Evaluation of fishing industry clusterization in the russian far east within the context of integration with Asian-Pacific markets

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Abstract

The study's aim is to assess the potential and processes of formation of sectoral clusters in the Far Eastern regions fishing industry.

The paper suggests the strategy for forming the fishing industry clusters in the Russian Far East, analyzes trends, taking place in the fishing industry, from the perspective of its clusterization, interprets locatization and density ratios of capture fisheries and fish-farming businesses in the Far Eastern territories.

The research first describes methods used to evaluate localization and geographical density of fishing-industry companies in the Far Eastern regions, and offers methodological recommendations for investigating fishing industry clusters. The second stage outlines trends of the industry such as increasing harvest level, changing proportion of capture fisheries and fish breeding, growing export, emerging exporting clusters, forming fishing industry associations. The third stage analyzes density ratios and specialization of fishing and fish-farming businesses by regions, compares the calculated ratios' values to other Russian regions' ones. On the basis of integral ratio we estimate the potential for clusterization of the fishing industry in Russian regions as well as on the territories of the Far Eastern Federal District.

The research comes to conclusion that a set of state support measures and effective investment projects, concerned with the fishing industry cluster, can produce an additional synergetic effect for the whole gross regional product.

Keywords: Cluster Policy, Integration into Markets of Asian-Pacific Region; Territorial Organization; Industrial Complex; Fishing Industry Cluster; Fish-Breeding; Fishing; Regional Development Management.

JEL Classification: L50, L51, L52, O25.

Introduction

The research aims to evaluate potential and processes of fishing industry cluster formation in the Russian Far East.

In the past decade, the Russian government has begun to implement a strategy to integrate Russian Far Eastern territories into the economic system of the Asia-Pacific region. The theoretical basis of the measures is the methodological of industrial clusters and the successful world practice of free economic zones. The total funding for the State Program "Economic and Social Development of the Far East for the Period to 2018" was set at 691,995.3 million rubles. Later, the programme was prolong, but

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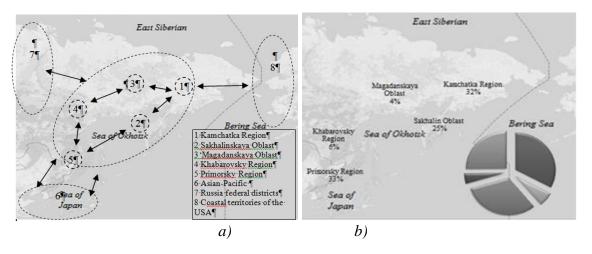
goals for integration are not achieve at the present stage (Saltykov and colleagues, 2017).

Similarly, some Asia-Pacific countries are interested in developing economic cooperation with Russian Far Eastern regions, including the Republic of Korea, which has proposed a list of projects in the development of bilateral cooperation, including fisheries industry.[187]

Working out economic strategies of long-term regional development should base themselves on the analysis of the regional industrial mix, take into account established trends, inter-regional trade relations, and factors providing for development or stagnation of the key regional industries.

One of the crucial industries of the Far Eastern Federal District (FEFD) is intersectoral fishing industry complex. Businesses of the fishing industry are located in all territories of the Far Eastern Federal District (pic.1). The District accounts for the bulk of exported seafood to Asian-Pacific markets: China, Korean Republic, Japan, etc.

a) *b)*

Pic. 1. Geographic distribution of the fishing industry businesses in the territories of the Russian Far East (a); annual mean values of harvest and specific weight in the structure of harvest in FEFD (b) (calculated by the authors)

We should highlight several methodological issues before analyzing the clusterization process in the Russian Far East:

- which criteria to follow when choosing a location for basic infrastructure to start the fishing industry cluster, in the Primorsky Region in particular;
- how to monitor forming fishing industry clusters in the Russian Far East;
- how to evaluate efficiency of managerial decisions (it can be implicitly measured through changes in harvest, export, import, dynamics of fishing production); at the same time the effect of fishing industry cluster on business practices and entrepreneurship in the region is analyzed in no way;

- how to apply factor analysis and process modelling to forecast a long-term and successful clusterization in the fishing industry in the Russian Far East and make appropriate managerial decisions;
- how to formulate a unified interpretation of the concept "a fishing industry cluster" and its structure in the Russian Far East, as terminological diversity exerts a negative impact on the implemented and developed strategies of social and economic development of the region. As a result, every region matures its own strategy of the cluster development.

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[187] Let's build 9 bridges between Seoul, Moscow: President Moon. Retrieved from http://www.korea.net/NewsFocus/policies/view?articleId=149046 (08/09/2019)

Methodological approach to the research of fishing industry clusters

In the course of the research we will use the following terms: *fishing industry* (fishery) – types of activity concerned with capture fisheries and preservation of aquatic bioresources, aquaculture, production and sale of fish products and other products made from aquatic bioresources; *capture fisheries* – activities on catching aquatic bioresources; *fish-breeding (fish-farming)* – raising fish and other water animals and plants, scallop, trepang, laminaria, salmonids and other species. Major types of capture fisheries and economic activities in the field of catching aquatic bioresources are defined in the Federal law «Of capture fisheries and preservation of aquatic bioresources"[188].

Algorithm of the research consists of two stages: at the first stage we research basic production indexes and trends in the fishing industry in the Far East; at the second stage we will analyze the density ratios of fishing businesses throughout the Russian Far East from the perspective of gross production per capita, localization of small fishing businesses, geographical arrangement of investments into fixed assets. At the final stage we will calculate an integral ratio. The methodology for calculating ratios can be found hereinafter. Those approaches are described in the works of E. Bergman and E. Feser (*Bergman, Feser, 1999*), L.S. Markov *(Markov, 2015)*, etc. Stage 1.

1. Specialization ratio of production (K_q) is calculated as per the formula:

$$\frac{q_t^f}{\Sigma_f Q_i^f} \bigg/ \frac{\Sigma_i q_i^f}{\Sigma_t \Sigma_i q_i^t},$$

where: q_i^f – quantity of gross production of fishing businesses in the *i*-th region, RUB;

$$\sum_f Q_t^f$$ – quantity of gross production of all businesses in the i-th region, RUB;

$$\sum_i q_t^f$$ – aggregate output of all businesses in the fishing industry in the country, RUB;

$$\sum_f \sum_i q_i^f$$ – gross output in the country, RUB.

2. The localization ratio for fishing businesses in the region () is calculated as per the formula:

$$\frac{p_t^f}{\Sigma_f P_t^f} \bigg/ \frac{\Sigma_i p_t^f}{\Sigma_f \Sigma_i p_i^f},$$

where: p_i^f – quantity of fishing businesses in the i-th region, in units;

$$\sum_k P_t^k$$ – quantity of businesses in the i-th region, in units;

$$\sum_i p_t^k$$ – quantity of fishing businesses in the country; $$\sum_k \sum_i p_i^k$$ – quantity of businesses in the country, in units.

3. The production ratio per capita is calculated as per the formula:

$$\frac{q_t^f}{\Sigma_f Q_t^f} \bigg/ \frac{\Sigma_i w_t^f}{\Sigma_f \Sigma_i w_i^f},$$

where: q_i^f – gross output of fishing production in the i-th region, RUB;

$$\sum_f Q_t^f$$ – gross output of production in the i-th region, RUB;

[188] Federal law № 166-FL «Of capture fisheries and preservation of aquatic bioresources" of Dec. 20, 2004. Retrieved 05/02/2019 from http://www.consultant.ru/document/cons_doc_LAW_50799.

$$\sum_i w_t^f$$

– population size in the i-th region, people;

$$\sum_f \sum_i w_i^k$$

– population size in the country, people.

4. The localization ratio of small businesses in the fishing industry is calculated as per the formula:

$$\frac{s_t^f}{\Sigma_f S_t^f} \Bigg/ \frac{\Sigma_i s_t^f}{\Sigma_f \Sigma_i s_i^f},$$

where s_i^f – quantity of small businesses in the fishing industry in the i-th region, in units;

$$\sum_f S_t^f$$

– total quantity of small businesses in the i-th region;

$$\sum_i s_t^f$$

– quantity of small business in the fishing industry in the country;

$$\sum_f \sum_i s_i^f$$

– total of small businesses in the country, in units.

5. The localization ratio of investment into fixed assets is calculated as per the formula:

$$\frac{v_t^f}{\Sigma_f v_t^f} \Bigg/ \frac{\Sigma_i v_t^f}{\Sigma_f \Sigma_i v_i^f},$$

where: v_i^f – volume of investment into fixed capital of fishing

businesses in the i-th region, RUB;

$$\sum_f V_t^f$$

– cumulative investment in fixed capital in the i-th region, RUB

$$\sum_i v_t^f$$

– cumulative investment in the fishing industry in the country, RUB

$$\sum_f \sum_i v_i^f$$

– investment volume in fixed capital in the country, RUB.

6. The density ratio of fishing objects is calculated as per the formula: $K_d = \frac{p_i^f}{s_i}$, where: S_i – square of the region under research, km².
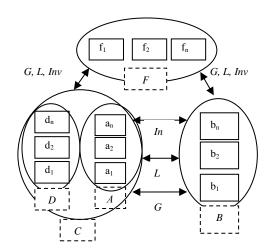
Stage 2.

At the concluding stage we calculate the integral ratio (), that allows to embrace the results of calculation for the whole aggregate of ratios as per the formula:

$$\frac{\mathbf{SUM} \sum \left(K_q \; ; K_p \; ; \; K_w \; ; \; K_s \; ; \; K_i \; ; \; K_d \right)}{n},$$

where:

K_q ; K_p; K_w; K_s; K_i; K_d; – the corresponding ratios, described above; n – number of ratios taken for calculation.

To learn the specific regional structure of fishing industry clusters, we applied the method of structure diagram. The methodological basis was laid by works by P.Y. Baklanov (*Baklanov, 2007*). As a part of the research, we drafted a diagram of fishing industry clusters, comprising numerous fishing businesses, located on different territories (pic. 2).

A – clusters of territories in the Russian Far East;
B – clusters of territories in the Asian-Pacific (APR);
C – set of fishing industry clusters in the Russian Federation, A and D among them;
D – territorial clusters in the RF (Northwest Federal District, Southern Federal District and others);
F – clusters of European fishing industry territories

G, L, Inv – flows of fishing industry goods (G), labour resources (L), investments (Inv)

Pic. 2. The general pattern of contacts among fishing industry clusters in the Russian Far East and neighbouring regions (compiled by the author)

Brief Literature Review

The research bases itself on the researches of foreign and Russian authors: E.Dahmen (*Dahmen, 1988*), A. Markusen (*Markusen, 1996*), M. Porter (*Porter, 1990, 1996*), S. Rosenfeld (*Rosenfeld, 1997*), O. Solvell (*Solvell, 2008*), M. Feldman (*Feldman, 1999*), S. Czamanski *(Czamanski, Ablas, 1997)*, M. Enright (*Enright, 1992, 2003*), R. Martin and P. Sunly (*Martin, Sunley, 2003*), E. Bergman and E. Feser (*Bergman, Feser,* 1999), L.S. Markov (*Markov, 2015*), S.N. Rastvortseva (*Rastvortseva, 2018*), O.Y. Vorozhbit (*Vorozhbit, 2008*) and others. We also assume works by P.Y. Baklanov (Baklanov, 2007), M.T. Romanova, A.V. Moshkova (*Baklanov, Moshkov, Romanov, 2011)*, and analysts from TINRO-Center (*Zhuk, 2010*) to be a theoretical and methodological basis for the research of the territorial structures of economy.

Genesis of fishing industry in the Russian Far East has a long production history and has undergone a few stages that formed the current image of the regional industry. To have a detailed idea of the local fishing industry in historic perspective, one can read works by *A. T. Mandrik (1994)*. With transition to market economy the industry encountered the problem of effective development strategies and scientific rationale for the latter. More extensive information on the baseline conditions and current problems of the regional fishing industry is supplied in the following research *(Saltykov and colleagues, 2019).*

Since mid 2000s the discussions on how to develop the fishing industry in the Russian Far East have started to mention a cluster approach, and the latter gained much popularity among Western and Russian economists. Some works of interest, devoted to the theoretical rationale of the industry siting have been published by now (*Animitsa, Denisova, 2014*). Out of many a definition we'd rather point out on some of them. M. Porter says that an industrial cluster is a set of industries, linked through "buyer-supplier relationships, or common technologies, common buyers or distribution channels, or common labor pools" *(Porter, 1990)*. Stuart A. Rosenfeld defines a "cluster" as "concentrations of firms that are able to produce synergy because of their geographic proximity and interdependence, even though their scale of employment may not by pronounced or prominent" (*Rosenfeld, 1997*). Edward M. Bergman and Edward J. Feser elaborate on the topic as follows: "Regional industry clusters are industry clusters that are concentrated geographically, normally within a region that constitutes a metropolitan area, labor market shed, or other functional economic unit" (*Bergman, Feser, 1999*). This term has a similar meaning, developed by economists and geographers of various theoretical fields, for example, "an industrial district", or "development blocks" by W. Dahmen *(Dahmen, 1988).* Nevertheless, definitions proposed by M. Potter got widespread use (*Porter, 1996*).

Fishing clusters in the Russian Far East has been a recurrent subject both in scientific circles, and in structures of public administration. For instance, S. R. Dreving gives grounds for the development strategy of the Kamchatka fishing

industry on the basis of cluster approach (*Dreving, Malenkov, 2009*). At the same time the majority of academic papers see the Primorsky region as a growth driver for the fishing industry development (*Vorozhbit, 2008*). S.E. Leljuhin (*Leljuhin, 2013*) substantiates the structure and peculiarities of the fishing industry cluster in the Primorsky region. In 2011 Lesovsky and Saltykov distinguished a cluster of marine economy in the Primorsky region in their research (*Lesovsky, Saltykov, 2011*). Later on, this idea was specified in the program "Social and economic development of the Russian Far East and the Baikal Region"[189] and in "Strategy of social and economic development of the Primorsky region for 2013–2017" [190] , and for other Far Eastern territories by analogy.

In 2014 the administration of the Primorsky region invited the Japanese Nomura Research Institute (NRI Ltd.) to design a model of cluster development for the territory. NRI put together a scientific consortium made up by foreign and Russian research centers: FSBSE TINRO-Center and Far-Eastern Marine Reaseach, Design and Technology Institute. The fishing cluster was presupposed to become integrated for the whole Russian Far East and include industrial objects for fish processing. The project was modified several times but hasn't been implemented due to lots of critical comments.

At the time the project, put forward by NRI, has lost its topicality, and at the instruction of President, the Russian Federal Fisheries Agency developed an alternative project, aiming to create fish industry clusters. Under its conditions the Primorsky region will become one of the four divisions of the Pacific Coast of Russia. Within the framework of the new cluster conception, major production facilities will be located in Vladivostok urban agglomeration. It's suggested to launch 5 priority investment projects with the investment total of 14 billion roubles and payback period of 9 years[191].

Results

Analysis of trends in the fishing industry in the Russian Far East from the perspective of clusterization
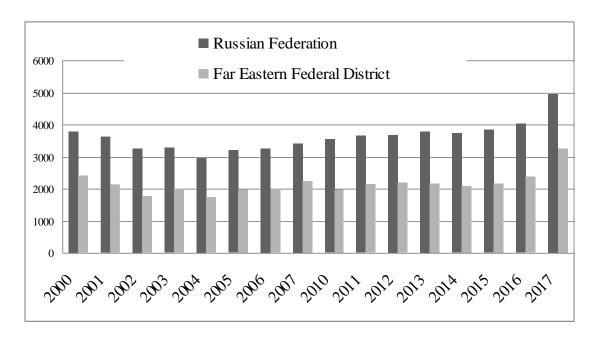
The Far Eastern fishing industry complex includes 2 754 fishery businesses, 197 fish-breeding businesses, 1 386 companies that can be classified as subjects of small business, engaged in both capture fisheries and fish-farming, as well as 449 sole proprietors. The territory of the Russian Far East houses 67 fish-breeding plants, 44 of them are located in the Sakhalin oblast, 10 – in the Khabarovsky region, 4 – in the Primorsky region, 4 – in the Magadan oblast, 5 – in the Kamchatka region.

Trend 1. Nowadays we can follow an increase in harvest of aquatic biological resources. In 2017 all companies of Russia produced 4 951 thousand tons of fish products, the Russian Far East businesses procured 3 246,8 thousand tons of these, the companies of the Northwest Federal District – 1 369,4, the organizations of the South Federal District – 116,4. Region-wise analysis of the harvesting dynamics displays that the share of the Far East accounts for 55-65 %, the Northwest Federal District 20-40 %, the total of the two above mentioned districts making 85–95 %. The percentage of the rest of Russian districts makes as little as 5-15 % of the Russian catch. These proportions keep relatively stable for extended periods of time (pic. 3).

[189] Russian Federation Government Resolution of March, 29 2013 N 466-r "On endorsing a state program "Social and economic development of the Russian Far East and the Baikal Region". System GARANT: Retrieved from http://base.garant.ru/70351168/#ixzz5nCz1Gq2shttp://base.garant.ru/70351168/ (07/05/2019).

[190] A 5-year program of social and economic development of the Primorsky Region (2013-2017). Retrieved from https://primorsky.ru (07/05/2019).
[191] How new-made cluster's been prepared // Fishnews: news, analysis and research journal. Retrieved from https://fishnews.ru/rubric/novaya-struktura-pravitel-stva/9901 (10/04/2019)
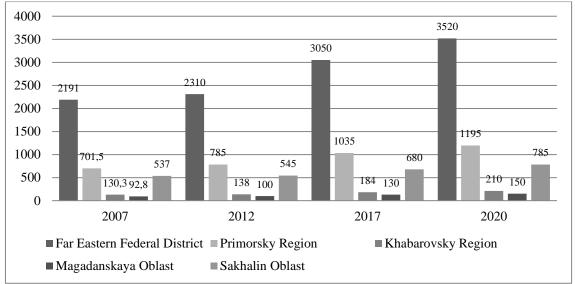
Pic. 3. The harvest share of the Far Eastern Federal District (calculated by the author according to figures provided by the Federal State Statistics Service)[192]
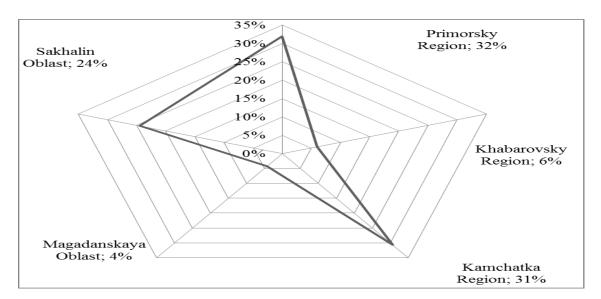
Pollock serves the basic production object of fishing industry businesses in the Russian Far East – about 1 733,8 thousand tons, that makes 59 % of the catch total, and the share of this species keeps on growing. The second in number are Pacific salmons (Humpback salmon, Siberian salmon, Red salmon), the fishing of the latter equals about 400.2 thousand tons (16 %), herring – 390 thousand tons (12 %), cod 102.9 thousand tons (3 %), other species add up to 2–3 % of the total harvest.

Businesses, involved in fishing and fish processing, are located in the Primorsky region (34 % of the harvest total in the Russian Far Federal District), the Kamchatka region occupies the second place with its 31 %, the third position is held by the Sakhalin oblast (24 %), the Khabarovsk territory accounts for 6 % and the Magadan oblast left with 4 %. Some moderate production level can be traced in the Republic of Sakha Yakutia, at the meantime the output of this territory is so small that they can be left out of account in the research (pic. 4).
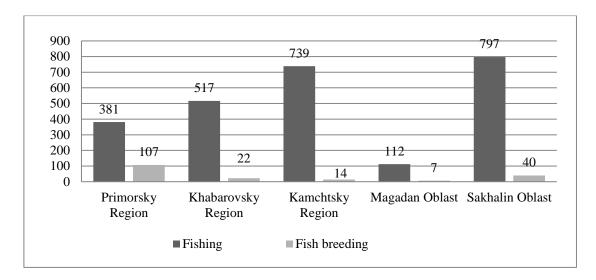

Pic. 4. Harvest of fish crop by regions of the Far Eastern Federal District (compiled by the author from the data of "The development strategy for fishing industry complex in the Russian Federation up to 2020"[193].

In summary, five larger regions can be distinguished on the criteria of their potential to form fishing industry clusters, as they have manufacturing base and resources, produce alike output, and enter horizontally and vertically integrated industrial associations.

Trend 2. A slight increase in the share of fish-breeding companies as compared to fisheries can be seen in the Russian Far East, whereas territorial disproportion in the distribution of production in the region still takes place. The analysis of territorial arrangement of the fishing industry businesses demonstrated a heterogeneous structure (pic. 5).

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[193] The development strategy for fishing industry complex in the Russian Federation up to 2020 // GARANT.RU: informational and legal web portal. 2009 Retrieved from http://www.garant.ru/products/ipo/prime/doc/2068101/#ixzz5mjeD9OAb (23/04/2016).
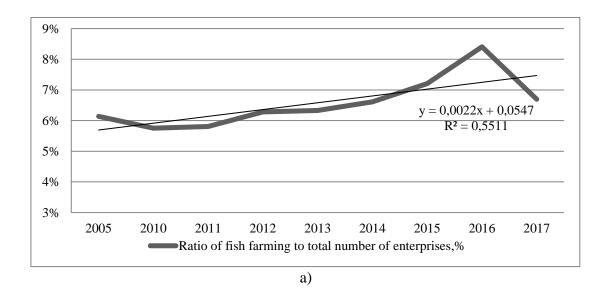
Pic. 5. Spread of capture fisheries and fish-breeding businesses by regions of the Far East Federal District (calculated by the author according to the estimates of the Federal Service of State Statistics)[194].

The Sakhalinskaya region occupies the leading position in terms of quantity of fishing businesses (29 % of the total quantity), the second leader is the Kamchatka territory (27 %), the third in order of importance is the Khabarovsk territory (19 %), the forth one is the Primorsky region (14 %), and the last area is the Magadan oblast(4 %). When analyzing fish-breeding companies the rating list will be nearly reverse: the biggest player being the Primorsky region (54 % of total number), the second-largest one – the Sakhalinskaya region
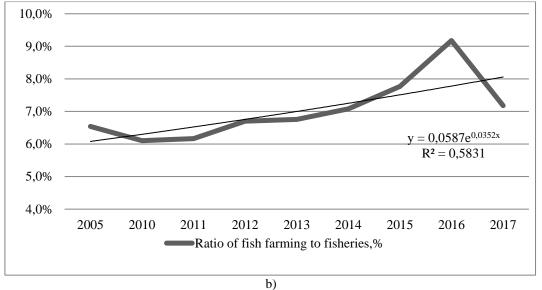
(20 %), the third one being occupied by the Khabarovsky region (11 %), the forth one – the Kamchatka territory (7 %), the final position – the Magadan oblast(4 %).

Balance between these types of economic activity is reflected by the ratio of fish-breeding businesses to the total number of companies in the industry (pic. 6, a) and the ratio of fish-breeding to capture fisheries (pic. 6, b).

a)

$$y = 0{,}0587e^{0{,}0352x}$$
$$R^2 = 0{,}5831$$

b)

Pic. 6. Ratios of fish-breeding and capture fisheries in the Far Eastern Federal District in dynamics (calculated by the author according to the estimates of the Federal Service of State Statistics)[195]
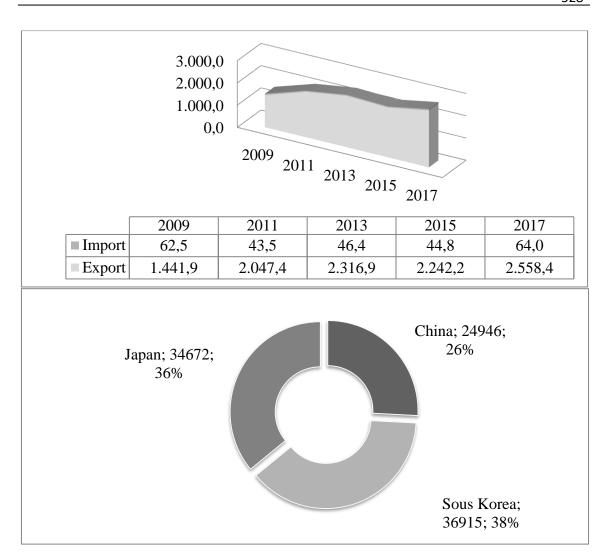
Since 2005 we can observe a moderate growth in number of fish-breeding companies, the rising curve correlates the trend (pic. 6), but the period between 2016 to 2017 was marked by a decrease in the share of fish-breeding in the industry total. There exists an opinion that "a decline in the volume of production of fish-farming is conditioned by price factors, that is, devaluation of the national currency. And a drastic contraction in production of fresh and cooled fish was a consequence of import dependency on fish seed of salmons, the import of which shrank away considerably in the beginning of 2015" (*Bogachev, 2018*). Nevertheless fish-breeding industry is considered to be one of the most

perspective areas to make use of aquatic biological resources. In 2013 the government adopted the Federal Law "About aquaculture (fish-breeding)",[196] and passed several normative acts, designed to facilitate development of this type of economic activity.

Trend 3. These days we can follow the forming trend of increasing export, about 35 % of caught fish go for export, the bulk of it makes undivided frozen fish with low added value. Export proceeds see annual rise with an average rate of growth equaling 17 %. The other situation is characteristic for import: the mean annual rate of import revenue comes out at only 4 % (pic. 7).

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[195] Regions of Russia. Social and economic indexes. 2018 / Russtat. M., 2018. 1162 p.; Regions of Russia. Social and economic indexes. 2017: statistical book. / Russtat: M., 2010. 996 p.
[196] Federal law "About aquaculture (fish-breeding) and introducing legislative changes in some legislative acts of the Russian Federation" of 02/07/2013 N 148-FL (the last revision). Retrieved from http://www.consultant.ru/document/cons_doc_LAW_148460/ (23/04/2019).

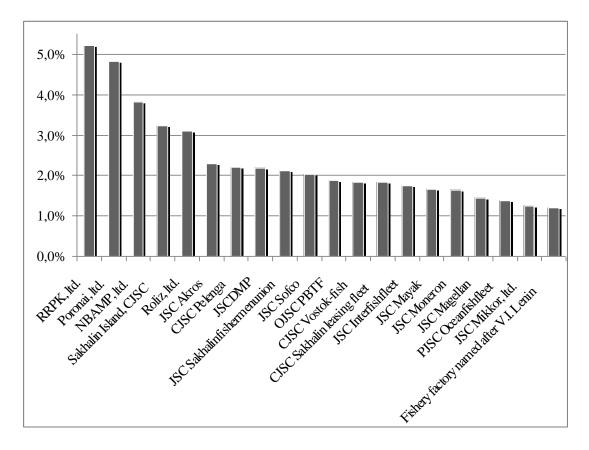|	2009	2011	2013	2015	2017
■ Import	62,5	43,5	46,4	44,8	64,0
■ Export	1.441,9	2.047,4	2.316,9	2.242,2	2.558,4

Pic. 7. Export and import of fish, crustaceous shellfish and other water invertebrates, mln. USD
(calculated by the author according to the estimates of United Federal Informing Statistical Service[197])

The largest exporters are "Russian fishing company, ltd." (RFC), – 5,22 % of export, second best is the Sakhalin company "Poronai, ltd.", the public joint-stock company "Nakhodkinskaya Base of Active Maritime Fishery" (PJSC "NBAMR") is the third-biggest company and holds 4,01 % of the exporting market. 47 % of export volume of the regional fishing industry accrue to only 20 major companies. Three groups of exporting companies can classified under three headings: enterprizes with export share over 2 %, companies with export penetration equaling 2 %, and businesses with export participation less than 2 % (pic. 8).

Pic. 8. Distribution of major exporters of fishing products in the Far Eastern Federal District by share in export structure (compiled by the author from statistics of international commerce published on the website http://ved-stat.com).

South Korea (38 %), Japan (36 %) and China (26 %) appear key importers of exported fishing goods. 80 % of import operations with fishing products are carried out from China. From 60 to 70 % of fishing output of Far Eastern companies run through the ports of the Primorsky region, from where it heads for Qingdao, Pusan, and further to the markets of Japan, USA and European Union (Table 1.).

Table 1. Export and import by commodity groups, thousands of dollars USA

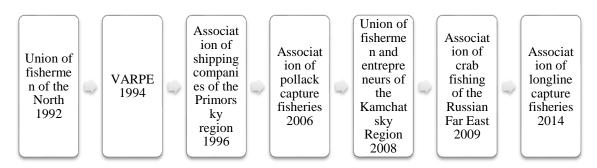| Export	2012			2015			2018		
Commodity Groups	All countries	Foreign countries	Union of the independent states	All countries	Foreign countries	Union of the independent states	All countries	Foreign countries	Union of the independent states
Fish, crustaceans, shellfish, etc., aquatic invertebrates	2216176,88	2211515,48	4661,4	2242174,47	2240736,5	1437,97	3281185,84	3280468,76	717,08

	All countries	Foreign countries	Union of the independent states	All countries	Foreign countries	Union of the independent states	All countries	Foreign countries	Union of the independent states
All goods	25831195,86	25583807,66	247388,2	20617528,05	20385170,08	232357,97	28188714,02	27939526,41	249187,61
Import	**2012**			**2015**			**2018**		
Commodity Groups	**All countries**	**Foreign countries**	**Union of the independent states**	**All countries**	**Foreign countries**	**Union of the independent states**	**All countries**	**Foreign countries**	**Union of the independent states**
Fish, crustaceans, shellfish, etc., aquatic invertebrates	38252,89	38252,89	0	44825,98	44825,98	0	60609,28	60609,28	0
All goods	10554783,65	10530596,2	24187,44	5880925,4	5701294,46	179630,94	6286220,46	6191405,76	94814,7

The problem is that the importing countries are interested in importing raw produce and create conditions for fishing imports with low degree of processing. Therefore, they give no incentive to develop regional processing, refurbish production facilities, attract investment, implement innovations in the fishing industry to raise its technification, also, there are problems with hiring high-skilled professionals.

Despite considerable export proceeds, modernization of fixed production assets keeps low. Wear and tear of assets varies by the regions of the Russian Far East. For example, over a 5-year period depreciation of key assets of the fishing industry, the Primorsky region has followed an upward trend from 46 % in 2013 to 71 % in 2017. The proportion of capital investment, directed towards development of the fishing industry complex remains exceptionally low in the total investment volume – ranging from 1 to 2 %. Put this into perspective: in 2000 their share reached 8 %.[198] At the same time the rate of depreciation of capital funds of the fishing industry in the Kamchatka territory makes 38,0 %.[199]

Trend 4. Integrated production holdings and industry associations develop gradually (pic. 9).

Pic. 9. Lifecycle of industry unions for coordinating fishing industry clusters in the Far Eastern Federal District (complied by the author from websites of associations)

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[198] Capture fisheries industry of the Primorsky Region: an analytical bulletin / Primorskstat. Vladivostok, 2018. 43 p.

[199] Capture fisheries industry of the Kamchtsky Territory. 2018: statistical book/ Kamchtskstat. Petropavlovsk-Kamchatsky, 2018. 55 p.
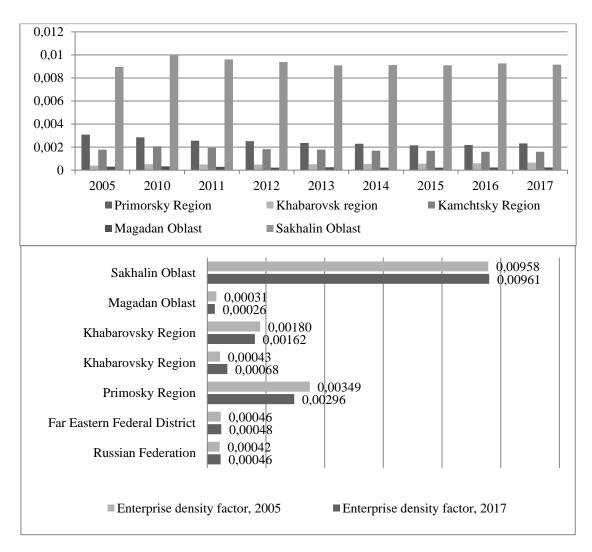
Since 1992 the Far Eastern Federal District sees the formation of industry associations that hold annual industry congresses and round tables, work out the strategy for the industry development [200]. Together with bodies of legislative power they coordinate capture fisheries of the region, elaborate joint projects, frame draft plans for laws in the sphere of fishing, analyze initiatives of Federal Anti-Monopoly Service in the field of fishing[201].

This process ensures the genesis of regulation structure that coordinates the activities of the agents concerned and lobbies the interests of the industry. Similar structures are internationally called *cluster structures*.

Analysis of localization ratios and geographical density of capture fisheries

To estimate the clusterization potential in the fishing industry of the Russian Far East we will analyze ratios' dynamics. One of the stipulated conditions for successful functioning and clusters' developing is thought to be high density of industrial objects on the territory.

Analysis of density ratios of fishing businesses demonstrates that the Sakhalinskaya region occupies the leading position, this territory incorporates the greatest number of fishing companies (pic. 10).

Pic. 10. Density ratio of fishing organizations by regions in the Far Eastern Federal District (calculated by the author according to Russtat statistics).
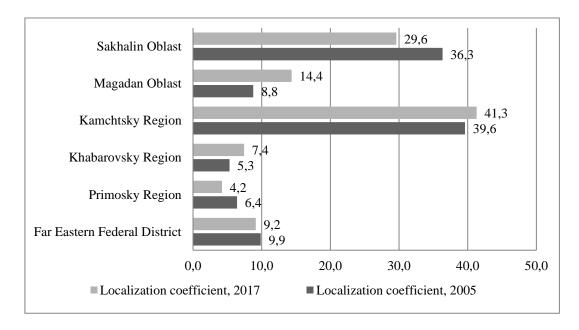

The second in number comes the Primorsky region, the third in succession is the Kamchatka territory, the forth and the fifth ones are the Khabarovsky territory and the Magadan oblast respectively. The ratio analysis gives an idea that from 2005 to 2017 the density of businesses increased very slightly, whereas some territories even evidenced density reduction. The density of shipping businesses shrank in the Primorsky region most of all, the second in number decrease took place in the Kamchatka region.

The analysis of localization ratio manifests the results similar to those of estimation of fishing businesses density (pic. 11).

Pic. 11. Localization ratios of fishing businesses in the Far Eastern Federal District (calculated by the author according to Rosstat statistics[202]).

The Primorsky region turns out to be the leader as to the harvest proportion, but it happens to feature the localization ratio of the least value. This phenomenon is stipulated by the fact that the ratio of fishing companies in the industrial structure of the region is far less than in other territories of the Far Eastern Federal District, that is 0,72 % as compared to the Sakhalin oblast – 5,08 %, the Kamchatka region – 7,09 %, the Khabarovsk region – 1,28 % and the Magadan oblast– 2,47 %. It is specified that over the period of 2015-2017 the Kamchatka region, the Magadan oblast and the Khabarovsk region have made their fishing specialization more pronounced. And vice versa, the Primorsky region and the Sakhalin oblast have discounted fishing as their main area of expertise.

On the next stage we will evaluate the potential and structural differences of fish industry clusters in the Russian Far East Territories (table 2).

[202] Regions of Russia. Social and economic indexes. 2018 / Russtat. M., 2018. 1162 p.; Regions of Russia. Social and economic indexes. 2017: statistical book. / Russtat: M., 2010. 996 p.
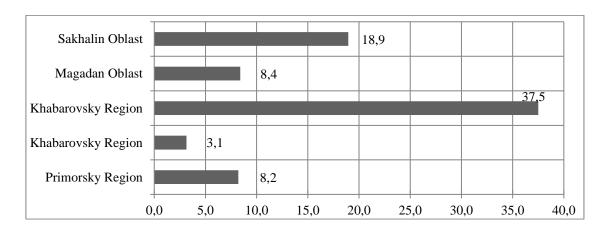
Table 2. Localization and density ratios for fishing industry over the territories in the Far Eastern Federal District in 2017.

Regions	Density ratio of fishing industry businesses			Localization ratio of fishing industry businesses				
	Capture fisheries and fish-breeding businesses	Capture fisheries	Fish-breeding businesses	Specialization of gross regional product	Ratio of production per capita	Ratio of number of fishing businesses	Ratio of small businesses	Ratio of investment into fixed capital
Primorsky region	0,0030	0,00217	0,00060	18,7	15,8	4,8	3,1	23,3
Khabarovsky region	0,0007	0,00060	0,00005	4,0	3,8	8,4	4,5	4,5
Kamchatka region	0,0017	0,00160	0,00003	56,9	69,8	46,8	23,3	103,3
Magadan oblast	0,0003	0,00024	0,00002	11,8	23,0	16,3	13,3	2,9
Sakhalin oblast	0,0105	0,00927	0,00087	12,5	57,6	33,5	30,4	17,6

Footnote. Calculated according to the data published in Regions of Russia. Social and economic indexes. 2018 / Russtat. M., 2018.

Calculation of the integral ratio stresses that the most of the potential for forming fishing industry clusters is owned by companies from the Kamchatka region, the Sakhalin oblast and Magadan oblast (pic. 12).

Pic.12. The integral ratio of fishing industry clusters in the Far Eastern Federal District

This way, there is a general presumption that the Primorsky region is not accorded the highest potential in fishing, and occupies only the fourth position. The fishing industry appears to be a relatively less profitable economic sector for the Primorsky region. However, it is this very region that is conceptually viewed by government in terms of clusterization, and most capital-intensive investment projects are to be delivered in this particular territory.

Conclusions

The research undertaken proved that an increase of production indexes takes place with fishing industry clusters: the volume of harvest and fish-farming produce grows upwards, the export share becomes larger, coordination of enterprises within the fishing industry or cluster structures show better efficiency within a single cluster. While wear and tear of production facilities move onward, the Primorsky region and the Kamchatka region evidence a decline in fixed investment. The number of fishing companies shows a very slight growth, the positive dynamics is primarily secured by fish-breeding businesses. The share of production with little degree of processing still remains high in the regional export structure. Thereafter the fishing industry nowadays develops via an extensive strategy, while the upturn of production indexes of the fishing industry outperforms the formation of horizontal and vertical production ties among companies of the fishing industry.

The insight into the integral ratio of the fishing industry in the Russian Far Eastern regions puts the Kamchatka region in the foreground with the value of 37,5, then the Sakhalin oblast comes one half as much – 18,9, the Magadan oblast accounts for 8,4, the Primorsky region gets 8,2, the Khabarovsky region is listed as having 3,1. Notwithstanding the fact that the companies of the Primorsky region accrue to the basic volume of harvest and fishing production, the analysis of relative ratios ranges this territory only to the 4th place. To our view, it's beneficial to take into consideration this rating when implementing development measures for fishing industry clusters in the Russian Far East. Investment projects and measures of government support, employed in the Kamchatka region and the Sakhalin oblast, can ensure a larger synergetic effect for the regional fishing industry and in the long run form really competitive, technology-savvy fishing industry clusters.

The obtained results can lay the basis for measures of economic regulation to help the fishing industry forward. They can also be drawn for a more profound research of development peculiarities of fishing industry clusters in the Far Eastern Federal District, or forecasting economic prospects for entrepreneurship in the regional fishing industry.

Acknowledgements

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