Comparative Estimate of the Resource Dependence of the Far Eastern Federal District Entities

G S Kovrov\textsuperscript{1}, V V Nikiforova\textsuperscript{1}, H E Egorov\textsuperscript{1}

\textsuperscript{1}North-Eastern Federal University named after M.K. Ammosova, Yakutsk, Russia

E-mail: kgs02@yandex.ru, nikvalentina2010@yandex.ru, ene01@yandex.ru

Abstract. The paper is devoted to studying the issues of estimating the resource dependence of the RF constituent entities and classifying them as resource-type regions. The methodological and technical approaches to determining and identifying the resource-type regions and estimating their resource dependence have been reviewed. The approach and technique for estimating the resource dependence of regions have been proposed, based on the analysis of which, a criterion for classifying a subject as resource-type regions identified. The state of the mineral resource base of the Russian Federation Far Eastern Federal District (FEFD) entities has been analyzed. According to the technique proposed, the resource dependence of the FEFD entities has been comparatively estimated based on the share of statistical indicators for the mining economic activity in the structure of the gross regional product (GRP) of an entity. Based on the analysis of the results obtained, the criteria for classifying entities as resource-type regions have been determined, according to which the FEFD entities classified.

1. Introduction

In today’s Russian economy, resource-type regions occupy a special place since the extractive industries are the main engine in the strategic and sustainable development of both the country and the regions. In this regard, despite along with the fishing industry, the Far Eastern Federal District economy is generally focused on the export of extractive industry products, it should be noted that certain federal district entities have very low mineral and fuel and energy potentials. In this regard, studying the issues of the regional economy dependence on raw materials extracted, including estimating the resource dependence to classify regions is a very urgent scientific and practical problem.

The research objective is to determine quantitative criteria for classifying the FEFD entities as resource-type regions and identifying those with different resource dependence degrees.

2. Methodology

The analysis of foreign [1-3] and local [4-11] literature sources on the methodological and technical aspects of determining and identifying resource-type regions has shown that resource-type regions are understood as those characterized by not only high resource abundance but also certain resource dependence degree.

Currently, two approaches are mainly used to identify resource-type regions, i.e. resource abundance and resource dependence. [11]
Based on the analysis of the above-described studies on this subject, the authors propose the below approach and algorithm for classifying resource-type regions. At the first stage, the resource abundance is determined for the selected entities by the formulas:

resource abundance per year \( (\text{Ir}_a) \):

\[
\text{Ir}_a = \frac{Z}{V},
\]

where: \( Z \) is approved balance mineral reserves; \( V \) is the annual volume of mining.

resource abundance per capita \( (\text{Ir}_p) \):

\[
\text{Ir}_p = \frac{Z}{P},
\]

where: \( P \) is the entity population, people.

Based on the analysis of the calculation results, the potential resource abundance of the entity per year and capita can be identified.

The entity’s resource dependence indicator is defined as the ratio of the mineral production volume to the gross regional product (GRP):

\[
\text{Ir}_d = \frac{\text{Vmp}}{\text{Vrp}},
\]

where:

- \( \text{Vmp} \) is the annual mineral production (the volume of the own-produced goods shipped, as well as work and services provided using own resources by the Mineral Production line of business (LOB)), RUB mln.
- \( \text{Vrp} \) is the entity’s gross regional product, RUB mln.

To identify the criteria for classifying entities as resource-type regions, we consider it sufficient to estimate the resource dependence without considering the income from the export sale of the resource.

3. Results

Mineral resources are of great importance in the economic development of the Far Eastern regions. Income received from the extraction and export of minerals and their processing products provides a significant part of budget revenues. The main budget-forming industries are diamond, gold, oil and gas, and coal production ones. According to the Far Eastern Customs Administration, the share of fuel and energy resources in the export structure is over 40% \[12\]. As of the end of 2019, a high proportion of the country’s diamonds (89%) and gold (50%) have been mined in the FEFD (Table 1).

| Item No. | FEFD Entities                        | Gold, t | Coal, mln. t | Gas, billion m³ | Oil, mln. t | Diamonds, mln. carats |
|---------|-------------------------------------|---------|--------------|-----------------|-------------|-----------------------|
| 1       | Magadan Region                      | 46.36   |              |                 |             |                       |
| 2       | Republic of Sakha (Yakutia)         | 36.5    | 17.3         | 2.9             | 14.1        | 34.3                  |
| 3       | Amur Region                         | 26.28   |              |                 |             |                       |
| 4       | Khabarovsk Territory                | 25.2    |              |                 |             |                       |
| 5       | Republic of Buryatia                | 5.56    | 7.2          |                 |             |                       |
| 6       | Kamchatka Territory                 | 5.75    | 0.09         |                 |             |                       |
| 7       | Chukotka Autonomous Region          | 24.5    |              |                 |             |                       |
| 8       | Trans-Baikal Territory              | 16.1    | 20.2         |                 |             |                       |
| 9       | Sakhalin Region                     |         |              |                 |             |                       |
| 10      | Jewish Autonomous Region            |         |              |                 |             |                       |
| 11      | Primorsky Territory                 |         |              |                 |             |                       |
|        | FEFD                                | 186.25  | 52.9         | 34.59           | 33.9        | 34.3                  |
|        | RF                                  | 367.95  | 439.2        | 738             | 560.26      | 38.5                  |
|        | Share of the FEFD in the RF         | 0.51    | 0.12         | 0.05            | 0.06        | 0.89                  |

Sources: [13, 14]
Among the FEFD regions, by the Mineral Production line of business (LOB), the Sakhalin Region and the Republic of Sakha (Yakutia) stand out: after launching the Sakhalin-1 and Sakhalin-2 offshore projects, this LOB indicator for Sakhalin is more than 60 % of the District’s GRP, for the Republic of Sakha (Yakutia) and Chukotka it is more than 40 and 30 %, and for the Magadan and Amur Regions, the Jewish Autonomous Region, and the Khabarovsky Territory it is about 17.5, 17, 13.5, and 6 %, respectively [15]. In the Primorsky Territory, in the past few years, the mining industry has lost its position (less than 3 %) for several reasons: the deposits that have been operated for many years are worked out, which requires developing new production sites and retrofitting the existing ones. Besides, an unfavorable price situation has arisen on the world market [16].

Along with the above-mentioned minerals, the mineral base of the Far Eastern region is represented by tin, antimony, iron ores, zinc, lead, uranium, silver, tungsten, etc. Figure 1 shows the FEFD resource abundance per year and 1,000 people (Fig. 1).

![Figure 1. The FEFD Resource Abundance.](image)

There is a long-term diamond, antimony, and silver resource abundance and relatively short-term gold, oil, gas, and coal one, which can be explained for gold, by the depletion of reserves due to many years of operating deposits (on the territory of Yakutia, the first mines appeared in 1923, and commercial production began in the 1960s) and for the hydrocarbon resources, by a high level of consumption associated mainly with the development of commercial development of reserves. Diamonds show a high resource abundance per 1,000 people.

In general, we may conclude that the district has a high resource abundance.

To estimate the resource dependence, the authors have considered 11 FEFD entities. According to Rosstat [15], the Mineral Production LOB share in the structure of the gross value added of the FEFD entities has been estimated for 2019 using the above technique. According to the calculation results, based on the average share of the FEFD (0.65) and the RF (0.27) Mineral Production LOB in GRP, the below criteria for classifying entities as resource-type regions have been determined and the rating of the FEFD regions by the resource dependence has been drawn up (Fig. 2):
- independent (-) – within [0; 0.27],
- moderately dependent (+) – within [0.27; 0.65],
- highly dependent (++) – over 0.65.
4. Conclusions

A comparative analysis of the estimation results (Fig. 1) considering the criteria defined above has shown that among the FEFD entities:

- five entities have a high resource dependence, i.e. Sakhalin Region, Republic of Sakha (Yakutia), Magadan Region, Chukotka Autonomous Region, and the Trans-Baikal Territory,
- independent regions are the Republic of Buryatia and the Khabarovsk, Kamchatka, and Primorsky Territories.

The results obtained during the study have shown that in general, by the extractive industry resources, the FEFD can be attributed to a moderately dependent resource-type region. In other constituent entities of the District, e.g., the Kamchatka and Primorsky Territories, the economy is based on the export of fish and sea products.

Thus, the approach and technique for estimating the resource dependence proposed by the authors to classify the resource-type regions may be considered adequate and recommended for identifying and attributing entities to resource-type regions.
5. References

[1] Brunnschweiler C N & Bulte E H 2008 The resource curse revisited and revised: A tale of paradoxes and red herrings *Journal of Environmental Economics and Management* **55**(3) 248–264 (https://doi.org/10.1016/j.jeem.2007.08.004)

[2] Sachs J D & Warner A M 1999 The Big Rush, Natural Resource Booms And Growth *Journal of Development Economics* **59**(1) 43–76

[3] Papyrakis E & Gerlagh R 2004 The resource curse hypothesis and its transmission channels *Journal of Comparative Economics* **32**(1) 181–193

[4] Balatsky E V, Gusev A B, Yurevich M A 2015 Resource dependence of Russia: imaginary and real threats *Society and Economy* **10** pp 5–29

[5] Belousova S V 2015 Resource regions: economic opportunities and financial justice *ECO* **6** pp 40–48

[6] Efremov E I, Kovrov G S, Nikiforova V V, Konstantinov N N and Kurneva M V 2016 Assessment of the Potential of Clusterization of Fuel and Energy Complex of the Sakha Republic (Yakutia) *Indian Journal of Science and Technology* Vol 9 (22) DOI: 10.17485 / ijest / 2016 / v9i22 / 95543, June 2016. www. indjst.org ISSN (Print): 0974-6846 ISSN (Online): 0974-5645

[7] Kurbatova M V, Levin S N, Kagan E S, Kislitsyn D V 2019 Resource-type regions in Russia: definition and classification *Terra economicus* **17**(3) pp 89-106 URL: file:///C:/Users/User/Downloads/sistema-resursnogo-obespecheniya-natsionaln-h-ekonomik-strategiya-formirovaniya.pdf

[8] Kushnir L L The system of resource provision of national economies: the strategy of formation *Terra Humana* pp 116-120 URL: file:///C:/Users/User/Downloads/sistema-resursnogo-obespecheniya-natsionaln-h-ekonomik-strategiya-formirovaniya.pdf

[9] Levin S N, Kagan E S & Sabin K S 2015 Regions of the "resource type" in the modern Russian economy *Journal of Institutional Studies* **7**(3) pp 92-101

[10] Nefyodkin V I 2015 The budgetary curse" of resource regions *ECO* **6** pp 5-24

[11] Resource regions of Russia in the "new reality" ed. acad. V V Kuleshova (Novosibirsk: Publishing house of IEOPP SB RAS) 308 p

[12] Far Eastern Customs Administration [web site] URL: http://dvtu.customs.ru/statistic/2019-god/itog16ovaya-informacziya/document/230465

[13] Regions of Russia Main characteristics of the constituent entities of the Russian Federation 2019 Federal State Statistics Service URL: https://gks.ru/bgd/regl/b19_14s/Main.htm

[14] Analytical bulletin Overview: the socio-economic situation of the regions of the Russian Federation in 2019 Issue number 37 Results of 2019 URL: www.riaring.ru

[15] Gross regional product by constituent entities of the Russian Federation in 1998-2018 URL: https://mrd.gks.ru/folder/27963

[16] Far Eastern currency URL: https://dv.land/economics/dalnevostochnaya-valyuta

[17] Information note on the state of the mineral resource base of solid minerals Far East 2019 URL: https://docviewer.yandex.ru/view/47007010

[18] State report "On the state and use of mineral resources of the Russian Federation in 2018" (Moscow) 2019 426 p URL: http://www.mnr.gov.ru/docs/gosudarstvennye_doklady/

[19] PJSC Severalmaz [web site] URL: http://www.severalmaz.ru

[20] PJSC ALROSA [web site] URL: http://www.alrosa.ru/

Acknowledgments
The paper includes materials prepared as part of the implementation of the state assignment of the Ministry of Education and Science of Russia under the project FSRG-2020-0010 Patterns of Spatial Arrangement and Development of Socio-Economic Systems of the Northern Resource-Type Region.