# Methodical assessment and analysis tools of national industrial complex capacity in the regional aspect

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**Abstract.** Current process of financial instability led to the complex of problems, which solution determines the need to develop the effective management mechanism of regional industrial estates stabilizing their development. The following article is an attempt to develop specific methodical tools to evaluate the environment and the functional results of the national industrial sector with consideration for heterogeneity and uneven territorial development of Russian. Suggested by the authors the implementation of assessment and analysis algorithm of national industrial complexes capacity contributes to a clear objectives statement of industrial policy of territorial authorities and the development on this basis the strategies socio-economic development for a long-term perspective in an unstable market environment.

## 1 Introduction

Existing financial unrest and the decrease of efficiency of traditional responsive actions to the crisis situations determine the objective necessity to create the competitive and efficient industrial complexes. As the result, there is a need for the development and application of improved methods and tools in the process of building and implementation of industrial policy. All this requires the serious transformation of business systems in industrial, reproduction- functional, institutional aspects. However, this regional component becomes the shaping factor to define the determinants of economic development. Sectorial specificity of the Russian industrial system modernization has grown stronger at the regional levels. In the development of new response principles to the growing non-linearity of the market environment, it is important to take into account regional specificities in development of sectorial structures of national industrial complexes, their various sustainable and structural dynamic types. Pursuant to required reasons, methodology and methods problems of capacity assessment of national industrial complexes appear in a y new light and require fundamentally different, new approaches to their resolving. In the context of this study, national industrial complex should be understood as set of economic entities of various industries located or registered in particular region and forming a variety of vertically and horizontally oriented industrial clusters. National industrial complexes use different types of region resources; its infrastructure thus forming regional socio-economic systems united by common material, labor, financial, information and other flows.

## 2 Urgency and Scientific Significance

In Russia, in recent years, the major indicators of the industry development slumped. Official statistical data [1, 2] reveal that in the country the industrial production index in six months of 2015 declined by 5.9%. The national total industrial production was the same as in 2007. During 2011-2015 years, annual industrial output without any substantial trend changes with a decline since 2014. The presence of optimal territorial and resource factors, the having of large-scale production facilities combined with inefficient competitive landscape suggest that in Russia there is a weakness in the use of national industrial complexes capacity. As the result, there is a need to find and develop the new management approaches, assessment and analysis of national industrial complexes capacity in the country-wide aspect.

Management improvement of economic development in general and the National Industrial Complex, in particular, as well as the rational development of regional industrial policy taking into account the decision of crisis management tasks involved in both domestic and external scientists Dzh. K. Lafta, B. M. Ayyub, M. T. Shafikov, E. V. Lapin, V. N. Nemtsev, N. L. Zaitsev, G. G. Fetisov, A. V. Andreev, M. V. Ivanova, V. V. Kistanov, I. L. Koz'eva,V. V. Kurnyshev, R. J. Carter, J. L. Gattona, D.W. Walters, L.K. Lau, L. I. Ushvitskii [3-18].

In economics, there is no agreement among scientists on the precise meaning of "capacity". For example, in «Russian defining dictionary» had specified capacity as the range of opportunities and tools in any field [19, p. 518]. In the dictionary of S. I. Ozhegov and N. Yu. Shvedova capacity is considered as a power degree in some respect, the range of opportunities and tools [20, p. 571]. As the result, considering the National Industrial Complex

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Capacity it should take into account the total of its possibilities and internal resources to increase industrial efficiency and to ensure sustainable development.

## 3 Main Part

### *A. Theoretical Part*

The best way to present the proposed tools of integrated analysis of National Industrial Complex Capacity and the possibilities of its use is to demonstrate a scheme (figure 1). National Industrial Complex Capacity should be viewed in the context of its main features: real opportunities, resources, availability of reserves, the ability to use the capacity, the level and results of its implementation [21].


**Fig. 1.** Block diagram of assessment and analysis of National Industrial Complex Capacity.

### *B. Setting*

Many internal and external, objective and subjective factors have a multidirectional impact on the conditions and results of National Industrial Complex operation, the study of these factors allow identifying the certain parameters of comprehensive evaluation of National Industrial Complex Capacity. Indicators are provided in Table 1.

**Table 1.** Indicators, Characterizing Parameters Of National Industrial Complex Capacity.

| Parameter | Indicators |
|---|---|
| Resource | The total territory, thou. sq. km. |
| | The annual average employed in the economy, thou. persons. |
| | The annual average employed in the industrial production, thou. persons. |
| | Value of fixed assets, bln. RUB. |
| | Wear of fixed assets, bln. RUB. |
| | New fixed assets, bln. RUB. |
| | Developed and employed advanced production technologies, pch. |
| Productive | The share of manufacturing in region GDP, % |
| | The index of production by economic activity «Mining operations», % |
| | The index of production by economic activity «Manufacturing», % |
| | The index of production by economic activity «Electricity, gas and water production and distribution», % |
| | Volume of own-produced and shipped goods, and work and services performed by own efforts, «Mining operations», mln. RUB. |
| | Volume of own-produced and shipped goods, and work and services performed by own efforts «Manufacturing», mln. RUB. |
| | Volume of own-produced and shipped goods, and work and services performed by own efforts « Electricity, gas and water production and distribution », mln. RUB. |
| Market- Infrastructural | Number of businesses and organizations, pch. |
| | Sales figures (wholesale turnover), mln. RUB. |
| | Transportation of goods by road of all organizations, million tonnes |
| | Cargo turnover of motor transport of all organizations, million tonnes |
| | The density of surfaced public roads, km |
| | The density of public railways. Railways to 10,000 km2, km |
| | Dispatching cargo by public railways, density of public railways, million tonnes |
| Informational | The use of electronic document management in organizations, % of total quantity of interviewed organizations |
| | Expenditures for Information and Communication technologies, mln. RUB. |
| | Organizations that had website, % of total quantity of interviewed organizations |
| | Using special software in organizations, % of total quantity of interviewed organizations |
| | Using Information and Communication technologies, % of total quantity of interviewed organizations |
| | Number of personal computers per 100 workers, pch. |
| | Use of Internet network in organizations, % of total quantity of interviewed organizations |
| Financial and investment | The institutions with foreign capital, mln. RUB. |
| | Fixed capital accumulation, mln. RUB. |
| | Industrial Producer Price Index, % |

| | |
|---|---|
| | Number of privatized property complexes of state and municipal unitary enterprises created during privatization of economic companies, pch. |
| | Domestic expenditure on Research and Development, mln. RUB. |
| | Investments in fixed assets, mln. RUB. |
| | The balanced financial result of performance (gain minus loss), mln. RUB. |
| **Economic** | Gross regional product, mln. RUB. |
| | Profitability of organizations assets on mining, % |
| | Profitability of organizations assets of manufacturing, % |
| | Profitability of organizations assets on electricity, gas and water production and distribution, % |
| | Fixed capital accumulation, mln. RUB. |
| | Average wade, thou.RUB. |
| | The specific weight of loss-making organizations,% |
| **Innovative** | Organizations performing research and development, pch. |
| | Expenditures for technological innovations, mln. RUB. |
| | The volume of innovative products works and services, mln. RUB. |
| | Staff number, employed in the Research and Development, persons. |
| | Organizations performing innovations, providing the increase of ecological safety in the production of goods, works, services, pch. |
| | The innovative activity of organizations, % |
| | Number of researchers with advanced degrees, persons. |

Analysis tools of National Industrial Complex Capacity based on calculating following integrated indices:

- partial estimate of specific J-Parameter of National Industrial Complex Capacity;
- integral index of National Industrial Complex Capacity.

We offer the following formula to calculate the integral index of National Industrial Complex Capacity:

$$P_i = \sum_{j=1}^{4} g_j \cdot d_j , \quad (1)$$

$g_j$ – level of importance J-Parameter of National Industrial Complex Capacity category; $d_j$ – weight of Capacity J-Parameter.

We thought it useful to determine the importance level of J-Parameter of National Industrial Complex Capacity by Pareto approach:

$$g_i = 0,8 - 0,2 \cdot (j - 1) \quad (2)$$

Under this developed method, a differentiated estimation of National Industrial Complexes Capacity of the Russian Federation within a framework of the constituent entities of the Russian Federation from statistical data 2012-2014 г.г had been drawn up.

## 4 Research Results

The analysis has further compared National Industrial Complex on the basis of complex indices that characterize certain parameters of capacity and identified four typological groups of the constituent entities of the Russian Federation [22, 23] depending on the obtained value of the integral index (Table 2).

**Table 2.** Grouping of the constituent entities of the Russian Federation on level of National Industrial Complexes Capacity in 2012-2014.

| **Cluster** | **The constituent entities of the Russian Federation that integrate the cluster.** |
|---|---|
| **Regions-leaders** | The Belgorod Region, the Vladimir Region, the Kaluga Region, the Kostroma Region, the Kursk Region, the Lipetsk Region, the Moscow Region, the Tula Region, the Nenets Autonomous District, the Vologda Region, the Kaliningrad Region, the Leningrad Region, the Volgograd Region, the Republic of Bashkortostan, the Republic of Tatarstan, the Perm Territory, the Nizhny Novgorod Region, the Orenburg region, the Samara region, the Sverdlovsk region, the Khanty-Mansi Autonomous District- Yugra, the Chelyabinsk Region, the Omsk Region, the Chukotka Autonomous District |
| **Relatively developed regions** | The Ivanovo Region, the Ryazan region, the Smolensk Region, the Tver Region, the Yaroslavl Region, Moscow, the Komi Republic, the Arkhangelsk Region without autonomous region, the Murmansk Region, the Novgorod Region, St. Petersburg, the Republic of Mordovia, the Udmurtian Republic, the Kirov Region, the Ulyanovsk Region, Yamalo-Nenets Autonomous District, the Tyumen Region without autonomous regions, the Republic of Khakassia, the Krasnoyarsk Territory, the Irkutsk Region, the Kemerovo Region, the Magadan Region, the Sakhalin Region |
| **Underdeveloped regions** | The Bryansk Region, the Republic of Karelia, the Pskov region, the Astrakhan region, the Rostov Region, the Karachayevo-Cherkessian Republic, the Republic of Marij El, the Chuvash Republic, the Saratov Region, the Kurgan Region, the Altai Territory, the Novosibirsk Region, theTomsk Region, the Republic of Sakha (Yakutia) |
| **Regions-outsiders (depressed region)** | The Voronezh Region, the Oryol Region, the Tambov Region, the Republic of Adygeya, the Republic of Kalmykia, the Krasnodar Region, the Republic of Daghestan, the Republic of Daghestan, the Kabardino-Balkarian Republic, the Republic of North Ossetia-Alania, the Chechen Republic, the Stavropol Territory, the Penza Region, the Republic of Altai, the Republic of Buryatia , the Republic of Tuva The Zabaikalye Territory, the Kamchatka Territory, the Primorye Territory, the Khabarovsk Territory, the Amur Region, the Jewish Autonomous Region, Republic of Crimea, Sevastopol |

Figure 2 shows quite a negative situation in terms of accumulation and use of the Capacity of National Industrial Complexes: on Regions-outsiders (depressed region) account for 28% of the constituent entities of the Russian Federation, Underdeveloped regions - 17 %, while on the Relatively developed regions account for only 27 %, and Regions-leaders at 28%.

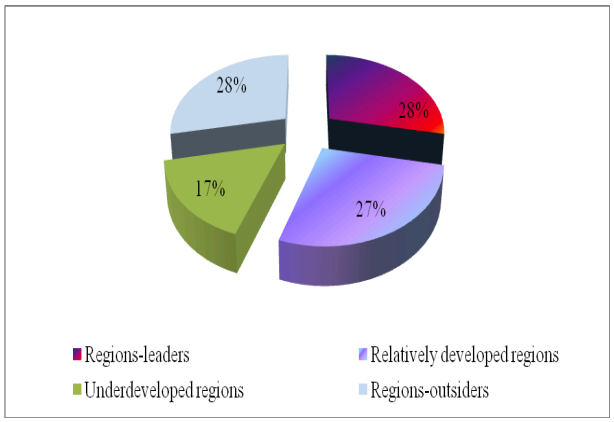


**Fig. 2.** Typology structure of the constituent entities of the Russian Federation on the level of and use of the Capacity of National Industrial Complexes in 2012-2014, %.

The proposed method assessment and analysis tools of National Industrial Complexes Capacity involves performing of multidimensional various aspects assessment of their formation and functioning in the current competitive environment, which may be useful for some users.

## 5 Conclusion

A practical point regarding the usefulness of the research is that generalizations and developed methodical approaches to assessment of National Industrial Complexes Capacity allowed selecting the reference regions-leaders and regions-outsiders required special attention and support of the state, suggest optimal basic directions to implement some of their development programs, and in a result, improve the efficiency of domestic industries as a whole.

Thus, the proposed methodological approach to assessment of National Industrial Complexes Capacity contributes to the transformation of understanding of number of processes and tendencies of modern development of Russian industry, modifies the notion about rational delimitation of authoritative powers and regulatory functions as part of the active state industrial policy between the federal, sectorial, regional and local levels of executive power.

## References

1. *Russia by the Numbers* (Federal State Statistics Service, Moscow, 2015)
2. *Russia Industry* (Federal State Statistics Service, Moscow, 2015)
3. Dzh.K. Lafta, *Organization Theory* (TK Velbi, Moscow, 2003)
4. B.M. Ayyub, *Risk Analysis in Engineering and Economics* (Chapman and Hall/CRC, 2014)
5. M.T. Shafikov, The socio-humanitarian knowledge, 236-246 (2002)
6. E.V. Lapin, *The economic potential of the enterprise: monograph* (Sumy, ITD Universitetskaya kniga, 2002)
7. V.N. Nemtsev, *Innovative enterprise of ferrous metallurgy: the problems of strategy and risks: a monograph* (Izd-vo Magnitogorsk. gos. tekhn. un-ta im. G.I. Nosova, Magnitogorsk, 2010)
8. N.L. Zaitsev, *The economy of industrial enterprise* (Moscow, INFRA-M, 2008)
9. G.G. Fetisov, V.P. Oreshinm, *Regional economics and management: a textbook* (INFRA-M, Moscow, 2006)
10. A.V. Andreev, *Regional economics* (Piter, St. Petersburg, 2012)
11. M.V. Ivanova, North and Market: Formation of Economic Order, **2(28)**, 146-149 (2011)
12. V.V. Kistanov, *Regional economy Russia* (Finansy i statistika, Moscow, 2011)
13. I.L. Kozeva, E.N. Kubozhev, *Economic geography and regionalism* (KNORUS, Moscow, 2012)
14. V.V. Kurnyshev, V.G. Glushkova, *Regional economy. Fundamentals of the theory and methods of research* (KnoRus, Moscow, 2012)
15. R.J. Carter, *Stores Management and Related Operations* (Macdonald&Evans, UK, 1985)
16. J.L. Gattona, D.W. Walters, *Managing the Supply Chain. A Strategic Perspective* (Macmillan Business. G.B., 1996)
17. L.K. Lau, *Managing business with SAP. Planning, implementation and evaluation* (IGP, 2005)
18. L.I. Ushvitskii, T.A. Kulagovskaya, A.A. Ter-Grigor'yants, I.V. Solovyova, E.S. Mezentseva, International Journal of Economics and Financial Issues, **5(4)**, 1011-1016 (2015)
19. V.A. Lopatsh, L.E. Lopatina, *Russian Dictionary* (Rus. yaz., Moscow, 2001)
20. S.I. Ozhegov, N.Yu. Shvedova, *Explanatory Dictionary of the Russian language: 80000 words and idiomatic expressions* (Azbukovnik, Moscow, 1999)
21. *Regional economics. Natural-resource and environmental foundations* (KnoRus, Moscow, 2012)
22. *Regional economics* (Yuniti-Dana, Moscow, 2013)
23. V.G. Glushkovoi, Yu.A. Simagina, *Federal District of Russia. Regional economy: textbook* (KNORUS, Moscow, 2009)