

# Is Cluster Integration Of Distant Regions With Certain Resource Capacity Possible?

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**Abstract:** Coastal regions are territories with a special regime for economic development. At the same time, the development level of the social sphere depends entirely on the territorial location of the region. The dependence between the technological development of the region, its institutions and the financial and economic environment exerts a crucial influence on the formation of the social and labour framework as a regional stabilizing platform for changing or introducing a new technological innovation. The article describes conditions for the integration of coastal regions in the form of a cluster considering sectoral specialization and socio-economic development capacity of territories.

**Index Terms:** Coastal regions, cluster, interregional industrial imbalances, regional problems

## 1. INTRODUCTION

The coastline regions in Russia are in the focus of particular attention on the part of the State authorities as strategically important territories from the external security point of view as well as resource-intensive areas with a high economic capacity. Though the inclusion of coastal regions into socio-economic development projects and granting special economic status to the territories as well as the implementation of cluster policies in these regions do not always enable achieving positive integrated results and triggering long-term social and economic effects [1],[2],[9]. International experience shows many examples of sustainable development of individual industrial sites based on cluster formations for territories with specific types of geographical location (fishing-industry cluster in Dalian (the People's Republic of China), protected environmental zones) [3],[10],[11]. In our opinion, the cluster approach is the most promising for resource-excessive coastal territories enabling shifting all elements of the regional socio-economic system from post-industrial to the innovative information paradigm. The effectiveness of cluster policy is appropriate to consider depending on the impact of synergy from the implemented activities [4]. Clusters based on coastal regions are prone to conflict of interests due to the pronounced dualism of effort areas. Activating primarily economic instruments for growth entails the following ways of development in the social sphere:

- 1) "locomotive" type: economic growth also stimulates the rise and improvement of social living and working conditions with funding based, however, on the principle of necessary and sufficient level;
- 2) parallel-type: the simultaneous and synchronous growth of the economy and social sphere; long-term and permanent financial support from the State and business (as part of socially responsible policies) without reference to social programs.

3) delayed-type: stimulating the regional economy does not constitute grounds for financing and developing the social sphere, the low investment in social infrastructure causes the decline and significant backwardness of the territory as well as deteriorating living conditions of the population [5],[6],[7],[8]. Coastal areas of the Far East are of particular interest in terms of cluster policy implementation. These territories are a set of depressed regional economic facilities with a wide range of social and economic issues caused by specific natural and climatic position, a considerable distance from the federal centre as well as the interregional fragmentation (both in terms of sectoral specialization and remoteness from each other).

## 2 BACKGROUND

### 2.1 Review Stage

Since 2014, the government bodies of the Russian Federation and the Far East have been discussing the possibility of forming a fishing-industry cluster within the regional area capable to address socio-economic issues related to strategic territories: resolving food problems connected with the saturation of the domestic market with fish products; modernizing the obsolete fishing-industry complex in the Far East (operating on facilities of the fish-product complex established during the Soviet period); reducing unemployment among the native population and initiate improving the quality of life of the local continuum; lowering migration losses to maintain control over territory with a critically low population density (1.2 persons per square kilometer). The ambitious project is a proposal for clustering the fishing-industry objects in the Far Eastern regions that have a total coastline 17,700 sq. km in length. During the period 2014 - 2019, several options for cluster integration were discussed at regional industrial forums proposing different integration scenarios (single megacluster, divisional clusters, region-based local cluster). However, none of them was approved or taken into implementation. This research is a part of an extensive work to answer the question: "Is it economically possible and advisable to form a cluster in the industry of fragmented territorial units into a single production array considering the unprofitability of industrial enterprises and low level of their investment attractiveness?"

## 3 DATA AND DESCRIPTIVES

We used the official statistics presented in Rosstat reports covering the period 2004-2018 for 6 regions of the Far Eastern Federal District. The data contains information on the fishing

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industry share in the gross regional product of the territories in value terms and the fixed capital investments of the analyzed industry. We standardize the data at the regional level for their subsequent clustering. Table 1 includes descriptive statistics on the production volumes of the fishing-industry cluster and the investment values by FEFD regions. Figure 1 presents primary information on the development of the gross output of the FEFD fishing-industry complex in value terms. The increase in the production value is evident in most parts of the Far East. The production is carried out by the organizations that are the successors of the Soviet fishing-industry model. This fact implies the possible obsolescence of technological processes, capital funds both at the extraction stage and at the primary and post-processing stage.

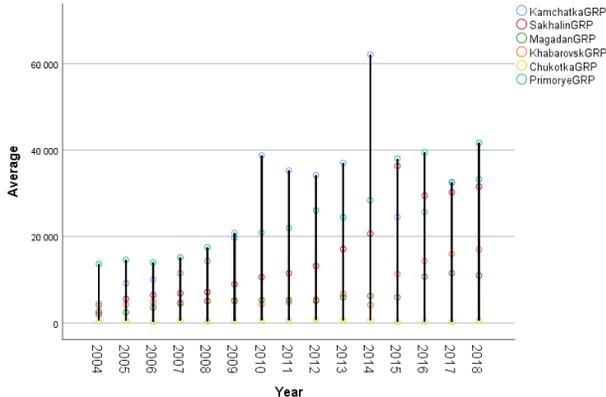


Figure 1 Production output dynamics of fishing-industry complex in Far Eastern Federal District by region.

Table 1 Main characteristics of Far Eastern regions as of January 1, 2018.

Regions	Area, thsd. sq. km.	Population, as of 1-Jan-2018, thsd. people	DRP as of 1-Jan-2018, mln. RUB.	Leading industries in DRP structure in 2018	Recreation zone of inclusion	Seas
Chukotka AD Group 3	721,5	50,8	44756,9	Mining 41,8%, Publ. administration 11,5%	"Russian North" tourist zone	East Siberian Sea
Kamchatka region Group 3	464,3	320,6	112750,5	Fishing, fish farming 17,4% Publ. administration 15,7%	"Russian North" tourist zone	Bering Sea Sea of Okhotsk
Magadan region Group 3	462,5	152,3	75147,0	Mining 24,1%, Publ. administration 14,6%	"Russian North" tourist zone	Sea of Okhotsk Sea of Japan
Khabarovsk region Group 3	787,6	1342,1	401456,4	Transportation and communication 17,1% Trade 13,2%	Far Eastern tourist zone	Sea of Okhotsk Sea of Japan
Sakhalin region Group 3	87,1	493,3	596906,8	Mining 60,9%, Construction 8,9%	Far Eastern tourist zone	Sea of Okhotsk Sea of Japan
Primorsky	164	1947,	546	Construction	Far Eastern	Sea of

region Group 3	,7	2	552,3	20,3%, Transportation and communication 19,2%	tourist zone	Okhotsk Sea of Japan
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Regions of the Russian Far East are hard-to-reach, but resource-excessive and low-income in demographic terms. According to the economic development, the Sakhalin region and the Primorsky region are in the lead among other regions. The DRP level is 1,179,668.8 and 834,023 million rubles respectively as of January 1, 2018. The main industries are mining and construction.

4 METHODOLOGY

To understand the complexity of the decision regarding the fishing industry clustering based on the Far Eastern regions to make by the federal centre, it is necessary to analyze the overall prospects for clustering. We use the average data on two indicators for the analyzed period enabling to shape an initial opinion on the possible form of integration. For cluster analysis, we use Ward's method in SPSS Statistics environment. There is also a particular interest in the correlation dependence between gross output and fixed investments as the only permanent source of support for the production process and replenishment of depreciated fixed assets. The limited sectoral data on the financial results from the activities of individual enterprises does not allow us to form a correct database for implementing cluster analysis taking into account leading and backward enterprises in the industry.

5 RESULTS

Table 2 presents the descriptive statistics for two analyzed indicators: a significant imbalance in the production indicator as the average value is 29 times higher than the minimum level; a large gap between the minimum and the average investment values. Thus, the regions of the Far East have a critical imbalance in production capacity.

Table 2 Descriptive statistics of average data for cluster analysis

	Descriptive statistics				
	Number	Minimum	Maximum	Average	Standard error
GRP	6	453,00	26230,00	13418,33	10512,518
Investment	6	11,00	1877,00	813,166	806,709
Quantity of valid elements (according to list)	6				

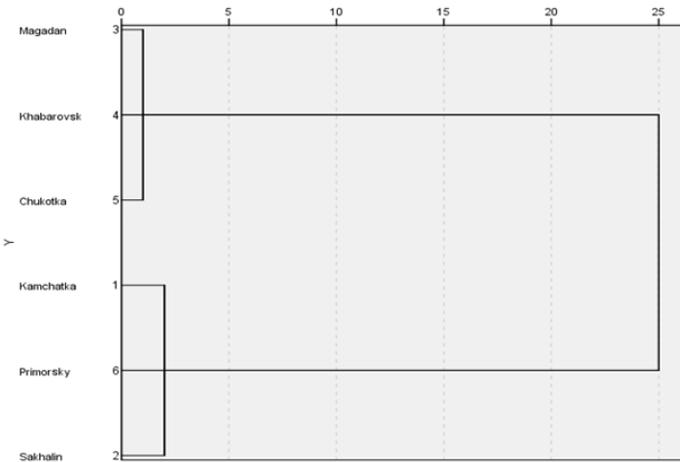
The results of the cluster analysis are summarized in table 3 and a dendrogram (fig. 2). The stages of agglomeration demonstrate the sequence of integrating regions into a cluster. During the first stage, the regions with the medium production level (the Magadan region and the Khabarovsk region) integrate. Then the backward region (Chukotka AD) joins them. During the following stages, there is an integration of the regions with a high production level (the Primorsky region, the Sakhalin region and the Kamchatka region). The spike in the distance coefficient at stage 5 shows an abnormally large

distance between the clusters thus rendering a clustering ineffective at this stage. The recommended number of cluster formations is 2.

**Table 3** Order of clusters agglomeration

Procedure of agglomeration (clusters)						
Stage	Combined cluster		Coefficient	First appearance of the cluster		Nextstage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	3	4	,010	0	0	2
2	3	5	,271	1	0	5
3	1	6	,736	0	0	4
4	1	2	1,286	3	0	5
5	1	3	10,000	4	2	0

The dendrogram provides a more graphic representation.



**Figure 2** Dendrogram of clustering using Ward's method

Based on the obtained results, clustering seems possible. But this conclusion is incorrect due to the data limitations. Further we will look at the location of fishing industry centres in the Far Eastern regions.



**Figure 3** Location of leading enterprises of fishing industry in Far East. (map scale 1:90,000,000)

In figure 3, we mapped the leading enterprises in the fishing industry of the analyzed regions with the schematic showing the distance between them in such a way as to all key enterprises to

be linked to each other by logistics. The total distance between the leading region (the Primorsky region) and the furthest point is more than 5,000 km. Thus, the principle of territorial proximity for the cluster integration is not applied, distances are very large, and there is no transportation between the regions. We also consider it advisable to analyze the investment attractiveness of the Far Eastern regions since it is proposed to implement these cluster projects through private investments.

**Table 4** Investment ranking of Russian regions for 2019

Regions	Rating
Kamchatka region	Weak capacity — moderate risk (3B2)
Sakhalin region	Low capacity — moderate risk (3B1)
Magadan region	Weak capacity — moderate risk (3B2)
Khabarovsk region	Low capacity — moderate risk (3B1)
Primorsky region	Low capacity — moderate risk (3B1)
Chukotka AD	Weak capacity — high risk (3C1)

Source: Investment attractiveness rating of Russian regions.

Three of the six regions have a weak capacity that negatively affects the attraction of investors. The rating takes into account all industries of the region that also significantly reduces the attractiveness of the clustering project as in Russia there is currently no experience in integrating regions on a megascale due to the negative investment climate in the federal district. There is an empirical interest in industrial opportunities to reinvest capital in reproduction processes and to maintain renovation of production facilities. By correlating the production indicator and fixed investment volume, the relationship between the two indicators can be identified.

**Table 5** Spearman's correlation coefficient

Correlated indicators: Fishery complex production/ Fixed-asset investments	Correlation coefficient / Bilateral criterion of significance
Kamchatka region	<b>0,664*</b> 0,007
Sakhalin region	0,936 0,000
Magadan region	0,277 0,318
Khabarovsk region	0,489 0,640
Primorsky region	0,954 0,000
ChukotkaAD	-0,082 0,773

\* Significant correlation marked in bold

As a result of the calculations, there is a strong correlation between the analyzed indicators in the three regions. During the period 2004-2018, these regions show significant cost volumes of production output and, as a consequence, investments.

## 6 CONCLUSION

The analysis of the economy in the coastal regions reveals the specific structure of the interregional dispersion of resource capacity and, as a result, an industrial imbalance. The probability of cluster integration between regions is possible

within geographical groupings taking into account the development level of separate economic activities and the interest in cooperation from strategic market participants. The analytical section confirmed the presence of significant discrepancies and sectoral differences between coastal territories as well as the high dependence on extractive industries in these regions. The results from the analytical section revealed issues in forming the fishing-industry cluster. The prerequisites for creating a group of cluster formations are weak, however, high territorial fragmentation, discrepancies in gross values and low investment attractiveness reduces the capacity of these processes.

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