Н. Станасюк
Національний університет "Львівська політехніка"

КОМПЛЕКСНЕ ОЦІНЮВАННЯ НАЦІОНАЛЬНОГО ПРОМИСЛОВОГО ПОТЕНЦІАЛУ

Визначено промисловий потенціал як результат від взаємодії наступних складових, а саме соціально-трудового, виробничо-господарського, фінансово-інвестиційного та інноваційного потенціалів. На основі опрацювання сучасних наукових праць узагальнено показники оцінювання промислового потенціалу та проведено їх класифікацію. Визначено систему показників оцінювання національного промислового потенціалу в розрізі його основних складових. Запропоновано проведення інтегральної оцінювання для визначення рівня розвитку промислового потенціалу на основі комплексного аналізу вхідних та вихідних індикаторів. У контексті запропонованої методики проаналізовано рівень розвитку промислового потенціалу за видами промислової діяльності та по Україні.

Ключові слова: промисловий потенціал, показники оцінювання, інтегральне оцінювання.

N. Stanasyuk
Lviv Politechnic national university

INTEGRATED EVALUATION OF NATIONAL INDUSTRIAL POTENTIAL

An industrial potential was defined as a result of interrelation of the following constituents: social and labor, industrial and economic, finance and investment, and innovative potentials. On the basis of studying of contemporary scientific works, indices of industrial potential evaluation are generalized and their classification is accomplished. Statistical factors, which characterize the development of industrial potential, can be divided into two groups: the first group is made up of indices, that represent the conditions necessary for industrial potential development (indices of resources of different types); the second group includes indices that testify the level of industrial potential development (indices of effectiveness and efficiency of the resources utilization). Such division became fundamental for distinguishing basic and realized industrial potential as well as generating input and output indicators of its development. The system of indices of national industrial potential evaluation in view of its main constituents was defined by processing the existing infobase. It was offered to conduct integral evaluation to determine the level of industrial potential development on the basis of standardization indices which represent the progress of its main constituents.

Key words: industrial potential, evaluation indicators, integral evaluation.

Statement of the problem. Research of different by nature indicators of evaluation of industrial potential by processing of static information and conducting of certain calculations is observed in scientific

circles. The number of indicators is enormous and unordered. Each of the offered indicators carries different informative loading that leads to obtaining of different values. Multidirectional nature of existing methodological approaches does not contribute to objective evaluation of industrial potential and reduces efficiency of its development management.

Analysis of recent research and publications. A great number of scientific works is devoted to the problem of evaluation of industrial potential due to its controversy. Among Ukrainian scientists it is necessary to mention the works of D. V. Androschuk, V. G. Bykova, V. G. Boronos, A. Y. Voronkova, V. N. Gavva, T. V. Kalinesku, N. S. Krasnokutska, O. Y. Kuzmina, Y. V. Lapina, V. A. Pavlova, V. V. Rossokha, M. R. Tymoschuk, R. V. Feschur, S. S. Shumska and others. But, the progressive advance in studying of the defined issues results in the increasing number of scientific works devoted to the research of micro level figures. Application of micro level approach isn't beneficial for integrated evaluation of the industrial potential and results in partial outcomes. At the same time, only integrated evaluation of the industrial potential gives a systematic idea of the state of its development and is the basis to determine perspective directions with the aim of effective use of available resources and purposeful development of the national industry in the context of modern economic realities.

Goals of the article. Methodological bases of industrial potential evaluation studied in this article stipulated to put forward the following tasks: to form a system of indices of industrial potential evaluation; to work out the methodology of integrated evaluation of potential to define its development level; to test the offered methodology in practice in order to determine the possibilities of national industry development.

The main material of research. Industrial potential, from the point of view of its formation, is the result of interrelation of numerous components. But, at the same time, their list is enormously various. Thus, the foremost task is to determine components of the industrial potential, so evaluation indicators will be formed from their perspective. Industrial and economic, innovative, finance and investment, social and labor potentials are pointed out more often in modern researchers' works and the potential itself is considered by resource-effective approach.

However, the drawback of the existing methodological approaches is their limit nature connected with the identification of the industrial potential with a certain dominant component that plays the leading role on the certain stage of the country economic development. Strategic orientation of the state on industry modernization resulted in the development of scientific researches aimed at evaluation of investment potential as a dominant part of national industrial potential. Today, innovations are considered to be a driving force of the national economy development.

At the same time, considerable part of Ukrainian scientists' works is devoted to the research of industrial and economic potential that in its economic essence is the closest to the industrial potential. Kudrina O.Yu. suggests to use indices that characterize availability and structure of capital assets, their condition and changes, and indices that characterize efficiency of their use (return on assets ratio and capitalization ratio) to assess industrial potential of a region; she regards the industrial potential as "possibility and ability of the productive systems" [10, c. 7].

We offer to group indicators of evaluation of the industrial potential by the following characteristic features (tab. 1).

Statistical indicators that characterize the development of industrial potential can be divided into two groups: 1) indicators, that represent conditions necessary for the development of the industrial potential (indicators of different types of resources); 2) indicators that prove the level of industrial potential development (indicators of effectiveness and efficiency of resources utilization). Taking into account the interpretation of industrial potential on the basis of interrelation of "resource-result" aspect, we offer to carry out integral evaluation of the industrial potential using input and output indicators.

Classification of indicators of industrial potential evaluation

Feature of the indicators classification	Indicators groups
1. By structure components	1.1. Evaluation indicators of social and labor potential. 1.2. Evaluation indicators of industrial and economic potential. 1.3. Evaluation indicators of natural resources potential. 1.4. Evaluation indicators of finance and investment potential. 1.5. Evaluation indicators of marketing potential. 1.6. Evaluation indicators of infrastructure potential. 1.7. Evaluation indicators of innovative potential. 1.8. Evaluation indicators of informative potential.
2. By functions of industrial potential management	2.1. Indicators of planning. 2.2. Indicators of organizing. 2.3. Indicators of motivation. 2.4. Indicators of control. 2.5. Indicators of regulation.
3. By hierarchical levels	3.1. Indicators of macro-level. 3.2. Indicators of meso-level. 3.3. Indicators of micro-level.
4. By the level of information generalization	4.1. Partial 4.2. Generalizing
5. By the way of obtaining	5.1. Primary (statistic data) 5.2. Secondary (calculated)
6. By the type of industrial potential development	6.1. Indicators of intensive development 6.2. Indicators of extensive development
7. By kinds of industrial activity	7.1. Indicators of mining industry 7.2. Indicators of processing industry 7.3. Indicators of electric power, gas, steam and condensated air supply 7.4. Indicators of water supply; sewage, waste utilization
8. By stages of recreated cycle of industrial potential	8.1. Indicators of formation 8.2. Indicators of development 8.3. Indicators of utilization

Summarized on [2–9]

Let's refer provision of industry with different types of resources, their state and changes to input indicators, on the basis of their evaluation we can define the size of basic industrial potential. Setting off its basic size is related to the hypothetical approach to definition of the category of economic essence as to possibility. Output indicators are set off on the basis of resultative approach to understanding of industrial potential. Having analyzed the indices of the mentioned group, we'll be able to obtain the size of the realized industrial potential that will allow to define priority directions of its development with the aim to get the desirable result.

To ground the choice of indices we used the following principles:
– indicators are formalized evidence of input and output indicators;
– every potential constituent has its functional purpose and is characterized by the set of indicators that can be calculated on the basis of reliable statistical information;
– each group of indicators is presented in terms of basic types of industrial activity;
– all indicators are chosen taking into account the object of the research in order to consider its specific nature.

The system of evaluation indicators of industrial potential development is made up taking into account their specific variety and goals (tab. 2).

Table 2

System of evaluation indicators of industrial potential development

Potential constituents		Indicators
Social and labor	Input indicators	1.1. An average number of regular workers per one industrial enterprise, persons. 1.2. Number of hired workers per one industrial enterprise, persons. 1.3. Number of unemployed per one industrial enterprise, persons. 1.4. Index of working time fund using. 1.5. An average nominal wages of regular workers per month, hryvnias.
	Output indicators	1.6. Index of wage returns. 1.7. Work efficiency.
Industrial and economic	Input indicators	2.1. An average annual cost of fixed assets per one industrial enterprise, thousands of hryvnias. 2.2. Degree of depreciation of fixed assets, %. 2.3. Index of renewal of fixed assets. 2.4. Retirement rate of fixed assets. 2.5. Index of introduction into operation of new fixed assets.
	Output indicators	2.6. Index of increase rate. 2.7. Capital productivity.
Finance and investment	Input indicators	3.1. Financial performance results per one industrial enterprise, millions of hryvnias. 3.2. Liquidity ratio of industrial enterprises. 3.3. Coefficient of autonomy of industrial enterprises. 3.4. Quantity of capital investments per one industrial enterprise, thousands of hryvnias. 3.5. Quantity of direct foreign investments per one industrial enterprise, millions of dollars. 3.6. A part of direct foreign investments in overall quantity of investments, %.
	Output indicators	3.7. Index of capital investments, %. 3.8. Efficiency of capital investments. 3.9. Level of profitability (loss ratio) of industrial enterprises activity %. 3.10. Level of profitability (loss ratio) of operating activity of industrial enterprises, %
Innovative	Input indicators	4.1. A part of innovatively active industrial enterprises, %. 4.2. A part of industrial enterprises that introduced innovative types of products, %. 4.3. A part of industrial enterprises that introduced innovative processes, %. 4.4. A part of industrial enterprises that introduced organizational innovations, %. 4.5. A part of industrial enterprises that introduced marketing innovations, %. 4.6. Index of technological innovativeness of industrial enterprises. 4.7. Index of processual innovativeness of industrial enterprises. 4.8. Amount of innovative spending per one industrial enterprise, thousands of hryvnias.
	Output indicators	4.9. Volume of innovative products sold per one industrial enterprise, thousands of hryvnias. 4.10. Innovations efficiency.

*A part of own elaboration

Integration of indices in combination is made by using the method of their standardization by the following formulae (1), (2).

$$X_{iy}^{I} = \frac{Xij}{Xm+1\,j} \tag{1}$$

$$X_{iy}^{I} = \frac{Xm+1\,j}{Xij} , \tag{2}$$

where $i = 1, 2, …, m; j = 1, 2, …, n; X_{m+1\,j} – j$ – index of standard type of industrial activity

Let's note, that formula (1) should be used when standard is of maximum value, and formula (2) when standard is of minimum value.

Deviation from standard should be calculated by the following formula (3).

$$Y_{iy} = 1 - X_{ij}^{1} . \tag{3}$$

The less is deviation from the standard, the better is situation in a certain type of industrial activity. Integration results of primary indices of certain constituents of basic industrial potential development in terms of the main types of industrial activity are shown in tab. 3. Supply of electric power, gas, steam and condensate air occupies the first place by the integral index of the basic industrial potential development with a considerable breakaway from other types of industrial activity, this is presumed by a high level of monopolism of the mentioned sector. The best results, for this sector of the economy, is achieved on three components of the potential, that is social and labour component (0,029), industrial and economic (0,147) and innovative (0,389). Obtaining of these results are connected with the high level of wages, considerable growth of productive potential and a big amount of innovative spending on introduction of processual technological innovations in the mentioned type of the industrial activity. Mining industry and quarries development are on the second place that is characterized by a considerable lag in industrial and economic constituent development (high degree of depreciation of fixed assets, their retirement and absence of growth). Water supply (0,510) and processing industries (0,565) are on the third and the forth places correspondingly with the slight lag in the development of the main components of the industrial potential. Thus, the worst situation in the sphere of water supply is observed in the development of innovative component, that considerably reduces the possibilities of the development and contradicts the strategic directions of the country.

Table 3

Integral index of basic industrial potential development in 2014

Types of industrial activity	Integral figure of the development of social and labour constituent	Integral figure of the development of industrial and economic constituent	Integral figure of the development of finance and investment constituent	Integral figure of the development of innovative constituent	Integral index of basic industrial potential development
Mining industry and quarries development	0,044	1,126	0,111	0,423	0,438
Processing industry	0,589	0,600	0,650	0,487	0,565
Electric power, gas steam and condensate air supply	**0,029**	**0,163**	0,188	**0,389**	**0,188**
Water supply: sewage, wastes utilization	0,534	0,381	0,560	0,628	0,510
Ukraine	0,381	0,610	0,527	0,495	0,494

Calculated on [1]

Results of the integral evaluation of the realized industrial potential are shown in tab. 4.

Table 4

Integral index of the realized industrial potential development in 2014

Types of industrial activity	Integral figure of the development of social and labour constituent	Integral figure of the development of industrial and economic constituent	Integral figure of the development of finance and investment constituent	Integral figure of the development of innovative constituent	Integral index of realized industrial potential development
Mining industry and quarries development	0,508	1,026	0,178	0,990	0,675
Processing industry	**0,107**	**0,103**	0,624	**0,000**	**0,208**
Electric power, gas steam and condensate air supply	0,238	0,453	0,421	0,923	0,509
Water supply: sewage, wastes utilization	0,723	0,376	0,643	0,959	0,675
Ukraine	0,229	0,424	0,565	0,130	0,337

Calculated on [1]

Processing industry occupies the first place by the integral index of the realized industrial potential development, and supply of electric power, gas, steam and condensate air is on the second place. The best results in processing industry is obtained in the development of social and labour (0,107), industrial and economic (0,103) and innovative (0,000) components of the industrial potential, that is connected with the achievement of high figures of effectiveness and efficiency of resources utilization. At the same time, mining industry and quarries development is on the first place by the level of the finance and investment component development (0,178).

On the whole, the integral index of the development of basic national industrial potential is 0,494, and realized – 0,337.

Conclusions and recommendations for further research. As a result, integrated evaluation of input indicators gave the possibility to define the basis of national industrial potential fundamental for national industry development, and the conducted research of output indicators was focused on determining the amount of the realized potential. It was found that supply of electric power, gas, steam and condensate air occupies the first place by the integral index of basic industrial potential development with a considerable breakaway from other types of industrial activity, this is presumed by the high level of monopolism in the mentioned sector and the state orientation on the development of strategically important branches. In the field of electric power, gas, steam and condensate air supply the best results are achieved by three components of the potential, that is social and labor component (0,029), industrial and economic (0,147) and innovative (0,389), which is connected with the high level of wages, considerable growth of productive potential and a big amount of innovative spending on introduction of processual technological innovations in the mentioned type of the industrial activity. At the same time, by the level of the development of the realized industrial potential this sector yields to processing industry which shows the highest figures on social and labor, industrial and economic, and innovative components.

As a conclusion, integral evaluation of the industrial potential development must be supported by two main directions:

– evaluation of the basic industrial potential as maximal possibility of its development;
– evaluation of the realized potential as an achieved level of the development.

87

The results of the conducted evaluation will be taken into account further for:

– improvement of structural reconstruction of national industry, that is determination of the strategic priorities of the state and removal of structural deformations and disproportions;

– formation of effective component-by-component structure of the industrial potential directed at the development of priority kinds of industrial activity and increasing of its competitiveness.

1. Відкрита статистична база Державної служби статистики України [Електронний ресурс]. – Режим доступу: http:// www.ukrstat.gov.ua. 2. Кудріна О. Ю. Промисловий потенціал регіону: формування, оцінка та стратегія: монографія / О. Ю. Кудріна. – Луганськ: Вид-во "Ноулідж", 2014. – 456 с. 3. Карпатський регіон: актуальні проблеми та перспективи розвитку: монографія у 8 томах / НАН України. Інститут регіональних досліджень / відп. наук. ред. В. С. Кравців. – Львів, 2013. – Т. 3. Промисловий потенціал / відп. ред. С. Л. Шульц. – 2013. – 292 с. (Серія "Проблеми регіонального розвитку").4. Лапін Є.В. Економічний потенціал підприємств промисловості / Є. В. Лапін // Вісник СумДУ. Серія "Економіка". – 2007. – № 1 (Т.2). – С. 63–71. 5. Потенціал соціально-економічних систем національного господарства: монографія / Н. Ю. Подольчак, І. І. Яремко, О. Є. Сухай. – Львів: Видавництво Львівської політехніки, 2013. – 220 с. 6. Таранюк Л. М. Оцінка економічного потенціалу промислового підприємства при проведенні реінжинірингу бізнес-процесів / Л. М. Таранюк // Механізм регулювання економіки. – 2014. – № 2. – С. 96–105. 7. Потенціал національної промисловості: цілі та механізми ефективного розвитку / за ред. Ю. В. Кіндзерського. – К., 2009. – 928 с. 8. Крехівський О. В. Промисловий потенціал України: стан і перспективи. – К.: Фенікс, 2007. – 120 с. 9. Розвиток промислового потенціалу України в процесі після кризового відновлення / за ред. Я.А. Жаліла. – К.: НІСД, 2010. – 48 с.10. Кудріна О. Ю. Стратегія підвищення ефективності використання промислового потенціалу регіону: автореф. дис. ... д-ра екон. наук: спец. 08.00.05 – Розвиток продуктивних сил і регіональна економіка / О. Ю. Кудріна; Східноукраїнський національний університет імені Володимира Даля. – Сєвєродонецьк, 2015. – 36 с.