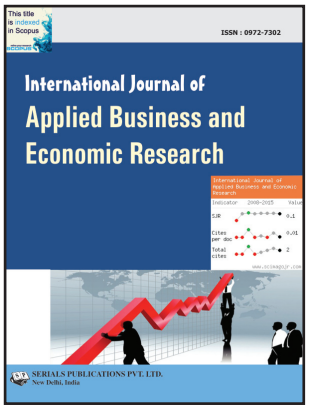

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Implementation of Cluster Scenario Approach for Economic Development of the Arctic Zone of the Russian Federation

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ABSTRACT

The paper shows main models of cluster formation and main concepts of cluster theory. Authors describe clusters classification based on enterprise interrelationship. Scenario of industrial components manufacturers' cluster is suggested in case of a basic anchor company. The procedure and the sequence of actions to create engineering and technology centers is presented. Main features and issues of industrial clusters in the Arctic Zone of the Russian Federation are shown and their role for economic development is described.

JEL Classifications: O180, R11.

Keywords: Economic development, regional economics, industrial cluster, Arctic Zone.

1. INTRODUCTION

Federal Law of the Russian Federation No 488 dated 31/12/2014 "On Industrial Policy in the Russian Federation" is one of the main documents treating the industrial development in Russian Regions. This document covers terms definitions, concepts, aims and targets of national industrial policy. Unfortunately, the recommendatory nature of the Law leads to certain ambiguity in defining goals stated by the document. We discuss here particular aims set by Ministry of Industry and Trade, such as modernization of machinery and improvement of its competitiveness, reduction of the dependence on imported components, optimization of current management systems. All these aims have one common element, which is the urgent necessity to increase innovative components in activities of industrial companies.

Transition to innovative development is impossible without infrastructure and promotion requiring significant investments. However, the amount of financing is so significant that only the State can grant enough money. Informational support, innovative development in industrial sector, promotion of human resources and government grants and municipal preferences are named in the Federal Law "On Industrial Policy" as main measures except financial stimulation of industry. All above mentioned steps are meant to improve the competitiveness of industrial companies.

The competition theory by M. Porter (Porter, 2008) is one of the most important theories on companies' competitiveness. Agglomeration of several specialized companies (cluster) is one of its essential parts. There are several cluster definitions depending on the context and purpose of the discussion. In the context of state stimulation of some industries clusters could be considered as an instrument of regional development.

Ideas of competition and economy innovations combined with trends to import substitution led to the strategy development of certain branches of industry through creating industrial clusters. The Resolution of the Government of the Russian Federation "On the Industrial Clusters and Specialized Organizations of Industrial Clusters" covers all the necessary definitions and requirements. In case, the group of companies confirms its status of the industrial cluster then the State gives it subsidies and preferences.

We will focus on several aspects of state activity, such as industrial growth, Arctic Zone development and Northern Sea Route elaboration. We will also examine peculiarities of the Russian approach to cluster economy – both theoretical and practical issues. Accessible data have been analyzed and main problems of development of innovative support infrastructure for industrial clusters have been defined.

2. CLUSTER DEVELOPMENT OF NATIONAL ECONOMICS

We will not describe in detail the evolution of scientific views on cluster development since this is not our goal. The process of changes and additions to the basic theory of Marshall is thoroughly studied by Russian researchers [9]. We will name possible principles of classification and explain why the Russian government considers the way of "cluster development of the national economy"so effective.

Golovanova, Avdasheva and Kadochnikov(2010), M. Konovalova(2011),Aleinikova, Vorobiev, Isakidis (2008), I. Akhunzhanova (2014, 2015) and many other Russian economists regarded clustering problems. Considering foreign cluster experience the scientists often use standard classification of their formation according six types (Golovanova, Avdasheva and Kadochnikov, 2010):

1. *The Italian model* is distinguished by a large number of small firms, united in various associations to improve competitiveness. This model could be applied for the production of a low technological level items with a high degree of differentiation and demand fluctuations.
2. *The Japanese model* is formed around a anchor company with large-scale production, integrating a lot of suppliers from the different stages of the industrial chain. Suitable for technologically sophisticated products. Their development requires high fixed costs, which can be paid back only with large volumes of sales.
3. *The Finnish model* is characterized by a high level of innovation, supported by a powerful sector of research and development, advanced education system, internationalization of business. The most recommendable form if it is a small country lacking natural resources and depending on export.

4. *The North American model* is characterized by severe competition between enterprises and could be applied when production process does not imply close relationships. Due to competition between suppliers in the cluster, as well as mass production, parent company achieves lower costs of the final product.
5. *The Indo-Chinese model*. The state plays the key role. The main emphasis is put on foreign investments, bringing modern technology and providing access to world markets.
6. *The Soviet model*. Market relations and competition are minimized, production is concentrated in large enterprises. Best suited for the raw material extraction industries in regions with low population density and poor development.

These models are grouped by countries and national companies characteristic features, which is not a common way to classify clusters, since it does not reflect the fundamental reason for their diversification. M. Porter and other western scientists (Porter, 1998, Manning, 2013), suppose that such formations as clusters are classified to suit different principles. For example, A. Markusen distinguishes four main cluster models as regards the relationship between companies within the cluster (Markusen, 1996). (Figure 23.1-23.4)

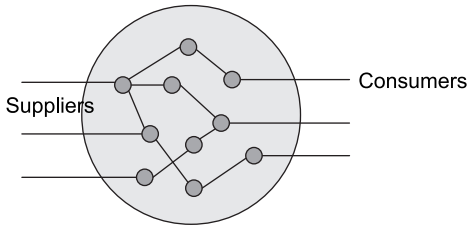

Figure 23.1: Marshall's model of cluster

This model is characterized by a fairly uniform distribution of firms within the cluster, mainly small businesses, which compete in the field of suppliers and consumers, either within the supply chain to each other. No businesses that could control the cluster as a whole, or would determine its development policy.

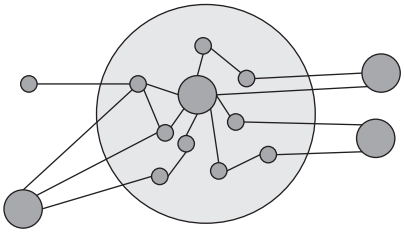

Figure 23.2: Anchor model

In this scheme, there are a few dominant companies that constitute the core of the cluster, which are interrelated to all other companies. Small companies in this cluster are engaged in the supply of materials, they specialize in service activities or produce the required semi-finished products. They depend entirely on the major policy makers companies. A striking example is the automotive Detroit cluster "Big Three".

This model is based on the fundamental principle of cluster creation. It is the geographical proximity of the location. Such formation of a cluster is associated with the facilities transfer by large companies to regions with certain competitive advantages. Especially it should be noted that the satellite companies in

this case do not have links with each other within the cluster. Large analogue parent companies may well compete.

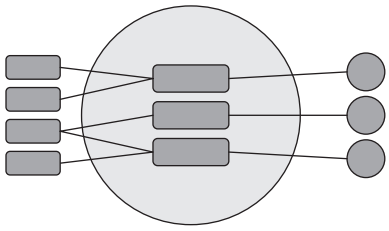

Figure 23.3: Model with dependent participants

The latest model is called the state-centric model of the cluster. It could be compared with the second model shown earlier, cluster core does not belong to the private sector.

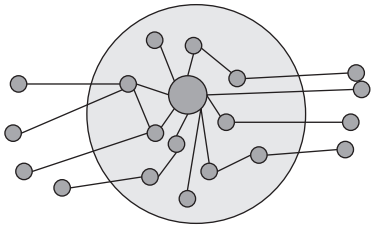

Figure 23.4: State-centric model of the cluster

Cluster companies are grouped around a central non-commercial or state-owned enterprise, which dominated in the region and prevail in cooperation. The best example of this type is any of the US military bases, which operate in any region, supported by many public-private contracts.

We have given these models of A. Markusen as an example of the possible clusters classification. Obviously, for the shipbuilding clusters only anchor model could be considered suitable, simply because there are only a few enterprises capable of manufacturing sophisticated high value products. Chains of complex high-level processing products leads to centralization of processes around large companies in Russian logistics conditions. So, Government of the Russian Federation is trying to take advantage of the real situation, centering the various subsidiary companies around the main anchor companies in various industries.

3. SCENARIOS FOR THE CREATION OF INDUSTRIAL CLUSTERS

Regulations of industrial clusters and specialized organizations of industrial clusters (SOIC) issued by the Government describe with details what group of companies could be recognized as an industry cluster, and what steps are to be taken. Given the existence of such a document, we propose a schematic description of the process of creating "standard" cluster, which would fit the definition of the Government and would meet the requirements of the state program on socio-economic development of the Arctic Zone of the Russian Federation. Due to the high complexity and multiplicity of program's objectives, it is clear that one of the main problems would be an over-dependence on import of components manufacturers almost in every segment. To solve this problem, we propose one scenario of cluster creation of components equipment, one of which is shown in Figure 23.5.

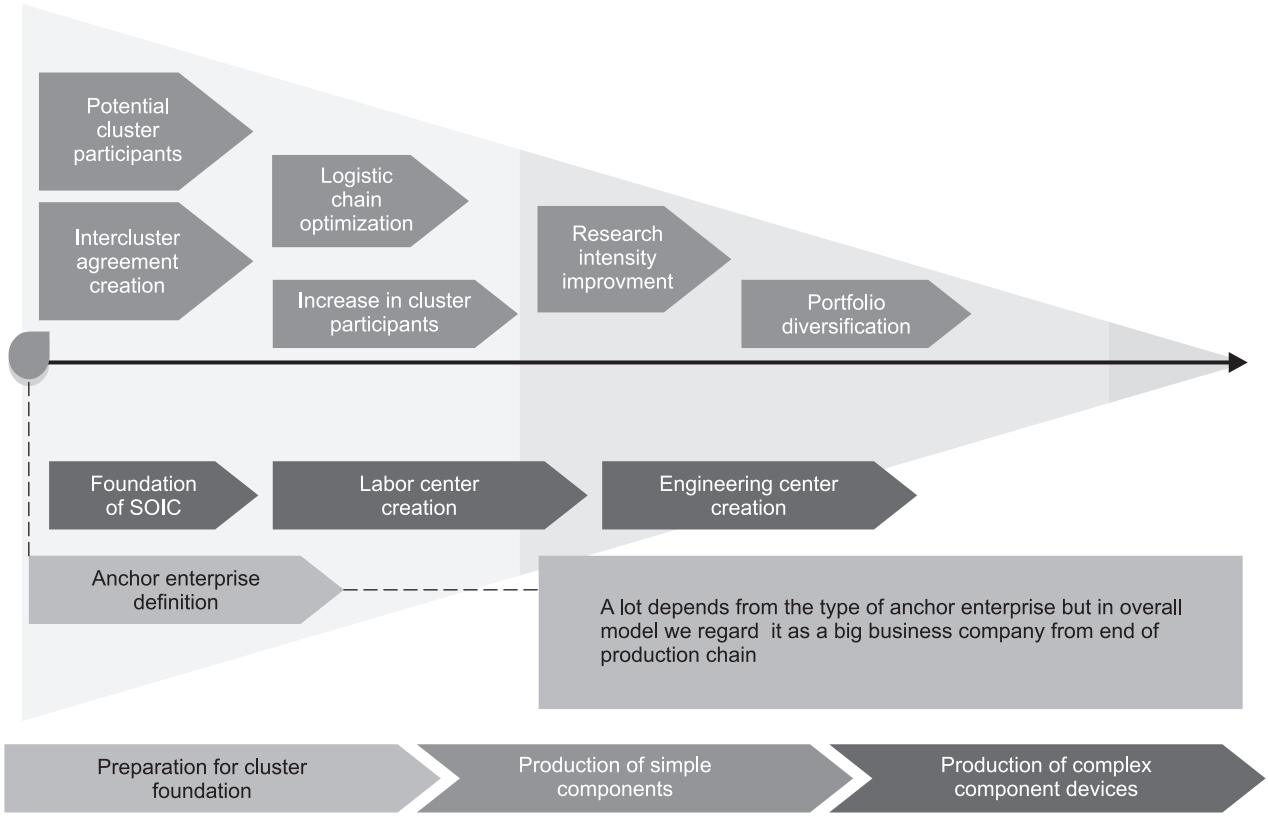

Figure 23.5: Scheme of the implementation of the project of standard cluster creating

When implementing such scenarios we can talk about increasing the level of the general development of the regions, and their self-sufficiency, and at the moment, it is also one of the priority objectives, due to the importance of substitution programs. To carry out such changes in the regional economics sharing as much as possible costs between the cluster participants. The development of innovation infrastructure in the regions and, in particular, engineering and technology centers require special attention. The establishment of such centers is impossible without a long-term scientific and technological forecasts in each sector separately (in the case of the Arctic Zone development, we accept the overall program) (Figure 23.6). It should benoted that all the individual projects of engineering and technology centers must undergo assessment of their economic efficiency.

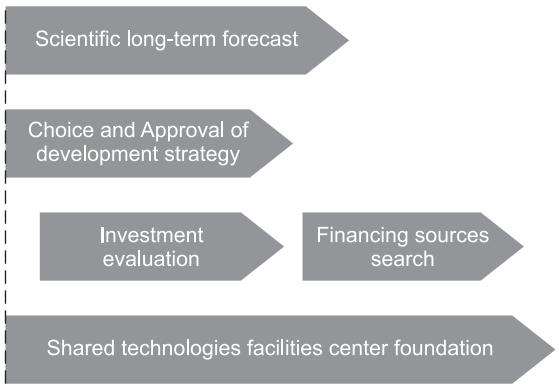

Figure 23.6: General procedure and the sequence of actions to create engineering and technology centers

Created according to this program, engineering and technology centers may not have the exact reference to the industry within which the clusters are created. Each of them may be some kind of innovation activity in the regions concerned. Currently, an existing network of shared centers does not reach the desired level of efficiency due to its certain detachment from cluster initiatives. When engineering and technology centers are creating under conditions of determined clusters and for their subsequent development in the inter cluster arrangements their level of efficiency greatly increase.

4. FEATURES OF CREATION OF INDUSTRIAL CLUSTERS IN THE ARCTIC ZONE

As mentioned earlier, the program of socio-economic development of the Russian Arctic for the period till 2020 should resolve a large number of multifaceted problems [7]. Firstly, a lot of attention is given to issues of cross-border cooperation with other Arctic countries, including the definition of the territories boundaries, the establishment of common search and rescue as well as effective natural resource sharing while preserving the environment. Secondly, quite a large segment of the tasks allotted on transport links speaking about the organization and efficient use of transit and cross-polar air route and the Northern Sea Route. The third block of the tasks is associated with the socio-economic development of regions belonging to the Arctic Zone.

All these tasks require the creation of centers of developed infrastructure that would become reference points for the program implementation Frame-cluster approach and supporting of the formation of development zones could be indicated as methods of solving the above mentioned problems. Frame-cluster approach is based on the advanced development of transport, energy and social framework of the territory and on concentration of resources in priority areas. The development of the Russian Arctic requires a fundamentally different quality of transport and energy infrastructure, as well as the social sphere (taking into account the enormous territory of the Arctic Zone of the Russian Federation and the lack of internal transport links). The territory of the Russian Arctic could be divided to supporting development zones naturally based on the transport and energy framework in the region and consequently a new population settlement system would be generated. Supporting Development Zones determine the allocation of the following types of Arctic areas :

1. The area of industrial development with future transition to post-industrial development (Murmansk and Arkhangelsk Regions);
2. The area of active development, based on the open deposits, existing network of gas and oil pipelines, sea ports;
3. Territories of the prospective development, based on the research of deposits, forming and developing transport routes;
4. Wildlife area that forms natural environment.

Frame-cluster approach is accompanied by changes in life-support structures (reduction of expenses, leading to higher costs of products and services, optimization of northern delivery), as well as increase of mining sector contributions to regional budgets (State program of the Russian Federation, 2014).

Thus, the industrial clusters are part of the implementation of the frame-cluster approach, due to the fact that they allow focusing in certain areas of the regional economy. The cluster policy promotes the

competitiveness of business by realizing the effective interaction of cluster participants. The companies potential is associated with their geographical location in close proximity, based on open access to innovations and modern "know-how", specialized services and highly qualified personnel, as well as lower transaction costs, providing the implementation of joint cooperation projects and productive competition. The formation and development of clusters could be an effective mechanism to attract foreign direct investment and encourage foreign integration. Participation of local clusters in global value chains would significantly raise the level of national technological base, and improve the speed and quality of economic growth by increasing the international competitiveness of enterprises that make up clusters (The strategy of innovative development of the Russian Federation for the period till 2020).

One of the most impressive examples of formed industrial clusters in the Arctic is a shipbuilding cluster in the Arkhangelsk Region, settled in 2011 (The program of cluster development, 2011). The volume of financing has reached 28 billion Rubles distributed for transport, energy, housing and innovative infrastructure, to be exact, for their development. Shipbuilding products are in great demand in the Arctic for mining and transportation. Arkhangelsk cluster was founded after thorough analysis of world trends. All new contracts in ship construction are divided mostly by ship type and its deadweight, the leader in both categories being, according to Clarksons Research (2016), bulk ships. Second and third place goes to oil tankers and freighters (Figure 23.7).

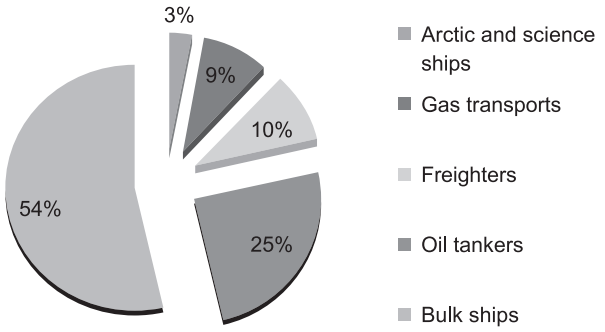

Figure 23.7: Structure of world shipbuilding orders by ship deadweight, 2015

Gas carriers and arctic ships present special interest for Russian shipbuilding clusters. First three groups are very popular and done mostly at Chinese and Korean wharfs due to the simplicity of their construction, but they are of lesser importance for Arctic Zone. What is indeed important is the possibility to build arctic sips within national shipbuilding clusters. Huge demand for those ships come from another industrial innovative Arctic projects such as Yamal LNG (Liquefied Natural Gas), which needs transportation for its annual production (16 mln. tones of LNG) (Yamal LNG project, 2016). Main routes are presented in Figure 23.8.

Since 2012, a growing number of liquefied gas carriers per year is ordered. In 2014, 75 LNG-type ships was ordered (in 2012 – 39 units, in 2013 – 46) with capacity of 11.2 million cubic meters, the LPG (Liquefied Petroleum Gas) and LNG ships compared with 2012 has almost doubled up to 109 units (in 2012 – 56 units) with a capacity of 6 million cubic meters. Until recently, the ship-owners have been careful in the placement of orders for the construction of new gas carriers under specific gas projects. But the LNG freight market, lower construction price of these vessels and relatively high daily spot freight rates gave rise to massive speculative orders for the construction of new vessels of this type. The total volume of global

Figure 23.8: Russian Arctic Zone and main LNG routes [16]

investment in new tonnage LNG is currently estimated at $ 12.5 billion (7.7 billion $ – LNG and 4.8 billion $ – LPG), based on the average cost of LNG carriers. The bulk of the contracts in 2014 were posted on the Asian shipyards – 1,624 vessels with total deadweight of 109.3 million tons accounting for 97% of all contracts concluded this year (by deadweight). High interest in gas transport building and development of innovative mining clusters establish a very strong support for shipbuilding component production clusters. Scenario for component manufacturers' clusters development suggested earlier contains a good description of the creation process that proves cluster's future perspectives. Such scenario is also applied for creation of a shipbuilding cluster of the Leningrad Province.

5. CONCLUSIONS

Summing up the results it is important to say that the Arctic Zone of the Russian Federation is surely going to be developed due to a great number of reasons, among them mining, exploration, politics, economics. A lot of different state programs exist to promote this development, along with overall state support programs, innovation cluster creation included. We believe that main cluster model for these programs implementation in industrial conditions is an anchor model; shipbuilding clusters were used as example. We suggest a scenario of such cluster development to show its practical realization inside of special framework created in the Russian Federation. Demand for these cluster production is based on other elements of Arctic Zone frame development, such as LNG innovative projects.

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