quality and failures in current industrial policy.

The potential path to industrial development for Belarus according to the matrix DI – CIP is quadrant 6 (increase in DI), quadrant 9 (increase in DI and CIP) and quadrant 8 (increase in CIP). The movement to quadrant 8 is suggested to be the most preferable, as it is on the «efficient path» (see table 2).

Identification of economic activities in the industry for priority state support. Quality of industrial development derivates from the ability of economic activities to be competitive in national and international markets. In this case, it is necessary to form a complex system that could provide the comparison of the level of economic activities' efficiency. Based on the efficiency measure, the government can judge the potential of economic activities for growth. This criterion helps to suggest the priority and necessity of a particular economic activity to be selected as an object for specific support within the framework of the ongoing industrial policy. It is proposed to use for analysis indicators that assess the significance of an economic activity for the country's economy and the quality of the economic activity's development (table 5).

Table 5

Indicators for economic activity's efficiency and effectiveness assessment in the industry

Indicators for evaluation of economic activity's significance for the country's economy (quantitative assessment)	Indicators for evaluation of economic activity's performance quality (qualitative assessment)
Share of an economic activity output in total economy output (Sc_1)	Labour productivity in an economic activity to the average labour productivity in the industry ratio (Dev_1)
Share of an economic activity value-added in total value-added (Sc_2)	The share of value-added in the output of an economic activity to the share of value-added in the total output of industry ratio (Dev_2)
Share of an economic activity in total export (Sc_3)	The share of innovative products shipped by an economic activity to the share of innovative products shipped total in the industry ratio (Dev_3)
Share of labour employed in an economic activity in total employment in the economy (Sc_4)	The average growth rate of an economic activity over the past three years to the average growth rate of the total industry over the past three years ratio (Dev_4)
Integral indicator of significance (Sc) $Sc_i = \frac{\sum_{j=1}^{4} Sc_{ij}}{4}$	Integral indicator of performance quality (Dev) $Dev_i = \frac{\sum_{j=1}^{4} Dev_{ij}}{4}$

Note. Developed on the basis of [15].

Analyses of these indicators in dynamics are making it possible to judge positive or negative changes in economic activities in the industry. Metrics for government decision-making in the field of justifying the choice of industrial policy instruments could be conducted by aggregating proposed indicators of economic activities' significance and quality of their performance into Sc (characterising and positioning the type of economic activity

[2]CIP database // UNIDO : portal. URL: https://stat.unido.org/database/CIP%202019 (date of access: 26.09.2023) ; World development indicators // The World Bank : site. URL: https://databank.worldbank.org/source/world-development-indicators (date of access: 26.09.2023).

in the country's economy) and Dev (characterising the prospects for its competitiveness and growth). Based on Sc and Dev the matrix Sc – Dev is built and it allows to attribute each economic activity to one of four groups:

1) industries-donors ($Sc_i > 2.5$; $Dev_i < 1$);
2) industries-leaders ($Sc_i > 2.5$; $Dev_i > 1$);
3) industries with growth potential ($Sc_i < 2.5$; $Dev_i > 1$);
4) emerging industries ($Sc_i < 2.5$; $Dev_i < 1$).

The authors' proposed methodology for grouping industries serves as the basis for choosing industrial policy instruments:

- for industries with a high Sc (>2.5), it seems appropriate to use vertical industrial policy instruments that have a selective effect;
- for industries with a low Sc (<2.5), it is necessary to use horizontal industrial policy instruments aimed to create an environment for the industries' development.

Furthermore, industrial policy instruments should suit the general goals of the country's economic policy. In this case, the targets of industrial policy are:

- social incentives (ensuring employment and social sustainability) for industries-donors;
- socio-economic incentives (profit-making, ensuring economic growth, employment and economic development) for industries-leaders;
- economic incentives (growth in market share, growth in profits) for industries with growth potential;
- innovative incentives (creating prerequisites for growth and development through the implementation of innovations and the acquisition of competitive advantages to increase the significance of the industries to the economy) for emerging industries.

Analysis of the industrial structure of Belarus by assessing ratios of Sc and Dev is shown in fig. 3.

Therefore, the prioritisation for specific government support should be given to manufacture of pharmaceuticals, medicinal chemical and botanical products, manufacture of computer, electronic, optical products and electrical equipment, manufacture of motor vehicles, trailers and semi-trailers, mining.

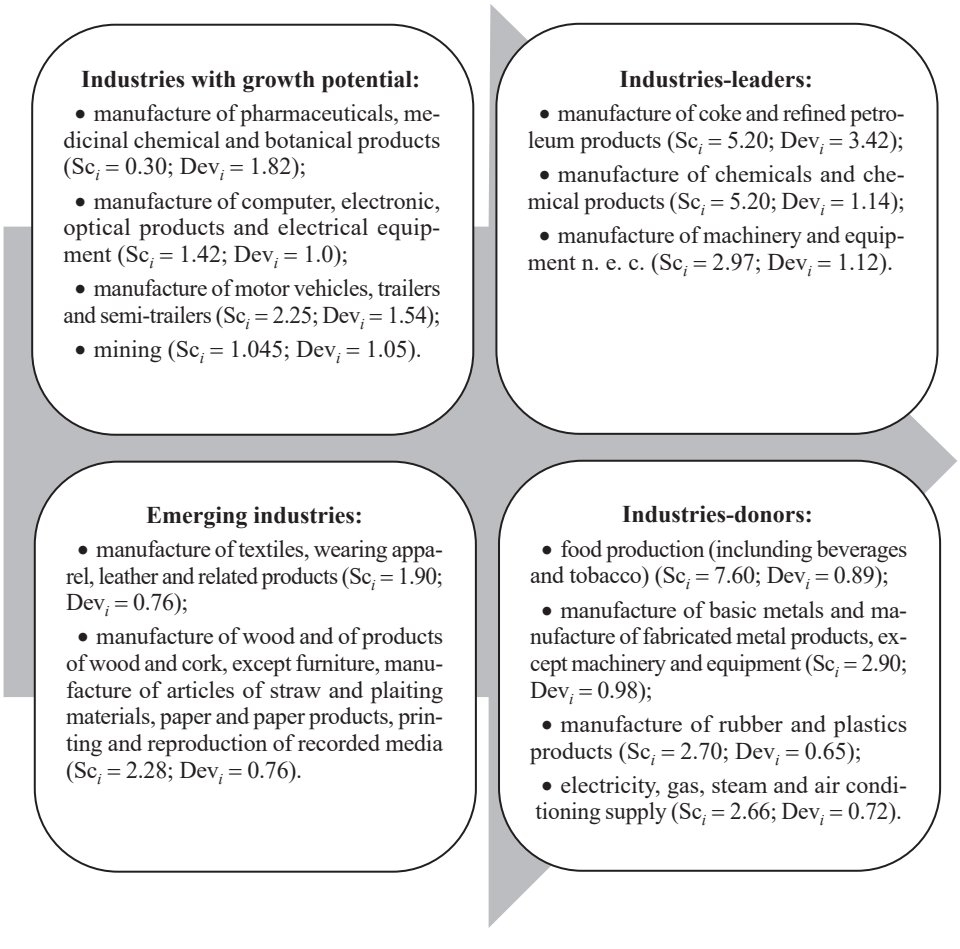

Fig. 3. Matrix Sc – Dev for Belarus, 2019.
Source: [16]

Discussion

Although there is a strong theoretical base for industrial policy, academics argue about two controversies in industrial policy investigation. D. Rodrik [17] provides an approach in which institutions and processes are more important than content because the content is country-specific and there are many «recipes». Some scholars advocate that the content of industrial policy stands over the institutional environment [18].

Because of the lack of scientific bases for industrial policy investigation and empirical evidence regarding the mechanism of its design, there is a high risk of government failures in dealing with the content of industrial policy [19; 20]. In this case, proposed in this research algorithm and methodological instruments will help to validate the content of the country's industrial policy. We believe that a balanced and reasonable approach is needed to solve problems dealing with industrial policy ineffectiveness. Mechanism of industrial policy design should be investigated for more the facilitative, coordinating role for government, consistent with the systems approach.

Conclusions

Industrial policy can be implemented more effectively by overcoming market and government failures by using theoretical bases for industrial policy design. The approach proposed in the article recognises the potential problems in the conducting of industrial policy and provides the solution for governmental failures preventing. The article provides the algorithm for industrial policy formation, certains the types of industrial policy with their main characteristics and interrelates them with the level of the country's industrial development, investigates the methodology for selecting objects for direct government support and estimates the effectiveness of the country's industrial structure.

The results of the research can be used by the government to justify the type of industrial policy and increase the effectiveness of the industrial policy tools application. In this case, better allocation of resources could be reached, as well as the targets of the country's industrial development.

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