UDC 338.43-025.27(98)(045)
DOI: 10.37482/issn2221-2698.2020.41.21

Features of Clustering in Fisheries by the Example of Fisheries in the Northern Basin and the Murmansk Oblast [*]

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Abstract. The purpose of the study is the rationale for creating a fisheries cluster in the Northern Basin. The analysis of the creation of classical clusters in foreign countries is carried out, information on the limited use of these structures is provided. The stages of clusterization of the fishing industry in Russia are considered. The reasons for the lack of implementation of numerous cluster projects are clarified. The main one is the refusal of fishing fleets to enter the cluster. The successful functioning of the fishery complex in the Northern Basin in the pre-market period is presented. The reasons for its destruction and the stagnation of enterprises and organizations' economies serving the main structures of the marine economic activity of fishing fleets are clarified. They are caused by a change in the structure of mining fleets, the development of uncontrolled export of fish products directly from the sea, with the departure of fishing vessels for repairs and maintenance to foreign ports. The practicality of creating a local fish cluster, the core of which will consist of fishing vessels with an incomplete cycle of processing aquatic biological resources and coastal fish processing enterprises, is justified. The proposed measures stimulate entry into the cluster. The study's practical significance lies in the creation of conditions for the deep processing of aquatic biological resources and the release of innovative fish products, as well as for the development of ship repair and other enterprises serving the fishing fleet.
Keywords: *Western Arctic, cluster, fishery of seafood, processing, innovation.*

Introduction

The goals and objectives of the country's fisheries are given in the state program of the Russian Federation "Development of the fishery complex"[1].

Many national scientists consider the creation of clusters in coastal regions to be one of the economic instruments for achieving the goals set for the fisheries industry by the President and the Government of the Russian Federation, referring at the same time to foreign experience [1–5].

However, the analysis of the economy clustering abroad, including countries with developed fishery, showed that the practice of formalizing the existing fishery complexes into clusters is not developed there [6, 7]. Only in Iceland the ICELAND ocean cluster was created in 2011. It has been in operation for more than six years. “The mission of the Icelandic Oceanic Cluster is to create value by bringing together entrepreneurs, business and maritime expertise. To fulfill this mission, we provide a wide range of services and invest our resources in new ancillary and shipping projects. Currently, the cluster includes more than 120 companies and an accelerator of 3,000

[*] For citation: Vasilyev A.M. Features of Clustering in Fisheries by the Example of Fisheries in the Northern Basin and the Murmansk Oblast. *Arktika i Sever* [Arctic and North], 2020, no. 41, pp. 21–37. DOI: 10.37482/issn2221-2698.2020.41.21

[1] Gosudarstvennaya programma Rossiyskoy Federatsii «Razvitie rybokhozyaystvennogo kompleksa»: utverzhdena postanovleniem Pravitel'stva RF ot 15 aprelya 2014 g. № 314 (v red. postanovleniya Pravitel'stva RF ot 27 marta 2019 g. № 324) // SZ RF. 2014. St. 2160 [State Program of the Russian Federation “Development of the Fishery Complex”: Approved by the Decree of the Government of the Russian Federation of April 15, 2014 No. 314 (as Amended by the Government of the Russian Federation of March 27, 2019 No. 324). SZ RF. 2014. Art. 2160].

square meters area. The network companies represent all parts of the ocean value chain with a focus on seafood. The branch of this cluster has been established and operates successfully in New England (USA). Twelve companies were created as subsidiaries of the cluster" [8]. Aquaculture Cluster is successfully operating in Norway. It is not only one of the driving forces in the field of aquaculture, but also innovation in the country as a whole[2].

Cluster structures have also been formed in the sector of commercial fish and seafood farming in the leading countries (Chile, Iceland, France, Vietnam). Asian countries (Japan, South Korea, China) have developed port complexes, including refrigerators for receiving and storing fish products, fish processing enterprises, technical centers for servicing and repairing ships, as well as transport and logistics networks for the delivery and sale of commercial products. An additional stimulus for the development of these complexes is the raw materials imported from Russia[3, 4, 5] [9].

Activities of State bodies for the clustering of fisheries

The necessity and directions for the development of clustering of the "fish" economy in Russia (in sectoral, territorial or innovative aspects) have been repeatedly reflected and declared in the official program and policy documents. One of them envisaged, at the initial stage (2008), to form a network of territorial production clusters, taking into account regional industry specialization. For the coastal regions of the Far East a bioresource cluster creation was envisaged, the basis of which will be the extraction and processing of aquatic biological resources and mariculture[6].

The next fundamental document in relation to fishing activities is the instruction of the President of the Russian Federation dated 21 March 2013 Pr-613 on the creation of a fish processing cluster with modern port infrastructure and refrigeration facilities in the Far East, the implementation of which will allow to reorganize the fish industry of the Far East in a single high-tech complex. Over the past period, several projects have been developed for the Far Eastern fishery cluster, including the Japanese Institute "Nomura". All of them remained unfulfilled[7].

Another instruction of the President of Russia Putin V.V. on the creation of a "fish" cluster in the Far East followed after the meeting of the Presidium of the State Council for the Development of Fisheries on 19 October 2015. The Russian Government reaction to it was the decision to create 4 regional clusters in the Primorskiy Territory, Kamchatka, Sakhalin and the Kuriles. One of

[2] Klastery Norvegii [Clusters of Norway]. URL: https://1neof.ru/klastery-norvegii/ (accessed 15 June 2020).
[3] Korea Industrial Complex Corporation: Official web-site. URL: http://www.kicox.or.kr/home/eng/ (accessed 03 January 2020).
[4] Maritime culture of China. URL: www.cseac.com (accessed 03 January 2020).
[5] Fuchzhou nameren postroit' krupneyshiy offshornyy rybolovetskiy klaster v Kitae [Fuzhou Intends to Build China's Largest Offshore Fishing Cluster]. URL: http://news.wenweipo.com/2014/01/07/NN1401070006.html (accessed 03 October 2019).
[6] Kontseptsiya dolgosrochnogo sotsial'no-ekonomicheskogo razvitiya Rossiyskoy Federatsii na period do 2020 goda (utv. Rasporyazheniem Pravitel'stva RF ot 17.11.2008 g. N 1662-r) // SZ RF. 2008. № 47. St. 5489 [The Concept of Long-Term Socio-Economic Development of the Russian Federation for the Period Up to 2020 (Approved by the Order of the Government of the Russian Federation of November 17, 2008 N 1662-r). SZ RF. 2008. No. 47. Art. 5489].
[7] Rybnyy klaster rastashchili po Dal'nemu Vostoku [The Fish Cluster Was Taken Away across the Far East]. URL: https://primamedia.ru/news/486698/ (accessed 09 January 2020).

them was created in June 2018 in the Kamchatka Territory and includes the Ministry of Fisheries of the Kamchatka Territory, the Agency for Investments and Entrepreneurship, JSC "Corporation for the Development of Kamchatka", the Union of Fishermen and Entrepreneurs of Kamchatka, the Union "Chamber of Commerce and Industry" of the Kamchatka Territory, as well as 49 enterprises of large, medium and small businesses. The cluster should become the main supplier of fish products to the European part of Russia along the Northern Sea Route.

The situation is similar in the coastal regions of the North-West of Russia. In 2016-2017 decisions to create clusters in the field of fishing activities in the Arkhangelsk, Kaliningrad and Murmansk oblasts and fish farming in the Republic of Karelia were made. The creation of these clusters was initiated by the regional administrations, which received support at the sectoral level..

The decision to create and develop a fishery cluster in the Murmansk oblast was approved by the regional governor in 2016 as part of the Murmansk oblast state program "Development of fish and agriculture, regulation of markets for agricultural products, raw materials and food" [8]. Subsequently, due to the lack of support and positive decision on this issue from the main potential participants (fishing organizations and the Murmansk Sea Fishing Port), the provision for the creation of a fishery cluster was excluded from the program [9].

In November 2017, by order of the Ministry of Agroindustrial Complex and Trade of the Arkhangelsk Oblast No. 356-p, a working group was formed to create a cluster, which completed its activities in May 2019 by signing documents on the formation of the Arctic Fisheries Cluster. It is considered to be interregional, with the involvement of the enterprises of the Northwestern Federal District. It is planned to create a multifunctional coastal complex in Arkhangelsk within the cluster, focused on receiving and deep processing of fish supplied via the NSR, as well as supplying it to the regions of the Central Federal District (CFD). This is supported by the commissioning of additional onshore processing facilities within the framework of the investment quotas mechanism.

It should be noted that, in spite of the Arkhangelsk trawl fleet's official entry into the cluster, the participation of fishermen in its activities, in our opinion, will not be active. This is primarily due to the presence of non-sailing fishing vessels. The priority of the supply of fish products abroad is also reflected. Therefore, the orientation towards the supply of Far Eastern fish both for

[8] Gosudarstvennaya programma Murmanskoy oblasti «Razvitie rybnogo i sel'skogo khozyaystva, regulirovanie rynkov sel'skokhozyaystvennoy produktsii, syr'ya i prodovol'stviya» (utv. postanovleniem Pravitel'stva Murmanskoy oblasti ot 11.11.2016 № 561-PP) [State Program of the Murmansk Oblast "Development of Fish and Agriculture, Regulation of Markets for Agricultural Products, Raw Materials and Food" (Approved by the Government of the Murmansk Oblast of 11 November 2016 No. 561-PP)]. URL: https://mrcx.gov-murman.ru/activities/RHK/rpu1-docs/561_pp.pdf (accessed 10 November 2019).

[9] Prilozhenie k postanovleniyu Pravitel'stva Murmanskoy oblasti ot 05.07.2017 №340-PP «Izmeneniya v gosudarstvennuyu programmu Murmanskoy oblasti «Razvitie rybnogo i sel'skogo khozyaystva, regulirovanie rynkov sel'skokhozyaystvennoy produktsii, syr'ya i prodovol'stviya» [Appendix to the Decree of the Government of the Murmansk Oblast Dated 05 July 2017 No. 340-PP "Changes to the State Program of the Murmansk Oblast "Development of Fish and Agriculture, Regulation of Agricultural Products, Raw Materials and Food Markets"]. URL: http://docs.cntd.ru/document/450257674 (accessed 10 November 2019).

processing and for supplying fish products to the regions of the Central Federal District should be considered correct.

Speaking about the development of the Arctic cluster as an interregional one, in our opinion, one should keep in mind the preserved ship repair base. This factor will facilitate interregional cooperation. At the same time, the leadership of the regions neighboring the Arkhangelsk oblast is jealous of leadership in the development of the Arctic. Therefore, it can presumably hinder interregional cooperation.

Materials and research methods

In the theoretical works of the authors named at the beginning of the article, the issues of the possibilities of creating fishery clusters from the point of view of determining factors are considered. An increase in the production of deep processing products, a decrease in prices for fish products, an increase in exports and an increase in filling the domestic market are declared.

However, the problems of attracting fish raw materials to onshore processing centers and reducing fish prices of ultimate suppliers are not investigated. At the same time, it is known that the export of fish is already excessively large and is inefficient from the state point of view. The domestic market does not receive fish raw materials and finished products of marine manufacture in the necessary quantities, ensuring its accessibility to the population. For example, in the Murmansk oblast up to 80% of the catch is exported [10].

In order to actualize the issue of a fishery cluster creation in the Murmansk oblast (or, conversely, the absence of such a problem) an analysis of the fisheries industry state was carried out.

The fishing industry of the Northern Basin was a powerful fishing and processing complex by 1990. The fishing fleet consisted of 434 vessels, including 181 units of large tonnage and 216 units of medium tonnage. The total catch of fish and seafood reached 1 593 thousand tons, the output of fish products was 1 299.2 thousand tons, including output of coastal factories — 141 thousand tons. The cargo turnover of the Murmansk Sea Fishing Port reached 1 166.2 thousand tons. The ship repair was fully provided by the Murmansk shipyard and the workshops of the mining enterprises. The necessary fishing equipment was made by the Murmansk fishing gear factory, and various containers were made by the container plant. Design and engineering organizations carried out orders for ships and coastal enterprises for the development and manufacture of new technologies for fish products, various equipment and outfit. The Nikolai M. Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO) and Northern Exploratory Fishing (Sevrybpromrazvedka) provided the fleets with a raw material base, and various schools — with personnel. We can say that it was a directively created effective fishery cluster [10].

[10] Razrabotka osnovnykh polozheniy dolgosrochnoy programmy osvoeniya bio- i uglevodorodnykh resursov Zapadno-Arkticheskikh shel'fovykh akvatoriy: otchet o NIR (zaklyuch.): 3-96-4006 / Institut ekonomicheskikh problem Kol'skogo nauchnogo tsentra Rossiyskoy Akademii nauk; nauch. ruk. Ostistyy B.K.; otv. ispoln.: Ostistyy B.K., Vasil'ev A.M. Apatity, 1998. S. 290 [Development of the Main Provisions of a Long-Term Program for the Development of Bio- and Hydrocarbon Resources of the West Arctic Shelf Areas: Report on Research: 3-96-4006. Institute of Economic Problems of

In the 1990s , in the process of privatization, fragmentation of old enterprises and establishment of new ones, separation of economic entities by type of activity and specialization, the general pool corporate structure collapsed, and interaction in a single production chain weakened. The decrease in the level of interaction was differentiated, but in most cases, it was critical.

So, in 1988–1990 the total share of products and services of service industries in the total cost of production fleets and floating bases was 45.0–46.0%. And in 1992 it had already dropped to 18.0%. It should be noted here that during this period price factors also had a significant impact on the change in the significance of certain types of costs that form the cost of production of field organizations. This was expressed, first of all, in a more dynamic rise in prices for the products of the main production of the fish industry [11].

There were quantitative and structural changes in the composition of the fishing fleet, a decrease in the catch of fish and seafood.

The number and structure of the fishing fleet, formed in market conditions, with the raw material base available in the nearby fishing areas taken into account, is shown in table 1.

Table 1

Dynamics of the Northern Basin fishing fleet development [11,12]

Indicators	1990	2000	2010	2017	The ratio of 2017 to 1990, %
Fishing vessels, units	416	423	287	224	53.8
Large and big, units	183	72	31	18	9.8
Average, units	221	318	174	136	61,5
Small and undersized, units	14	33	31	70	500,0
Total catch, thousand tons	1593	648	824.4	569.2	35.7
Note: according to the registers of the Murmansk Sea Fishing Port					

In 2017 fishing activities were carried out by 177 vessels registered in the ports of the Northern Basin and leased from the enterprises of the basin (80.0% of the registered composition). The delivery and unloading of fish products directly from the fishing areas was carried out by 107 fishing vessels: 1 large, 2 big, 55 medium, 49 small and undersized vessels.

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the Kola Scientific Center of the Russian Academy of Sciences; scientific. adv. Spinous B.K.; executed by: Bristly B.K., Vasilyev A.M. Apatity, 1998, p. 290].

[11] Kontseptual'nye napravleniya innovatsionnogo razvitiya morekhozyaystvennogo kompleksa Evropeyskogo Severa Rossii: otchet o NIR (promezhut.): 3-10-4002 / Institut ekonomicheskikh problem Kol'skogo nauchnogo tsentra Rossiyskoy Akademii nauk; nauch. ruk. Vasil'ev A.M.; otv. ispoln.: Vasil'ev A.M., Kuranov Yu.F., Grushenko E.B. i dr. Apatity, 2011. 97 s. [Conceptual Directions of Innovative Development of the Maritime Complex of the European North of Russia: Report on Research (interim): 3-10-4002. Institute of Economic Problems of the Kola Scientific Center of the Russian Academy of Sciences; scientific. adv. Vasilyev A.M.; executed by Vasiliev A.M., Kuranov Yu.F., Grushenko E.B. et al. Apatity, 2011. 97 p.].

[12] Nauchnye i prikladnye osnovy ustoychivogo razvitiya i modernizatsii morekhozyaystvennoy deyatel'nosti v zapadnoy chasti arkticheskoy zony Rossiyskoy Federatsii: otchet o NIR (promezhut.): 0226-2018-0006 / Institut ekonomicheskikh problem Kol'skogo nauchnogo tsentra Rossiyskoy Akademii nauk; nauch. ruk. Vasil'ev A.M.; otv. ispoln.: Vasil'ev A.M., Kuranov Yu.F., Fadeev A.M. i dr. Apatity, 2018. 115 s. [Scientific and Applied Foundations of Sustainable Development and Modernization of Maritime Economic Activities in the Western Part of the Arctic Zone of the Russian Federation: Report on Research (interim): 0226-2018-0006. Institute of Economic Problems of the Kola Scientific Center of the Russian Academy of Sciences; scientific. adv. Vasilyev A.M.; executed by Vasiliev A.M., Kuranov Yu.F., Fadeev A.M. et al. Apatity, 2018. 115 p.].

A group of "non-sailing" to Russian ports vessels was formed in. In 2017 there were 70 units: 57 medium, 4 large and 9 big vessels. As part of the latter, 6-7 trawlers are permanently deployed in the South Atlantic in the economic zones of African states. The rest of the "non-sailing" trawlers belongs to Murmansk enterprises and carry out fishing activities in the near Atlantic, the Norwegian and Barents seas.

The main part of demersal fish species (55.0–60.0%) is currently caught by medium-sized non-serial trawlers purchased abroad (were in exploitation) and new ones (built after 1995). They include vessels equipped with filleting equipment, the productivity of which in the fishery is approximately twice that of the serial group of vessels. They also determine the main composition of "non-sailing" ships.

Physically and morally obsolete medium freezer trawlers of serial (prereformed) construction, catching up to 25% of bottom fish, are used mainly in the nearby fishing areas. They produce only primary cutting fish products. All waste is thrown overboard.

Small and undersized vessels, mastering 7–8% of ABR in the "coastal" fishery mode, are the main suppliers of chilled primary processed fish products (semi-finished fish gutted with or without head).

The favorable situation in the bottom fishery has contributed to an increase in fillet production at sea. Its volumes in 2008–2013 increased threefold and remained at the level of 28.0–29.0 thousand tons until 2016. 25.0–28.0% of the total catch (raw) of cod and haddock was directed to fillet production. Subsequently, the production of fillets on ships under the influence of the price situation on international markets decreased and in 2018 amounted to 19.5 thousand tons using one-fifth of the raw material from the total catch [13].

The last decade is characterized by the growth of financial indicators of the fishing organizations of the Murmansk oblast. In 2009–2016, the overall growth in the profitability of fishing organizations in the Murmansk oblast increased 3.3 times (from 22.4 to 73.9). In 2017 it was slightly lower (69.5%) (Table 2).

Table 2

Production indicators of the Murmansk oblast enterprises

Indicators	2005	2009	2013	2015	2016	2017
1. Catch, thousand tons	579.0	609	696	681	644	698
1.1 The share of cod and haddock in the catch structure, %	29.5	33.3	47.4	44.6	49.5	47.0
2. Production of fish products, thousand tons	480.0	504.0	564.4	538.0	508.9	546.7
2.1 Frozen (including herring)	424.7	442.0	479.7	461.5	425.6	451.5

[13] Nauchnye i prikladnye osnovy ustoychivogo razvitiya i modernizatsii morekhozyaystvennoy deyatel'nosti v zapadnoy chasti arkticheskoy zony Rossiyskoy Federatsii: otchet o NIR (promezhut.): 0226-2018-0006 / Institut ekonomicheskikh problem Kol'skogo nauchnogo tsentra Rossiyskoy Akademii nauk; nauch. ruk. Vasil'ev A.M.; otv. ispoln.: Vasil'ev A.M., Kuranov Yu.F., Fadeev A.M. i dr. Apatity, 2018. 115 s. [Scientific and Applied Foundations of Sustainable Development and Modernization of Maritime Economic Activities in the Western Part of the Arctic Zone of the Russian Federation: Report on Research (interim): 0226-2018-0006. Institute of Economic Problems of the Kola Scientific Center of the Russian Academy of Sciences; scientific. adv. Vasilyev A.M.; executed by Vasilyev A.M., Kuranov Yu.F., Fadeev A.M. et al. Apatity, 2018. 115 p.].

2.2 Fillet	8.1	12.2	28.4	28.8	28.2	25.7
2.3 Other food and canned products	38.2	41.8	50.8	43.9	50.5	65.2
2.4 Non-food products	9.0	8.0	5.5	3.8	4.6	4.3
3. Export of fish products from fishing and coastal enterprises, thousand tons	225	212	304	314	332	346
3.1 Share of frozen fish products (uncut and semi-finished product), %	84.4	92.2	87.2	85.0	88.0	84.5
4. Profitability of sold products of fishing organizations, %*	0.1	22.4	37.0	67.3	73.9	69.5
Note: *profit (loss) ratio of sales to cost of goods sold (products, works, services) including commercial and management costs						

At the same time, it should be noted that the profitability of the pelagic fishery in the North Atlantic in recent years did not exceed 20.0–25.0%. The situation is similar for the enterprises developing catches of pelagic fish species in the economic zones of African states. Taking this into account, the profitability of products sold in the fishery of bottom fish species was higher than the average indicators and was at the level of 85.0–90.0%, and possibly even higher. This is confirmed by the results of the analysis of financial indicators of the enterprises of the Northern Basin in the fishery of bottom fish species, where the main share (87.0–90.0%) is cod and haddock.

The sustained increase in production profitability was due to the influence of the following main factors:

- increase in the efficiency of fishing activities. This took place under the influence of an increase in the technical level of the used fishing fleet, optimization of its structure and improvement of the state of the raw material base in the bottom industry (cod, haddock);
- intensification of export activities, supported by the devaluation of the ruble in 2014 and setting to zero export duties on fish products in the period 2013–2017;
- granted tax benefits (since 2009).

Fishing in the Northern Basin is characterized by a high level of export activity, which makes fishing enterprises highly dependent on external market conditions.

In the context of unlimited liberalization of export activities, the private interests of fishing companies prevail over the state ones. This is confirmed by the disregard for the requirements declared at the state level to ensure the approved directive provisions of food safety and the adopted decisions on import substitution [14].

Changes in fisheries policies and reduced fishing potential due to market transformations have led to a decrease in catches and demand for services from enterprises and organizations serving the fleet. Table 3 shows data on some indicators of enterprises and organizations of the Murmansk oblast, characterizing the direction of the ongoing processes.

[14] Stenogramma: Zasedanie prezidiuma Gossoveta po voprosam razvitiya rybokhozyaystvennogo kompleksa [Transcript: Meeting of the State Council Presidium on the Development of the Fisheries Industry]. URL: http://открытаяотрасль.рф/articles/679 (accessed 19 November 2019).

According to the data given in table 3, the port's handling of fish products decreased 5.6 times, the number of employees — 9.9 times.

Table 3

Dynamics of production indicators and the number of workers in infrastructure enterprises of the fishery complex of the Murmansk oblast

Indicators	1990	2000	2008	2017	The ratio of 2017 to 1990, %
1. Total sea cargo turnover of the fishing port (excluding oil depot), thousand tons	1412.9	396.3	254.9	319.3	22.6
1.1. Cargo turnover of fish products	1166.2	383.4	189.7	207.4	17.8
1.2. Unloading of fish products	1142.4	370.8	185.7	165.6	14.5
2. Packing plant					
2.1. Production of cans for ships, sq.m.	227.7	30.2	24.4	by order	10.7
2.2. Production of corrugated packaging for ships, sq.m.	14.3	11.8	7.9	by order	55.2
3. Number of employees, people					
3.1. Ship repair production	9088	2230	1750	600-700	7.1
3.2. Industrial equipment (fishing gear)	363	175	80-90	85-90	24.1
3.3. Package plant	1383	737	452	340	24.6
3.4. Fishing port	5049	1943	1440	511	10.0
3.5. Transport ships	6295	n/d	n/d	250-300	4.4
3.6. Scientific research, design, technological	5424	n/d	n/d	500-550	9.7
Note: according to data obtained from enterprises					

Ship repairing activities of 30–35 small organizations are limited to servicing small, undersized and, in insignificant numbers, medium fishing vessels. Some of them are being repaired and docked at the remaining complex facilities of enterprises in Arkhangelsk. A significant factor is that there is no sustainable prospect for small ship-repair enterprises in the Murmansk oblast due to the uncertainty of the possibilities of interaction between sea and coastal enterprises. In order to increase the volume of ship repair at Russian enterprises, it has long been necessary to solve the problem of “non-sailing” ships, which are currently being repaired abroad. According to RK-Profi No. 47 (733), fishery organizations annually spend about 2 billion rubles for this purpose.

A stable practice to form mobile teams to carry out repair work on Russian ships has developed in Norway [12].

Packaging for canned food and preserves are not produced in the Murmansk oblast, they are imported from St. Petersburg. The production of corrugated packaging is carried out in limited volumes by the order of enterprises. The relative retention of the employees’ number of the Murmansk tare factory is due to the diversification of its activities in the can production, not related to fishing and fish processing.

The production of fishing gear and the provision of fishing equipment is more differentiated and is carried out by 6-7 micro-enterprises.

There are several enterprises in Murmansk that provide services for ship supply, including food, spare parts for ship mechanisms, fire-fighting equipment and emergency rescue equipment, radio equipment, satellite communications, navigation and fish-finding equipment.

A significant reduction in the number of employees occurred in the structure of industry research institutes and planning and design organizations. At the same time, the decrease in scientific and technical personnel was largely associated with a decrease in the volume of fish processing and ship repair production, including the modernization and re-equipment of ships, with a decrease in funding.

Currently, scientific developments (technical and technological) are carried out at the Murmansk State Technical University and PINRO. The latter also carries out scientific research activities to determine the state of raw material reserves of aquatic biological resources (ABR) in the water area of the North Atlantic and the Arctic Seas. This work is carried out on a limited scale due to underfunding and lack of modern research vessels. The private enterprise RPC "Morinfo" also provides information support to fishing activities.

There are 2–3 small design and engineering organizations in Murmansk that develop technical documentation related to the operation of ships (purchased, undergoing repair or modernization).

The intensification of foreign economic activity of fishing organizations in the Murmansk oblast, export of at least 80.0–85.0% of the most massive and liquid bottom fishing objects (cod, haddock, etc.), limits the possibilities of the domestic market. The wholesale system of this group of goods is dominated by the “seller's market” with prices at the export level. The high level of wholesale prices for fish products has an additional restrictive effect both in the retail sales system and when used for production purposes for deeper processing and expansion of the range of products. The latter is to the greatest extent associated with the activities of the Murmansk coastal enterprises specializing in the processing of cod fish species, in which the cost of raw materials (semi-finished product) in the cost structure reaches 65.0–70.0%. The products obtained from the processing of cod and haddock make up 66.0–71.0% of the total natural volume of production of Murmansk coastal enterprises. The initial raw material base for this developing production is the supply of frozen and chilled semi-finished products from oceanic and coastal fisheries in the Barents and Norwegian Seas (table 4).

Table 4

Production indicators of onshore fish processing enterprises of the Murmansk oblast

Indicators	2005	2009	2013	2015	2016	2017	The ratio of 2017 to 2005, %
1. Total output of fish products, thousand tons	31.1	27.4	29.8	20.7	27.0	31.7	101.9
1.1 Food products	30.4	27.4	23.9	16.0	19.9	26.3	86.5
1.1.1 Frozen (freezing of chilled raw and semi-finished products)	12.6	11.6	6.5	2.0	1.9	4.5	35.7
1.1.2 Products from cod fish species (fillets, klipfisk, minced fish, etc.)	9.3	8.1	14.1	11.7	15.9	18.2	195.7
1.1.3 Other food products (salted, smoked, cookery, etc.)	2.0	2.3	3.3	2.3	2.1	3.6	180.0
1.2 Canned food, preserves	6.5	5.4	3.9	3.1	5.0	3.7	56.9
2. Food products, including canned food and preserves (excluding frozen fish), thousand	17.8	15.8	21.3	17.1	23.0	27.3	153.4

tons							
2.1 Share of products from cod fish species,%	52.2	51.3	66.2	68.4	69.1	71.4	136.8
3. Profitability of sold products of onshore enterprises,%	-3.3	-2.5	0.5	2.7	7.0	-2.3	69.7
4. Unloading of chilled fish products	14.1	7.2	32.6	28.1	27.8	38.7	274.5
- cod, haddock	12.5	6.1	27.4	22.7	21.2	30.4	243.2

It should be noted that the average annual load of the main production (fillet and klipfisk production) of enterprises does not exceed 40.0–45.0%. Not more than 7.0% of the total catch of cod and haddock is sent to fillets and klipfisk. Insufficient utilization of the main capacities and the high cost of raw materials determine, in general, persistently low indicators of the economic efficiency of coastal fish processing. Unprofitable enterprises of coastal processing of cod fish species are compensated by the possibility of VAT refund on the export of fish products (up to 70.0% of the main types of produced products).

The increase in fillet production since 2016 was largely due to the commissioning of the new “Polar Sea +” plant as part of the “Norebo” holding with guaranteed supplies of chilled raw materials. This trend continued in 2017.

The usage of chilled raw materials in the production of fillets from cod fish is the most promising option for the development of coastal enterprises, since it increases the quality and cost of products, the possibility of selling them in Western markets. As a result, competitiveness and financial results are increasing.

When assessing the prospects for the development of onshore enterprises, the most significant problems include the lack of guaranteed supplies of fish raw materials for processing, which has a negative impact on capacity utilization and the rhythm of production activities, restrains production volumes and an increase in positive financial results. The presence of a significant raw material component of exports and unloaded capacities of onshore enterprises confirms the need to increase the scale of onshore deep processing and, accordingly, to increase the discharge of chilled semi-finished products.

A potential base for increasing the supply of chilled fish raw materials for coastal processing can be considered frozen semi-finished product exported by fishing enterprises (gutted fish without a head). This applies, first of all, to the products produced by medium-sized serial-built vessels in the Russian economic zone.

Study results and discussion

The above data indicate that in the current conditions the main part of the fishing organizations of the Murmansk oblast have no incentives to create an additional unifying organizational system in the form of a cluster. They see it as an additional add-on that limits their capabilities. The same negative attitude was towards the proposals (February 2019) to participate in the interregional "Arctic Fishery Cluster" of the Arkhangelsk Oblast.

In world practice, the formation of clusters with the participation of marine fishing companies has not been widely developed, which, in our opinion, is associated with the use of a small fishing fleet, united in various legal forms with coastal enterprises processing catches and trading fish [15]. Oceanic fishery predominates in Russian fisheries. Trawler owners appropriate substantial rental income. According to our calculations, it is up to 40% of the value of the economic turnover [13]. The export of fish products directly from the sea is weakly controlled. There are opportunities to receive unaccounted income [16]. In the Murmansk and Arkhangelsk oblasts, these factors contribute to the isolation of fishing enterprises especially strongly, since more than half of the harvested hydrobionts are currency-intensive: cod, haddock, halibut and crab with a high rental component [13]. A similar situation is in the Far East fishing basin.

The analysis of the Murmansk fishery complex showed:

- growing potential of the oceanic fishery block and the alienation of its main part from the relationship with the infrastructure coastal base of Russia (Northern Basin);
- stagnation of onshore fish processing, as well as the infrastructure sector, which serves in limited volumes medium, small and undersized vessels based in the Murmansk seaport;
- impossibility of creating a regional cluster on classical terms due to the refusal to voluntarily enter into the oceanic fishing fleet, which is the core of the potential cluster.

At the same time, it can be argued that the effective overcoming of most of the negative phenomena noted above in the functioning of the fisheries of the Murmansk oblast is possible in unification. This is based on the rich resource potential of the seas of the Western Arctic, which should be used in the interests of society and the state, as well as an efficient fishing fleet and new high-tech coastal enterprises for processing fish and seafood under construction.

As is known, the Murmansk oblast has been called a pilot region for the development of the Arctic zone of the Russian Federation, where the Kola support zone is being created, which should be based on seven sectoral and intersectoral clusters, including a fish one. Also, according to the Forecast of socio-economic development of the Murmansk oblast for the period up to 2035, the largest share in the GRP structure will be occupied by the key sectors of the region's economic specialization: manufacturing, extractive and fishing industries, each of which will make up about

[15] Nauchnye i prikladnye osnovy ustoychivogo razvitiya i modernizatsii morekhozyaystvennoy deyatel'nosti v zapadnoy chasti arkticheskoy zony Rossiyskoy Federatsii: otchet o NIR (promezhut.): 0226-2019-0022 / Institut ekonomicheskikh problem Kol'skogo nauchnogo tsentra Rossiyskoy Akademii nauk; nauch. ruk. Vasil'ev A.M.; otv. ispoln.: Vasil'ev A.M., Kuranov Yu.F., Fadeev A.M. i dr. Apatity, 2019. 120 s. [Scientific and Applied Foundations of Sustainable Development and Modernization of Maritime Activities in the Western Part of the Arctic Zone of the Russian Federation: Report on Research (Interim): 0226-2019-0022. Institute of Economic Problems of the Kola Scientific Center of the Russian Academy of Sciences; scientific. adv. Vasilyev A.M.; executed by Vasiliev A.M., Kuranov Yu.F., Fadeev A.M. et al. Apatity, 2019. 120 p.].

[16] Press-konferentsiya rukovoditelya Federal'nogo agentstva po rybolovstvu Andreya Kraynego 25.12.2012 g. [Press Conference of the Head of the Federal Agency for Fisheries Andrey Krainy 25 December 2012]. URL: http://presscentr.rbc.ru/pressconf/2012/12/25/837697/ (accessed 21 December 2020).

10-12% of the GRP. They are supposed to be combined into 7 clusters, the structure of which covers almost all enterprises in the Murmansk oblast[17].

It is proposed to use the "Project Approach" as the main economic mechanism for forming clusters[18].

The Forecast does not say how the negative attitude to joining the cluster of the oceanic fishing fleet will be overcome. In our opinion, in this case the decisions of the federal authorities are indispensable in this case. For example, the rules for endowing fishing organizations with quotas of bioresources or export policy may be changed, as well as the adoption of the Law “On the connection of the fishing fleet with the coastal community” is possible.

Conclusion

The article shows, on the one hand, the improbability of establishing a classic fishery cluster under existing organizational conditions and, on the other hand, the expediency of its formation. The directions of federal and regional bodies activity are proposed in order to stimulate fishing entities to enter the classic fishery cluster.

It can be concluded, by the reference to the real state of the fishery complex of the Murmansk oblast, that the potential for the formation of a cluster is currently promising, in our opinion, on the basis and in the scale of interaction of coastal fishing, coastal fish processing plants, and other enterprises and organizations serving fishing activities. The proposed option has four properties — the determinants of the Porter model: the necessary production factors, the demand for fish products in the domestic and foreign markets, the presence of related and service industries (in the city of Poljarnyj and in the city of Murmansk), as well as intra-industry competition. The initiator of the fish food cluster can be (with the support of the "Center for cluster development of the Murmansk oblast") the Murmansk branch of the all-Russian "Fish Union". It mainly unites enterprises that process cod fish species. Active participation of coastal fishing enterprises (NPO ACFFM) with the involvement of the management of the Shipyard in Poljarnyj, interested in this process, is also necessary.

In 2018, the management of the Federal Research Center of the KSC RAS formed a group to carry out scientific and productive activities for the development of biotechnologies. The goal of the project is to create a research and production cluster of biotechnology for the processing of pharmacologically valuable raw materials, including algae, crustaceans and fish waste. Involvement of this group in the composition of the fish food cluster being created will enhance its innovative orientation.

The strategic goal of creating a territorial-local fish cluster in the Murmansk oblast is to form an effective system of interaction and cooperation between participants - companies in the

[17] Prognoz sotsial'no-ekonomicheskogo razvitiya Murmanskoy oblasti na period do 2035 goda [Forecast of Socio-economic Development of the Murmansk Oblast for the Period Up to 2035]. URL: https://minec.gov-murman.ru/activities/forecasts/sub02/ (accessed 10 January 2020).
[18] Ibid.

fishery complex (backbone and infrastructure) and the scientific and educational sector to ensure food security, saturation of the domestic market with high-quality and affordable fish products for the population, increase efficiency and competitiveness of enterprises and the economy of the region as a whole, its export potential. To achieve the strategic target, interaction covers all interested parties, including associations of cluster participants, non-profit and public organizations, investors, government and local authorities

The local project of creating a fishery cluster in the city of Poljarnyj on the basis of the ship-repair plant of JSC "10 SRY" is supported by its management. The cluster includes the unloading of fish products, inter-voyage repairs of ships, preparation for going to sea for fishing, complete processing of products, their transportation to the consumer and the construction of a small and medium-sized fishing fleet.

The main goals and functions of the cluster structure can be represented as follows:

- coordination of joint actions to expand the scale of fishing and onshore production activities;
- development of measures to improve the efficiency of ABR development and their processing;
- development and implementation of new technologies for fish processing, management and marketing;
- training, retraining and attracting qualified specialists;
- implementation of joint investment projects for infrastructure development;
- strengthening the stability and predictability of long-term contractual relations for the supply of raw materials to onshore enterprises, the performance of work and the provision of services between the cluster members;
- coordination with the competent authorities of proposals aimed at lowering administrative barriers to the delivery and unloading of fish products from the fishery.

The considered fish cluster is characterized by the common activity of the participants (backbone and infrastructural) to create the final fish products of varying degrees of processing (food, canned, technical, fodder).

The long-term and sustainable operation of the fish cluster can only be achieved through the implementation of effective incentive measures, particularly for fishing organizations. For these purposes, in addition to attracting national program activities and supporting development institutions, a comprehensive system of raw materials and financial support for participants at the sectoral (departmental) and regional levels should be developed and used. For example, the list of potentially effective incentive measures consider a guaranteed increase in the volume of coastal fishery due to a change in the status of fishing vessels producing primary cutting products from bottom fish at sea, as well as due to the transfer of unrealized scientific quotas and quotas to the coastal fleet of the third countries.

One of the main directions of achieving the goals of creating and developing the cluster is the implementation of joint projects. This requires, in accordance with the approved legislative framework, the identification of mechanisms and instruments for budgetary, informational and advisory support for the implementation of these projects.

A problematic issue in the Murmansk oblast is the lack of capacity for the disposal of increasing non-food waste at onshore and fish farms. For these purposes, it is necessary to build a plant for fat and flour production as an infrastructure component. The construction of a covered berth is no less important in conditions of limited docking opportunities and unfavorable climatic conditions.

In order to give the cluster an innovative focus, it is necessary to consider the possibilities of financial support for the development of biotechnologies (on the basis of raw materials of little-used ABR and waste from operating enterprises) with their subsequent commercialization. The latter will also require investment in the development of new production in the framework of public-private partnerships.

In Murmansk oblast in the period 2019–2021 it is planned to increase the capacity (by 1.5-2.0 times) for fish processing, including fillet production, based on the construction of factories within the framework of the state program of resource support, with the allocation of investment quotas for cod and haddock for this purpose. This circumstance, other things being equal, will increase the competition of onshore enterprises for the attraction of chilled raw materials

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Received on May 06, 2020.