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Methodology of the resource potential assessment under import substitution

Abstract. The article presents methodology of the resource potential assessment in import substitution as developed by the authors. This methodology precludes two-level analysis, and allows evaluating resource potential in the region and optimal economy sectors for development. It is based on the analysis of development factors, resource capabilities and constraints in particular regions. It has been found out that

We tested our methodology for the Regional Resource Potential (RRP) assessment on the example of Central Federal District of Russia regions for the period of 2005-2015. According to the analysis of resource potential complex index, we can conclude that Moscow possessed the greatest resource potential, while the lowest level of RRP was observed in Ivanovo region (2006-2008, 2011-2015), Tambov region (2005, 2010) and Orel region (2009).

To prove universal value of the developed methodology, we cross-tested data from Kursk region (Russia) and Swietokrzyskie voivodeship (Poland). It has been found that Kursk region's agriculture has higher resource potential than agriculture in Swietokrzyskie voivodeship, however, manufacturing industry in Swietokrzyskie voivodeship has higher recourse potential than the one in Kursk region.

Keywords: Resource Potential; Integral Index; Agriculture; Manufacturing

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Методологія оцінки ресурсного потенціалу при імпортозаміщенні
Анотація. У статті представлено методологію оцінки ресурсного потенціалу в національній економіці з огляду на його вплив на реалізацію завдань імпортозаміщення. Розроблена авторами методологія передбачає застосування дворівневого аналізу й дозволяє оцінити одночасно ресурсний потенціал території та пріоритетні потреби окремих секторів економіки. В основі аналізу лежить оцінка факторів розвитку, зокрема ресурсних можливостей та обмежень окремої території.
Ключові слова: ресурсний потенціал; інтегральний індекс; сільське господарство; промислове виробництво.

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Аннотация. В статье представлена разработанная авторами оригинальная методология оценки ресурсного потенциала в контексте задач импортозамещения. Данная методология построена на применении двухуровневого анализа, который позволяет одновременно оценить ресурсный потенциал территории и приоритетные потребности отдельных секторов экономики. При осуществлении анализа также учитываются ресурсные возможности и ограничения изучаемой территории.
Ключевые слова: ресурсный потенциал; интегральный индекс; сельское хозяйство; промышленное производство.

1. Introduction

Nowadays import substitution is one of the major trends in economic development of each country. For Russia import substitution is pushed further by international political developments: crisis in relations with Western European countries, imposed economic sanctions, and rouble weakened against foreign currencies. The process of import substitution is impossible without solid resource base which is necessary for successful economic development within whole country and its territorial entities. The availability of certain resources, their quality, efficiency, interchangeability, and upgrading of reserves define the success of area economic development.

Problem Statement. Existing socio-economic disparities of territories within each country is largely determined by the diversity of resources and the efficiency of their use. It is important to note that increasing disparities in socio-economic development between individual countries and their territorial entities do not allow us to use universal measures to implement the measures for import substitution. We need to handle this problem with a comprehensive analysis of the most promising sectors of economy, taking into account their existing resource potential at the regional level. Hence, implementation of the import substitution strategy today is an important task for Russia.

2. Brief Literature Review

The problem of import substitution is one of the most difficult in economic science. Numerous fundamental studies formed both theoretical and methodological foundations of import substitution research.

The origin of the import substitution concept should be sought in the works of famous mercantilists (T. Mun [23], W. Petty, A. de Montchrestien, J. B. Colbert, etc.).

A lot of scholars reveal certain aspects of import substitution process: E. G. Animitsa [16], V. A. Semykin [28], I. F. Sukhanova [22], O. A. Ushakova [31], J. Jacobs [11], W. Bauer [2], J. Sachs [15], J. Eatwell [6].

From our point of view the import substitution process is impossible without a rational system of resource potential control.

Works by many scientists are devoted to study of resource potential: F. N. Klotsvog and I. A. Kushnikova [21], E. L. Chizhevskaya [32], T. A. Yakushkina [35], E. A. Illarionova [19], P. Z. Shahbazov [34]. G. S. Merzlikina and I. V. Pshenichnikov [25], K. V. Chukanov [33] elaborated approaches to the assessment of the potential for import replacement or region import substitution potential.

Examples of practical approaches to the assessment of the territories' potential are presented in The Development Report Card for the States (DRC) [4], territorial capital concept, EU Regional Competitiveness Index [7], Regional Economic Potential Index, developed by scientists at Memorial University of Newfoundland (Canada), Regional Capacity Index developed for the United States and Australia [14].

In traditional methodologies a lot of attention is paid to the assessment of natural resources potential, human resources, business development and intangible assets. The number of indicators used to assess the territories' potential is subjective and cannot be quantified, which we see as their significant drawback.

The publications by some scholars are devoted to the assessment of individual elements of resource potential. For example, natural potential assessment is reflected in writings by O. F. Balatskiy [35], M. L. Bronstein [17], K. G. Gofman [18], E. S. Karnaukhova [20], S. G. Strumilin [30], A. M. Hussen [10], R. Q. Grafton et al. [9].

3. Purpose

The aim of our work is to develop universal methods for resource potential assessment of import substitution industries by applying the indicators for every structural element of resource potential.

4. Results

Our study has been realised at the regional level, but we should note that our methodology can be used to asses resource potential at different levels: from the national one to the level of separate territorial entities.

Regional Resource Potential (RRP) is a complex and multifaceted category. To obtain the optimal characteristics for this concept, it is necessary to consider all its elements, and to define quantitative and qualitative criteria for its evaluation.

RRP is composed of five elements: natural resources potential, labour potential, material and technical potential, economic and financial potential, information and innovation potential.

The process of import substitution is impossible without the construction of system for rational management of resource potential. The level of economic development of the region, and the state policy for resource regulation determine the importance of exploring approaches to RRP management.

Resource potential assessment enables us to obtain objective information about the availability of resources which are necessary for effective socio-economic development of territories, and also in trends of resource potential concentration for the production of competitive and high-quality products in various industries, modernization and technical upgrading of enterprises. With the help of a complex indicator of RRP it is possible to evaluate effectiveness, rationality and completeness of use of each resource type. This assessment is an important indicator for management quality of regional development. It is possible to identify not only the availability of certain resources, their specific characteristics, quality and key factors of capacity and resource capacity, but also the place and role of region within national economy.

The methodology of regional resource potential assessment in regards to import substitution consists of the following steps:

- comprehensive assessment of regional resource potential;
- definition of priority import substitution industries in the region;
- assessment of resource potential and efficiency of its use for each priority sector;
- forecasting development of import substitution and of its organizational and management models.

1. Indicators for each element of resource potential.

As indicators for the regional resource potential have different dimensions, we have carried out calculation of the integrated indicators, and evaluated and interpreted complex integral index of RRP:

$$RRP = \sqrt[5]{NRP \times LP \times MTP \times EFP \times IIP.} \qquad (1)$$

Calculations according to this method allow determining the level of availability and use of regional resources. Structural analysis of RRP elements detects the potential for each type of resource. Analysis of these indicators in dynamics allows to predict availability and use of RRP in the future (see Table 1).

2. We need to define sectoral priorities for import substitution separately for every territorial unit (country, region, etc.), based upon its economic development, available resources, and trends of economic development. And to find priorities in industrial import substitution we also need to assess following aspects of economy:

- sectoral structure of industry;
- import structure;
- experts' evaluation of economic prospects.

It is useful to consider the indicators characterizing the contribution of the industry to the economy of the country (or other territorial entities within the country) to justify the primary choice of sectors for import substitution. In the national economy such indicators are gross national product and gross regional product. When assessing the structure of imports, the share of imported goods for each sector is calculated in total imports.

For contemporary situation in Russian economy, the assessment of the resource potential with the aim of implementing import substitution policy must be performed for the sectors of agriculture and manufacturing.

3. We have developed system of indicators to define the elements of resource potential for selected industries (see Table 2).

To assess the resource potential for Agriculture, hunting and forestry, we offer to use the integrated indicator which is calculated according to the formula:

$$RPSag = \sqrt[4]{NRPag \times LPag \times MTPag \times EFPag.} \qquad (2)$$

To assess the resource potential for Manufacturing, we offer use the integrated indicator which is calculated according to the formula:

$$RPSm = \sqrt[3]{LPm \times MTPm \times EFPm.} \qquad (3)$$

4. This research allows us to develop organizational and managerial model of import substitution process, and to carry out forecasting of development trends, as well as measures aimed to improve the process efficiency.

We tested our methodology for RRP assessment on the example of Central Federal District's (CFD) regions for the period from 2005 to 2015. According to the analysis of resource potential complex index we have come to the conclusions: Moscow possessed the greatest resource potential during that period. The lowest level of RRP was observed in Ivanovo region (2006-2008, 2011-2015), Tambov region (2005, 2010) and Orel region (2009).

The cluster analysis of CFD regions was conducted for this study, and four clusters were identified. Two clusters consist of single region each: Moscow and Ivanovo region, respectively. The second cluster is composed of 5 regions, and the third cluster - of 11 regions. The analysis of agricultural and manufacturing resource potential was done for the regions of the second and third clusters. Belgorod region possessed the greatest resource potential in agriculture during that period. The lowest level of resource potential was observed in Kostroma, Smolensk and Tver regions. Kursk region took the second and the third places in agricultural sector from 2010 to 2015 among the regions.

During the period under review the lowest level of manufacturing resource potential was observed in Smolensk, Tambov and Tver regions. The manufacturing resource potential is also low in Kursk region. Its level decreased during the period under review. The extremely low values of labour potential, and material and technical potential in the manufacturing industry have the greatest impact on it.

To prove universal value of developed methodology we cross-tested data from Kursk region (Russian Federation) and from Swietokrzyskie voivodeship (Poland) (see Table 3).

Kursk region has a high level of natural resources potential. The region has a quite high volume of agricultural land, amounting to more than half of the region. Swietokrzyskie voivodeship is ahead of the Kursk region on the levels of labour, and material and technical potential. This is due to higher average salaries, economic profits, and value of fixed assets in the economy of Polish regions in comparison with Russian regions.

While comparing RRP of agricultural and manufacturing industry, the following issues were identified:

- Kursk region's agriculture has higher resource potential than agriculture in Swietokrzyskie voivodeship;
- Manufacturing industry in Swietokrzyskie voivodeship has higher recourse potential than the one in Kursk region.

According to the results of the comparative analysis of resource potential structural elements in Kursk region and Swietokrzyskie voivodeship, the recommendations for the

Tab. 1: **Indicators of integrated assessment of regional resource potential**

RRP elements	Relative indicators characterizing RRP elements
natural resources potential $$NRP = \sum_{i=1}^{n} \frac{NRP_n}{n}$$	NRP_1 - ratio of exploration works volume for essential mineral resources to population, (RUB/people) NRP_2 - area ratio of farmland to population, (ha/ people); NRP_3 - area ratio of forest to population (ha/ people); NRP_4 - area ratio of water surface to population (ha/ people); NRP_5 - area ratio of acreage to population (ha/ people.)
labour potential $$LP = \sum_{i=1}^{n} \frac{LP_n}{n}$$	LP_1 - occupational level (%); LP_2 - average monthly nominal wage per employee in the full range of organizations (RUB); LP_3 - index of labour productivity (%); LP_4 - ratio of profit to average annual number of employed in the economy (RUB/pers.)
material and technical potential $$MTP = \sum_{i=1}^{n} \frac{MTP_n}{n}$$	MTP_1 - ratio of introduced new assets' value to the average annual number of employed in the economy (RUB/ people); MTP_2 - ratio of fixed assets' value to the average annual number of employed in the economy (RUB/people); MTP_3 - proportion of completely worn-out fixed assets (%); MTP_4 - degree of fixed assets wear (%)
economic and financial potential $$EFP = \sum_{i=1}^{n} \frac{EFP_n}{n}$$	EFP_1 - ratio of net profit (loss) to enterprises and organizations number (thousand RUB/unit). EFP_2 - main capital investment per capita (RUB); EFP_3 - profitability of sold goods, products, works, services (%); EFP_4 - GRP per capita (RUB); EFP_5 - consolidated budget incomes per capita (million RUB)
information and innovation potential $$IIP = \sum_{i=1}^{n} \frac{IIP_n}{n}$$	IIP_1 - number of personal computers per 100 employees (pieces); IIP_2 - ratio of information and communication technology cost value to gross regional product (%); IIP_3 - used advanced manufacturing technology (units); IIP_4 - ratio of staff involved in scientific and development research to employees number in economy (%); IIP_5 - innovation activity of organizations (%); IIP_6 - share of expenditures on technological innovations in total volume of shipped goods, performed works and services (%); IIP_7 - share of innovative goods, works, services in total volume of shipped goods, performed works, services (%)

Source: Elaborated by the authors

Tab. 2: **Indicators of assessment of the resource potential for the sectors of economy and of the efficiency of its use**

Kind of resource potential	Indicators for resources	Indicators of resources potential efficiency
	Agriculture, hunting and forestry	
RRPag	$RRPag_1$ - ratio of agricultural land to total land area (%.); $RRPag_2$ - ratio of acreage to total land area (%)	$RRPag_3$ - crop yields (cereals and vegetables) (dt/ha); $RRPag_4$ - ratio of commodity products to agricultural land areas (RUB/ha); $RRPag_5$ - ratio of revenues to agricultural land areas (RUB/ha); $RRPag_6$ - ratio of profit from sales to agricultural land areas (RUB/ha)
LPag	$LPag_1$ - average monthly nominal wage per employee in the industry(RUB); $LPag_2$ - ratio of average annual number of employees in the industry to total average number of employees in the region (%)	$LPag_3$ - ratio of commodity production to average annual number of employed in agriculture (RUB/people); $LPag_4$ - ratio of revenues to average annual number of employed in agriculture (RUB/people); $LPag_5$ - ratio of profit to average annual number of employed in agriculture (RUB/people)
MTPag	$MTPag_1$ - ratio of fixed assets value in agriculture to total value of fixed assets (%); $MTPag_2$ - degree of fixed assets wear (%); $MTPag_3$ - proportion of completely worn-out fixed assets (%); $MTPag_4$ - number of tractors per 1000 hectares of arable land (pcs); $MTPag_5$ - updating technique coefficient (%)	$MTPag_6$ - ratio of revenues from goods sales, products, works, services in agriculture to the fixed assets value
EFPag	$EFPag_1$ - ratio of fixed capital investment to fixed assets cost (%); $EFPag_2$ - share of profitable organizations (%)	$EFPag_3$ - profitability of sold goods, products, works, services (%); $EFPag_4$ - return on assets (%)
	Manufacturing	
LPm	LPm_1 - average monthly nominal wage per employee in the industry (RUB); LPm_2 - ratio of average annual number of employees in the industry to total average number of employees in the region (%)	LPm_3 - ratio of shipped goods volume of own production, works, services to average annual number of employed in the industry (mln RUB/thsd people)
MTPm	$MTPm_1$ - ratio of fixed assets value in the industry to total value of fixed assets (%); $MTPm_2$ - degree of fixed assets wear (%); $MTPm_3$ - proportion of completely worn-out fixed assets (%)	$MTPag_4$ - ratio of revenues from goods sales, products, works, services in the industry to the fixed assets value
EFPm	$EFPm_1$ - ratio of fixed capital investment to fixed assets cost (%); $EFPm_2$ - share of profitable organizations (%)	$EFPm_3$ - profitability of sold goods, products, works, services (%); $EFPm_4$ - return on assets (%)

Source: Elaborated by the authors

Tab. 3: **RRP research for Kursk region and Swietokrzyskie voivodeship, 2015**

RRP elements	Kursk region	Swietokrzyskie voivodeship
natural resources potential	0.47	0.35
labour potential	0.36	0.39
material and technical potential	0.35	0.38

Source: Calculated by the authors

Russian region were given concerning the need to update the material-technical base of enterprises, to improve the financial basis, the quality and quantity of labour resources, and to expand production. For the development and implementation of measures on efficiency increase for Kursk region in import substitution industries it is necessary to build efficient management system of import substitution based on resource potential analysis of these industries.

As a result of applied research with elaborated methodology, the priority import substitution industries were identified, their strengths and weaknesses defined, and measures were developed to improve the competitiveness of import substituting products, to increase production volumes, and to improve control over import substitution at the regional level.

5. Conclusions

The methodology of resource potential assessment for import substitution has several advantages:
1) Versatility. This technique can be used for resource potential assessment at national, regional, and local levels.
2) Objectivity. The indicators used for the analysis are selected from the official statistical data.
3) Complexity. Calculations of complex resource potential indicator and indicator of sector resource potential were carried out on the basis of assessment of resource potential structural elements, which allows us to characterize the resource potential of object, to identify the defining factors, and to consider both comparative advantages and disadvantages.

We suppose that this methodology of resource potential assessment can be used to assess the potential for import substitution, to identify priority directions of regional economic development, to identify weaknesses in particular industry, and to form the effective system of process control over import substitution with regard to the regional resource potential.

References

1. Aspromourgos, T. (1988). The life of William Petty in relation to his economics. *History of Political Economy, 20*(3), 337-356. doi: https://doi.org/10.1215/00182702-20-3-337
2. Bauer, W. (1972). Import Substitution and Industrialization in Latin America: Experiences and Interpretations. *Latin American Research Review, 7*(1), 95-122. Retrieved from http://www.jstor.org/stable/2502457
3. Bruton, J. (1996). Import Substitution. In H. Chenery and T. N. Srivivasan (Eds.), *Handbook of Development Economics, Vol. 2.* New York: Elsevier.
4. Central Statistical Office of Poland (2016). *Official web-site.* Retrieved from http://stat.gov.pl/en
5. The Corporation for Enterprise Development (2016). *Development Report Card for the States.* Retrieved from http://cfed.org/knowledge_center/research/DRC
6. Eatwell, J. (1987). Import substitution and export-led growth. In J. Eatwell, M. Milgate, & P. Newman (Eds.), *The New Palgrave: a dictionary of economics.* London: Macmillan. doi: https://doi.org/10.1057/9780230226203.2767
7. European Commission (2013). *EU Regional Competitiveness Index RCI 2013.* Luxembourg: Publications Office of the European Union. Retrieved from http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/6th_report/rci_2013_report_final.pdf
8. Halvorsen, R., & Layton, D. (Eds.). (2006). *Explorations in environmental and natural resource economics: essays in honour of Gardner M. Brown, Jr.* Cheltenham: Edward Elgar Publishing Limited.
9. Grafton, R. Q., Adamowicz, W., & Dupont, D. (2004). *The economics of the environment and natural resources.* Bodmin: Blackwell Publishing Ltd.
10. Hussen, A. M. (2004). *Principles of environmental economics: Economics, ecology and public policy.* New York & London: Routledge. Taylor & Francis.
11. Jacobs, J. (1970). *The Economy of Cities. Cultural heritage.* New York: Random House.
12. KPMG (2015). *Australian Regional Capacity index.* Retrieved from http://www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/Documents/australian-regional-capacity-index.pdf
13. LEADER Observatory (1999). *Territorial Competitiveness: Creating a Territorial Development Strategy in the Light of the Leader Experience.* Brussels: LEADER Observatory.
14. Memorial University of Newfoundland (2016). *Regional Economic Capacity Index.* Retrieved from http://reci.ucs.mun.ca/about.php
15. Sachs, J. D. (1985). External Debt and Macroeconomic Performance in Latin America and East Asia. *Brookings Papers on Economic Activity, 2,* 523-573. Retrieved from http://www.earth.columbia.edu/sitefiles/file/about/director/pubs/BPEA1985_2.pdf
16. Animitsa, E. G., Animitsa, E. A., & Glumov, A. A. (2015). Import Substitution in the regional industrial production: conceptual-theoretical and applied aspects of the region. *Ekonomika Regiona (The Economy of Region), 3,* 160-172 (in Russ.).
17. Bronstein, M. L. (1968). *Natural economic differences and the stimulation of farm production.* Moscow: Economics (in Russ.).
18. Gofman, K. G. (1977). *Economic valuation of natural resources in socialist economy: theory and methodology.* Moscow: Nauka (in Russ.).
19. Illarionova, E. A. (2015). *Economic potential of region: content, assessment, prerequisites of sustainable development.* (Doctoral dissertation). Kursk. (in Russ.).
20. Karnaukhova, E. S. (1977). *Differential rent and economic evaluation of land.* Moscow: Economics (in Russ.).
21. Klotsvog, F. N., & Kushnikova, I. A. (1998). Macroeconomic assessment of the resource potential of the Russian regions. *Problemy prognozirovaniya (Problems of Forecasting), 2,* 31-35 (in Russ.).
22. Lyavina, M. Yu., & Sukhanova, I. F. (2014). Import substitution as a factor of regional economic growth. *Vestnik Volgogradskogo gosudarstvennogo universiteta (Bulletin of Volgograd State University), 28*(5), 26-36 (in Russ.).
23. Mun, T. (1967). *England's treasure by foreign trade.* Oxford: Basil Blackwell.
24. Mezentseva, E. V. (2016). Import substitution as a factor in the development of regional industrial potential. *Izvestia Yugovostochnogo gosudarstvennogo universiteta (Annals of Southwest State University), 66*(3), 102-111 (in Russ.).
25. Merzlikina, G. S., & Pshenichnikov, I. V. (2015). Formation of the potential of regional industrial import substitution in the conditions of crisis. *Izvestia VolSTU (Annals of Volgograd State Technical University), 179*(15), 80-84 (in Russ.).
26. *Russian Federation Federal State Statistics Service* (2016). Official website. Retrieved from http://www.gks.ru
27. Prokopenko, O. V., Kysly, V. N., & Shevchenko, H. N. (2014). Peculiarities of the natural resources economic estimation under the transformation conditions. *Economic Annals-XXI, 7-8,* 40-43. Retrieved from http://soskin.info/en/ea/2014/7-8/contents_10.html
28. Semykin, V. A., Safronov, V. V., & Terekhov, V. P. (2014). Import substitution as an effective tool for optimal development of market economy. *Vestnik Kurskoy agrarnoy akademii (Bulletin of Kursk State Agricultural Academy), 7,* 2-7 (in Russ.).
29. Smirnov, M. A., & Dudko, V. N. (2016). Innovative-investment aspect of import substitution in Russia. *Economic Annals-XXI, 3-4,* 44-46. doi: https://doi.org/10.21003/ea.V157-0013
30. Strumilin, S. G. (1963). *Selected works. Vol. 1: Statistics and Economics.* Moscow: Nauka (in Russ.).
31. Ushakova, O. A. (2015). Strategic planning of regional import substitution. *Vestnik Orenburzhskogo gosudarstvennogo universiteta (Bulletin of Orenburg State University), 183* (8), 148-150 (in Russ.).
32. Chizhevskaya, E. L. (2003). *Study of conditions for the comprehensive development of economic potential of territory.* (Doctoral dissertation). Tyumen (in Russ.).
33. Chukanov, K. V. (2015). *Realization of import substitution potential of regional economy.* (Doctoral dissertation). Tambov (in Russ.).
34. Shahbazov, P. Z. (2013). *Assessment of regional economic potential and factors of its efficiency.* (Doctoral dissertation). Kislovodsk (in Russ.).
35. Balatskiy, O. F. (Ed.). (2006). *The economic potential of administrative and production systems.* Sumy: University book (in Russ.).
36. Yakushkina, T. A. (2012). Role of resource potential estimation in the region development. *Vestnik Bryanskogo gosudarstvennogo universiteta Bulletin (of Bryansk State University), 3,* 308-311 (in Russ.).