

# Specialization of Resource Regions: a Mechanism for Applying Public-Private Partnerships

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**Abstract**— The research specifies the terminology and suggests an algorithm for identification of resource regions, as well as regions ready for smart specialization using cluster analysis. A distinctive feature of the algorithm is the complexity of the use of the justified and systematized groups of factors and indicators, including macroeconomic, infrastructural, innovative and resource ones. Taking into account the proposed algorithm, the authors' classification of resource regions as well as regions prepared for smart specialization is presented, based on a consistent and complete division of regions into the groups proposed in the work. It was shown that the resource regions, depending on the degree of readiness for smart specialization, have a different level of PPP development. It is determined in the dynamics that the resource regions with higher readiness for smart specialization have a higher level of PPP development. While in resource regions unprepared for integrated development, as well as in enclave regions (regions with economic and infrastructure isolation from macro-regional and all-Russian ties), it is necessary to develop PPP mechanisms with the subsequent increase of the economic, infrastructural, innovative, personnel and qualification levels. This will allow for the organization of integrated exploitation with the involvement of the necessary volume of private investments for sustainable development in the long term.

**Keywords**— *resource regions, public-private partnerships, Russia, smart specializations.*

## 1. INTRODUCTION

Foreign researchers study resource regions in perspective of the national economies. One of the first works on the problems of the development of resource regions was carried out by R. Auty in 1970-1980 [1-2]. J. Sachs and A. Warner [3-5] drew attention to the fact of slower development of rich resource countries in their works. At the same time, a large number of concepts referring to this phenomenon appeared in academic literature: "resource curse", "Dutch disease", "oil curse", "enclave type of development", etc. [6-7]. All these works reflected the negative impact of the resource orientation on the economies of transition countries, rich in natural resources in three areas: technological, macroeconomic and institutional. At that time, a model of the "enclave dual economy" [8] appeared, which described the differences in the development of resource economies compared to the successful countries of Southeast Asia.

Regions of Russia, which can be attributed to the resource type on the basis of the presence of natural resources, were identified on the basis of a wide range of criteria. Thus, V.P. Orlov [9] under the resource region understands the region "in which more than 50% of the shipped products are represented by minerals."

As a key criterion for the allocation of resource regions of Russia, the share of gross added value from mining in the structure of the gross regional product is used [10-11]. Another criterion for classifying the region as resource one is the specialization on the resource production more than 50% in the structure of industrial production.

The problems of searching for an integrated model for the development of resource oil and gas countries and regions on the basis of the formation of organizational and economic mechanisms using PPP are only indicated in the literature.

The relevance of this research consists in the insufficient study of the specific features of each region of the country. Regions of Russia are differentiated economically, which significantly affects their development. The natural resources of the regions are the foundation for the development of the entire country. Currently, the active task is to prepare the regions for the practice of PPP with the subsequent increase of their economic, infrastructural, innovative, personnel and qualification level. This will allow for the organization of integrated exploitation with the involvement of the necessary volume of private investments for sustainable development in the long term.

The paper aims to identify the resource regions in Russia and to assess the readiness of resource regions for use of the practice of public-private partnership (PPP).

To achieve this goal, the following tasks were formulated:

- (1) to analyze resource regions: definition of resource regions, criteria, the value of these regions for the country as a whole,
- (2) to distribute the resource regions of Russia in clusters, depending on the degree of readiness for smart specialization in 2014-2016 years,
- (3) to determine the relationship between the degree of readiness of resource regions for smart specialization and PPP,
- (4) to research the directions and approaches for using PPP in Russia.

## 2. COMPARATIVE ANALYSIS OF RESOURCE REGIONS PREPARED FOR SMART SPECIALIZATION AND IMPLEMENTATION OF PPP BASED PROJECTS

### 2.1 CLUSTER ANALYSIS FOR DETERMINING RESOURCE REGIONS

The operation preceding the cluster analysis is the standardization of variables. The standardization process in this paper was carried out according to the formula:

$$z_{ik} = \frac{x_{ik} - \min(x_{ik})}{\max(x_{ik}) - \min(x_{ik})} \quad (1)$$

Where – value of characteristic k for the object i.

The study uses a hierarchical agglomerative method of cluster analysis. Clustering was performed by Ward's method with Euclidean metric (formula 2) [12]:

$$d(Z_i, Z_j) = \sqrt{\sum_{k=1}^n (z_{ik} - z_{jk})^2} \quad (2)$$

In the work, the cluster analysis was carried out using a specialized statistical data processing package Stata 13.

### 2.2 CLUSTER ANALYSIS FOR DETERMINING REGIONS READY FOR SMART SPECIALIZATION

At the second stage of the research, the resource regions are clustered according to the degree of readiness for smart specialization based on the dynamics of 14 indicators in 2015-2016 [13-16].

### 2.3 RANKING OF REGIONS OF RUSSIA ACCORDING TO THE LEVEL OF DEVELOPMENT OF PUBLIC-PRIVATE PARTNERSHIP

The ranking of regions by the level of PPP development is calculated in accordance with the methodology approved by the Ministry of Economic Development of Russia [17]. The value of the indicator "The level of development of the sphere of public-private partnership in the region of the Russian Federation" is determined on the basis of values assessment of its constituent factors: the development of the institutional environment; normative and legal support of the sphere of public-private partnerships; experience in implementing public-private partnership projects.

Based on the ranking of the level of PPP development in the regions of Russia, an analysis of the transition of each resource region to different group according to the level of PPP development and the degree of readiness for smart specialization is carried out in the dynamics (2015-2016).

## 3. DATA

The information base for the compilation of statistical information were the sources of the Federal State Statistics Service, the Federal Tax Service, the State Balance of Russia, the Ministry of Energy of the Russian Federation [18-20].

Taking into account the literature review, five factors were considered for all territories of the Russian Federation in 2016 to identify the resource regions: the share of the mining industry in the GRP structure, the share of the mineral extraction tax in the tax structure, current oil production, current gas production, current coal production.

To identify the readiness for smart specialization of resource regions, 9 indicators were analyzed for three years

(2014-2016): population density, the share of added value of processing industries in the GRP structure, GRP per capita, investment per capita, road density, per capita monetary incomes per month, the share of employment in the extractive industry in the region's total employment, the share of innovative goods, works and services in GRP, the ratio of the added value of the extractive industry to the processing industry in GRP.

## 4. EMPIRICAL RESULTS AND DISCUSSION

Based on the cluster analysis carried out for 85 regions of the Russian Federation on the data of 2016, 20 regions were attributed to the resource hydrocarbon ones.

Further, all these regions were divided into clusters according to the degree of readiness for smart specialization with the aim of further connection with the change in the level of development of PPP. Three clusters were identified at a distance of  $d = 30$ .

The first cluster represents resource regions ready for smart specialization. The cluster is characterized by a high level of the added value of the processing industry in the GRP structure, a high share of innovative goods, works and services, developed infrastructure, high population density. In 2015, only two regions were attributed to the cluster: the Republic of Tatarstan and the Samara Region. In 2016, 5 were included in this cluster with addition of Udmurt Republic, Perm Territory, Tyumen region. The changes are related to the growth of the share of innovative goods in these three regions and the growth of investments (Table 1). This cluster is also characterized by a high ranking in PPP development (qualitative level of development of the institutional environment, investment attractiveness, extensive practice of implementing PPP projects). A distinctive feature of this group is the existing conditions for the implementation of PPP projects, understandable to both local and external investors.

The second cluster consists of resource regions that are not ready for complex development. The cluster consisted of 11 regions in 2015, and in 2016 3 regions moved to the first cluster. The regions of this cluster are characterized by a high population with incomes below the subsistence minimum, a low volume of innovative goods and services.

The third cluster represents resource enclave regions. The cluster contains 7 regions of the Russian Federation, which have low population density, high amount of investment in fixed assets in extractive industries, high per capita monetary income, but undeveloped processing and transport infrastructure.

Based on the conducted studies, the relationship between the rating of the level of PPP development in the regions and the degree of readiness for smart specialization was revealed. Three regions moved from the second cluster (regions not ready for smart specialization) to the first cluster (ready for smart specialization) after one year. Moreover, these regions (Udmurt Republic, Perm Territory, Tyumen region) improved their place in the ranking of PPP development, which indicates the development of PPP mechanisms in these regions. The investment attractiveness of these regions grows and, accordingly, the level of economic, infrastructural, innovative development increases in the regions.

**Table 1. Cauterization of resource regions according to readiness for complex development in 2015-2016**

Region	2015	Region	2016	
1. Republic of Tatarstan	Cluster 1 – Regions ready for smart specialization	1. Republic of Tatarstan	Cluster 1 – Regions ready for smart specialization	
1. Samara region		1. Udmurt Republic		
2. Republic of Komi		1. Perm Territory		
2. Arkhangelsk region		1. Samara region		
2. Astrakhan Region		1. Tyumen region		
2. Udmurt Republic		2. Republic of Komi		
2. Perm Territory		2. Arkhangelsk region		
2. Orenburg region		2. Astrakhan Region		Cluster 2 - Regions not ready for smart specialization
2. Tyumen region		2. Orenburg region		
2. Krasnoyarsk Territory		2. Krasnoyarsk Territory		
2. Irkutsk region	2. Irkutsk region			
2. Kemerovo Region	2. Kemerovo Region			
2. Tomsk Region	2. Tomsk Region			
3. Nenets AD	Cluster 3 – Resource enclave regions	3. Nenets AD	Cluster 3 – Resource enclave regions	
3. Khanty-Mansi AD -Yugra		3. Khanty-Mansi AD -Yugra		
3. Yamalo-Nenets AD		3. Yamalo-Nenets AD		
3. Republic of Sakha (Yakutia)		3. Republic of Sakha (Yakutia)		
3. Magadan region		3. Magadan region		
3. Sakhalin region		3. Sakhalin region		
3. Chukotka AD		3. Chukotka AD		

Enclave regions represent territories of the Russian Federation with low level of PPP development except for the Khanty-Mansi AD, where the legislative mechanisms of public-private partnership are integrated into the system of investment legislation.

### 5. CONCLUSION

The paper shows that at present time the regional authorities are actively preparing resource regions that are ready for smart specialization, for the practice of public-private partnership. This will allow for increase of their economic, infrastructural, innovative, personnel and qualification levels to make it possible to organize their integrated development with attracting the necessary amount of private investment for sustainable development in the long term.

At the same time enclave regions are still unattractive for investment policy, due to weak development of public-private partnership mechanisms. In these conditions, it is necessary to implement comprehensive practical-oriented training programs for specialists from executive and local government bodies; to introduce a systematic approach to the management of PPP projects in the regions; to carry out further effective organizational, information, legal and methodological support for the implementation of the private concession initiative mechanism; to enhance authorities in terms of methodological and organizational assistance to PPP projects in the regions.

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