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## Conference Paper

# Northern old industrial regions: breaking the path in resource development

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### **Northern old industrial regions: breaking the path in resource development**

**Abstract:** The major reason for economic depression of old industrial regions is the aging of their economic structure and loss of competitive advantage of their basic sectors. Not the sectors of the regional economy are getting old but conditions of their development in the concrete region, determined by economic age. Indicators of basic sectors getting old are production of non-competitive output because of backward technique and technology, ineffective organization of the industrial process etc. It is possible to include in the list of old industrial regions not only manufacturing but also resource-dependent regions like Magadan Oblast in the North-East of Russia. Resource regions have distinct specificity in their aging: it is general decrease in the quality of extracted resources and lack of technology to utilize depleted resources. Generally the main directions of the restructuring of the economy of the old industrial regions are diversification, introduction of product, process and organizational innovations and elaboration of new competencies. Magadan Oblast in the North-East of Russia has been developing its gold deposits for more than 80 years. So it can be regarded as Northern resource old industrial region. And its directions of economic restructuring lie in resource diversification, technological and institutional innovations, and new economic competencies of the labor force. Efficiency of each direction of regional economic restructuring is measured by indicators of GRP, employment, and real income. At the result of different combination of the projects in the three directions of restructuring we can characterize six scenarios for Magadan Oblast future development, which can help to change the economic specialization of the region and increase rates of economic growth of the previously territory of economic depression.

**JEL codes:** R11, Q32

**Keywords:** old industrial regions, restructuring, northern resource regions

Old industrial regions usually include problem (depressive) regions as the special category. In these European and American regions economy is usually based on branches of the first and second technological orders, where formation of industrial structures had begun in the XVIII-XIX centuries. Thanks to competitive advantage of key branches of the economy their development had good dynamics in comparison with other regions till the 1960-1970's, when they began lagging behind the territories specializing on the branches of the next technological order. We can distinguish special group of old industrial regions specializing on coal-mining, ferrous metallurgy or the light (textile) industry<sup>1</sup>.

Russian experts look at the concept of the «old industrial regions» in a more broad way – as the regions which have created structure of industrial production at different stages of industrial development since the end of the XIX century till 1960-1970s. In the past they were more developed

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<sup>1</sup> Klyuter H. – Strukturnye izmeneniya v ugolnoy promyshlennosti i reorganizaciya social'noekonomicheskoy sistemy Rurskogo regiona Germanii// Region, razvitie i sotrudnichestvo =Reg. development coop. – M., 1998. – № 1/2. – S. 28–36; Kuklinski E. Regionalnoe razvitie – nachalo povorotnogo etapa// Region, razvitie i sotrudnichestvo =Reg. development coop. –M., 1997. – № 0. – S. 3–7; Malhus V.F. Restrukturizaciya staropromyshlennykh rayonov: prigranichnye regiony// Region, development and the collaboration= Reg. development coop. – M., 1998. – № 1/2. – p.26–27; Granberg, A. G. Osnovy regionalnoy ekonomiki: ucheb.dlja vuzov: 3-e izd. – M.: GU VCHE, 2003. – 495 s; Kim V.G., Timoshenko. V.P. Staropromyshlennyy rayon: problemy social'no-ekonomicheskogo ozdorovleniya/Ural.akad. gos. slujby i dr. – Ekaterinburg: Isd-vo «Ekaterinburg». 1996. Vyp.3. -59 c. (Possia nachinaetsja s provincii); Nesterova D.V. Metodologicheskie prinzipy formirovaniya regionalnoy politiki: analiz i uchet osobennostey transformazii ekonomiki staropromyshlennogo regiona// Ekonomika region. – Ekaterinburg, 2005.-№3. – s.16–30.

in comparison with the other regions, but eventually they passed to the category of depressive owing to the aging of their branches of specialization. Russian old industrial regions are much more diverse than foreign according to the period of their formation and specialization.

However, classifying old industrial regions, neither foreign, nor Russian scientists take into consideration resource-based regions, with one exception - coal-producing regions. In these regions the cause of depression is linked to the depletion of natural assets.

After our analysis of the genesis of old industrial regions we came to a conclusion that the general reason of a “depressivnost” of social and economic development of such regions, at all distinctions of their economic specialization, is the aging of their economic structure and loss of the competitive advantage of the previously basic branches of the economy. And branches, caused by old technological, infrastructural, institutional, including organizational, conditions of their functioning in the concrete region can really become outdated. A prove of aging of key economic branches is the production of noncompetitive goods owing to backward technology and equipment, the inefficient organization of production, its regulations, etc. The specific nature of a “depressivnost” of regions of resource specialization includes also (plus to previous reasons) aging of key branches because of deterioration of extracted resources, and lack of adequate equipment and technology to extract exhausted deposits.

The objective nature of aging of structure of the economy allows us to break the Russian tradition<sup>2</sup> and to include in the category of old industrial not only well developed regions, but also resource-extracting regions, and as a result to expand this typology with **old industrial regions of resource specialization**. We think that it is necessary to include regions where more than 50 % of the industrial output mining provides and durable period of resource exploitation has ceased social and economic dynamics of the region<sup>3</sup>.

Old industrial regions of resource specialization have some specific features. Exhaustion of natural assets caused by long period of operation, unlike material assets in manufacturing regions, has irreversible character and is expressed in steady deterioration of parameters of extracted resources. Therefore economic and social problems typical for these regions, are expressed here especially badly.

Phenomenon of old industrial region includes out-of-date structure of their economy; old social structures, and a certain type of thinking, preventing to go beyond the habitual trajectory of development of the region to look for regional prospects in new branches and fields of activity<sup>4,5</sup>.

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<sup>2</sup> Granberg A., Artobolevskiy S., Kovaleva G., Rossel E. Restrukturizatsiya staropromyshlennyykh regionov: opyt Rossii i mira// Region, rasvitiye i sotrudnichestvo= Reg. development coop. – M., 1998. – № 1/2. – s. 4–23.

Staropromyshlennyye regiony: perspektivy i ogranicheniy sozialno-ekonomicheskoy modernizatsii: kollekt. monografiya/ otv.red.D.V.Nesterova. –Ekaterinburg: Izd-vo Ural.un-ta, 2006. – S.8 – 28.

Strukturnaya perestroika i ustoychivoye rasvitiye staropromyshlennogo regiona/ O.A.Romanova, M.G.Filatova, R.I.Chenenova, S.G.Chenchevich// Vestn.Ros.gumanit.nauch.fonda.-M.-1998.– №3. – S.86–98.

Territorialnaya struktura khozaystva staroosvoennykh rayonov/ G.A. Privalovskay, S.A. Tarchov, A.I.Treyvisch i gr.: otv. red.G.A.Privalovskay, S.A.Tarchov/ RAN; In-t geografii. – M.: Nauka,1995 – 181 s.

<sup>3</sup>Gal'ceva N.V.Predposylki i perspektivy restrukturizatsii ekonomiki Magadanskoj oblasti /otv. red. N. A. Goryachev. – M.: KomKniga, 2009. – 320 s.

<sup>4</sup> Nesterova D.V. Metodologicheskie prinzipy formirovaniya regionalnoy politiki: analiz i uchet osobennostey transformatsii ekonomiki staropromyshlennogo regiona// Ekonomika region. – Ekaterinburg, 2005.-№3. – s.16–30/

<sup>5</sup> Bömer Hermann. Political Economy of Modernising old Industrial Areas and the Crisis of the New Economy – the Example of the Ruhr Area and the City of Dortmund Paper (draft) presented to the 42nd European Regional Science Association Congress; Laan Mihkel. Industrial restructuring in transitional Baltic Sea Region countries (Baltic States, Kaliningrad oblast). Paper to be presented at the 43rd European Congress of the Regional Science Association, Jyväskylä, Finland, August 27-30, 2003; Maier Gunter and Trippel Michaela. New Path Creation in Old Industrial Regions The Case of the Software Park Hagenberg in the Province of Upper Austria Paper prepared for the 51st European Congress of the Regional Science Association International 30th August - 3rd September 2011, Barcelona, Spain Preliminary working draft only – subject to revision; Sucháček Jan. Regional Decline and Restructuring in Ostrava Agglomeration and Katowice Conurbation. 45th Congress of the European Regional Science Association 23-27 August 2005, Vrije Universiteit Amsterdam; Udo Staber. Spatial Proximity and Firm Survival in a Declining Industrial District: The Case of Knitwear Firms in Baden-Württemberg/Regional Studies, Vol. 35.4, pp. 329- 341, 2001.

Late acknowledge of urgent necessity to change the former trajectory of development leads to strategic mistakes in management of such territories. It in turn causes "blocking" of development of these regions and considerable waste of time to look for new directions of restructuring of their economy. The number of old industrial regions doesn't remain constant in time and depends, on the one hand, on intensity of obsolescence of concrete technological order, on the other hand – on the incessant attempts to restructure the economy of these regions.

Having revealed age of the economic structure as the reason of “depressivnost” in the development of old industrial regions, we face a methodological problem of definition of age. It is possible to consider this question in a wide context of endogenous model of economic growth in which development of regions is caused first of all internal, i.e. endogenous, factors, including economic age of the main local assets. It is known that the theory of endogenous economic growth is extremely popular among representatives of a modern economic science<sup>6</sup> and consequently inevitably affects many, even directly not related with questions of economic growth, lines of regional research.

The scientists investigating this category of regions, don't concretize duration of the period of development within a certain structure of economy from which the region should be included to category of the old industrial region. In our opinion, this problem has no universal decision for all old industrial regions; and for each type one needs to elaborate solution individually. One of the approaches, offered for monoprofile regions, consists in definition of economic age of the territory as the age of the key industry which production makes more than 50 % in industrial output and with which the regional economy has been related for a long period of time. We utilized this approach for the case of Magadan Oblast located in the Northeast of Russia where economy has been based on gold mining for 80 years.

We understand number of the years which have passed from the moment of the beginning of large-scale industrial gold mining as age of gold mining. We took for a reference point 1931. As a result by 2012 the age of gold mining makes 80 years, and the extracted production – three thousand tonnes of gold (placer 2,7 and ore – 0,3).

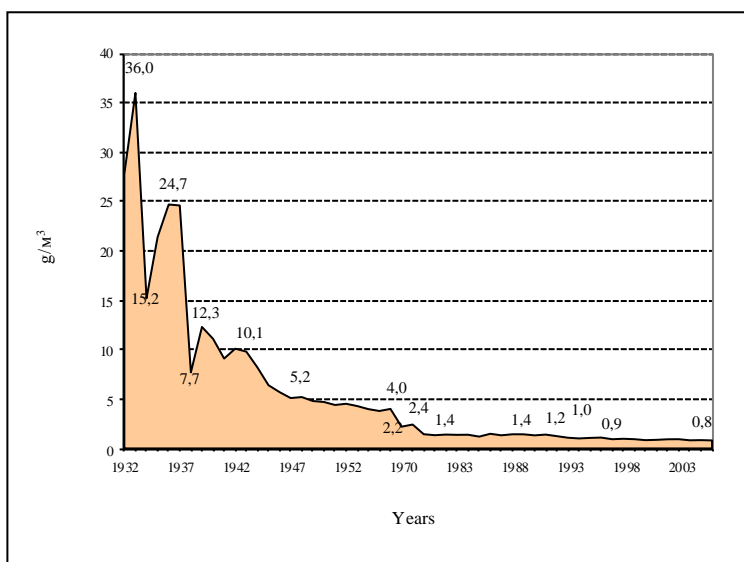


Fig.1.Change in the average content  
in the placer objects of the Magadan region

<sup>6</sup> Romer P. 1990), «Endogenous Technological Change», Journal of Political Economy Vol. 98, #5, Supplement, pp. 71-102. Romer P. (1990). Human Capital and Growth: Theory and Evidence, Carnegie-Rochester Conference Series on Public Policy, Vol. 32: 251-86; Aghion, P. and P. Howitt (1998). Endogenous Growth Theory, Cambridge, Mass.: The MIT Press.

In the first years of gold mining all mines had developed unique and rich fields: the average content of gold in deposits reached more than 100 g/m<sup>3</sup>. After the peak of average concentration - 36 g/m<sup>3</sup> in 1933, the main qualitative characteristic of placer objects began to decrease, and now it is less than 1 g/m<sup>3</sup> (fig. 1).

Utilizing indicators of gold mining that are more sensitive to the age, one can reveal three periods of development – young, mature, and old (fig. 2). According to these periods social and economic dynamics of the region are considered.

The most sensitive to age of gold mining are the following indicators: volume of gold production, the average concentration of gold, a ratio of placer and ore production, use of different equipment.

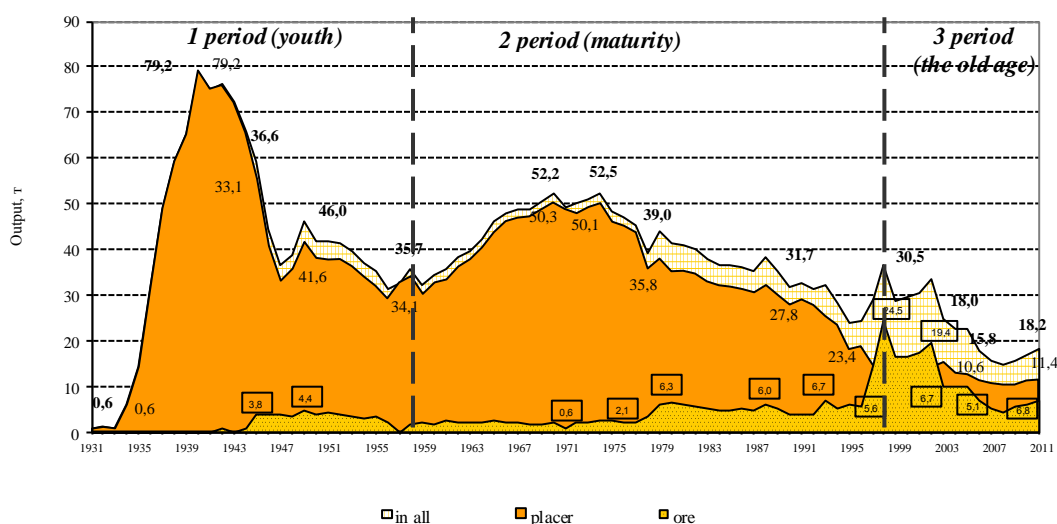


Fig. 2. A periodization of gold mining in Magadan area

Other indicators like number of subsoil users, a share and a rating of the region among other gold-producing regions, etc. are less sensitive to the age. The external factors influencing a situation (for example, the price for gold) could not stop or turn back objective process of aging.

Each period of gold mining can be described by the system of indicators.

**In the youth of gold mining (1931-1956)** the biggest annual volume of gold mining for the history in the Magadan area was produced – 79,2 t and the highest average annual volume – 49,2 t; and the average concentration of gold in sand was 11 g/m<sup>3</sup> (tab. 1).

Table 1

The comparative characteristic of the periods of age of gold mining in the Magadan area

| Indicator  | Period (age)            |                     |                       |
|--|-------------------------|---------------------|-----------------------|
|  | young                   | mature              | old                   |
| Duration, years  | 26                      | 39                  | 11                    |
| The volume of cumulative production, t                                     | 1091,4                  | 1570,9              | 316,4                 |
| The average annual production, t   | 49,2*                   | 40,3                | 26,4                  |
| Maximum annual production, t   | 79,2                    | 52,5                | 36,4                  |
| The minimum annual production, t   | 0,6                     | 23,9                | 15,8                  |
| The amplitude of the output (max / min)                                    | 132                     | 2,2                 | 2,3                   |
| The average concentration of gold in the placer deposits, g/m <sup>3</sup> | <u>36-3,8**</u><br>11,0 | <u>4-1,1</u><br>2,3 | <u>1,1-0,8</u><br>0,9 |

|  |         |     |      |
|--|---------|-----|------|
| The average concentration of gold in the ore, g/m <sup>3</sup> | no data | 6,3 | 10,8 |
| Average share of the ore mining for the period, %              | 4       | 8   | 49,1 |
| Production per employee in the industry, kg                    | 0,9     | 2,7 | 2,7  |

\* without the first 4 years when production varied from 0,6 to 6 t.

\*\* In numerator is a range of values, in a denominator is the average value during the period.

The share of ore production in the youth of gold mining was insignificant and very expensive (4 % from total production in 26 years). Simple mining and geological conditions of the placer deposits caused surface production predominantly. During the first period of gold mining the Magadan area became the leader among gold producing regions, providing more than 40 % of the total gold mining production of the USSR.

The beginning of gold mining caused industrial development of the territory: the seaport, airports, roads, power plants, settlements, schools and hospitals were constructed. Use of work of prisoners allowed not to develop the social sphere that provoked population outflow from the region in post-war years.

Reduction of average annual production of gold by 25% in only five years (from 1951 to 1956) and lack of acceptable working conditions had decreased the average number of working in the Magadan area for the same period by 29 %. Crisis of gold mining caused the crisis of a social and economic development of the region shown in reduction of number of a manpower and outflow of the population from the region at the beginning of the next period (from 1957 to 1959 about 30 thousand people (9,1 %)).

As a result of deterioration of characteristics of resource base in **a maturity stage of gold mining (1957-1995)** secondary processing of scatterings, distribution of more difficult and expensive ways of production – underground, drazhny, hydraulic – and preparation for large-scale development of ore fields had begun. The peak of production made 66 % from a maximum in youth average production – 40,3 t (in youth - 49,2 t), a share of ore production increased slightly (8 % of total volume of gold). The average concentration of gold in deposits had decreased from 4,0 to 1,1 g/m<sup>3</sup>. Exhaustion of resource base, prevalence of small objects promoted splitting of several large subsoil users into 80 small and medium-sized enterprises; the gain of industrial stocks ceased to compensate their selection, by the end of the period of a maturity having made 78 %. Thanks to intensive improvement of equipment and technology of production development occupied in branch grew by one during this period rather previous in 3 times, having made 2,7 kg.

Since 1984 the Magadan area conceded leadership in gold mining to the Republic of Sakha (Yakutia), having moved to the 2nd place in a rating of gold producing regions of Russia. Deterioration of parameters of gold deposits, lack of technical and financial possibilities of subsoil users for their effective working off coincides in time with falling of the world price for gold and transition of the Russian economy to the market relations in aggregate lead to the next crisis in branch and to crisis in region economy: from 1990 to 1995 production of placer gold was reduced by 35 %, industrial output decreased for 40 %, outflow of the population made 37 %. The branch and area had passed to the old age period.

Operation of the exhausted resource base in an **old age (since 1996 – to the present)** was accompanied by the rapid deterioration of parameters. Maximum amount of gold was only 36,4 t (69,3 % from a maximum level in a period of maturity), average annual production decreased to 26,4 t (65,5 % from level of the period of maturity). The average concentration of gold in placer deposits had decreased 2,5 times in comparison to the maturity period, having made less than 1 g/m<sup>3</sup>. Large-scale gold deposits, in a fly-in- fly-out mode, without expenses on construction of the constant settlements has been exploited. The share of ore production in separate years surpassed the share of a placer gold production and for 1996-2007 reached 49,1 % of total volume. The number of users continued to increase (now more than 160).

Temporary growth of gold mining during working off of a large-scale ore deposit of Kubaka had provided recovery of the region, the area again became leader among the other gold mining regions (in 1997-2002), but after its working off production had promptly fallen, the main socio-economic indexes of the territory had decreased also. As a result gold mining in 2007 concerning the end of the previous period of a maturity had decreased 1,5 times (placer 1,7 times), industrial output –1,6 times, population of area and in the economy –1,4 times; the share of federal transfer in the consolidated budget of the region had increased 1,6 times.

For confirmation of a age-regulated role of gold mining in the economy of the region retrospective modeling of the main social and economic indicators of the Magadan area depending on the value of the average concentration of gold in placer deposits has been carried out. As a result of modeling it has been received (tab. 2) that if gold mining was in the maturity period now (the average concentration of gold was 2,3 of g/m<sup>3</sup>), and at the same scale of production, the area would extract 36 t of gold and would be the leader among gold mining regions of the Russian Federation, and volume of a gross regional product would move in a rating of regions of the Russian Federation from the 78th to the 74th place, and share of federal transfer in the budget – from the 71st place to the 47th.

Even bigger growth of indicators would be had by the Magadan area under the conditions of youth stage of the gold mining (the average concentration was 11 g/m<sup>3</sup>): the volume of gold mining production would be 151 t (contemporary all-Russian level), increase in a gross regional product 3,7 times (the rating on GPR among the Russian regions with the 78th would raise to the 46th position), Oblast would become region with budget free of federal transfer payments, and the region would move in a rating of regions of the Russian Federation from the 81st on the 28th place according to the population figures.

Table 2

Results of modeling of socio-economic indexes of the Magadan area depending on the periods of age of gold mining

| Parameter  | old age<br>(2007) | estimate |       |
|--|-------------------|----------|-------|
|  |                   | mature   | young |
| Mining of gold, t  | 16                | 36       | 151   |
| GRP, bln. rub.   | 35                | 49       | 131   |
| Share of subsidies in the budget,%                         | 44                | 22       | 0*    |
| The population of the Magadan region, thousands of people. | 166               | 375      | 1591  |

\* Own income exceeds the level of expenditure in 2007 by 2 times.

Modeling of socio-economic indexes of area in the conditions of a countdown of the periods of gold mining showed the reason of negative tendencies in the regional economy - long functioning within out-of-date structure of industrial production. In other words, problems of social and economic development of the Magadan area have been caused not only by aging of gold mining in such, but also that this branch still remains a key branch of the region, occupying about 70 % (taking into account silver production) in industrial output of the region. The received conclusions allow to include the Magadan area in the group of problem old industrial regions<sup>7</sup>.

There is a question, how fatal is the "aging" of a key branch of the Magadan economy? Whether there are the rejuvenation mechanisms, capable to give new impulses to gold mining and region development as a whole? The economic history of the Magadan area in the last 80 years shows that they really exist both in the gold mining, and in regional economy as a whole, besides there is a successful experience of other regions.

<sup>7</sup> Gal'ceva N.V. Predposylki i perspektivy restrukturizacii ekonomiki Magadanskoi oblasti /otv. red. N. A. Goryachev. – M.: KomKniga, 2009. – 320 s.



Results of the analysis of world experience in overcoming of “depressivnost” of development of old industrial regions showed effectiveness of the restructuring of their economy. A necessary condition of its implementation is problem understanding at the state level, assistance of the federal and regional authorities in the form of direct financing of creation of infrastructure and the new enterprises, institutional measures – creation of special legal regimes of managing (bonded economic areas, tax privileges) for investment appeal of old industrial regions<sup>8</sup>. For old industrial regions of resource specialization we suggested the following key directions of restructuring which are considered as rejuvenation mechanisms: diversification, introduction of innovations, and also development of new competences for transition to other branches and fields of activity.

Possibilities of realization and a specification of the directions of restructuring of economy of the region are defined by the capacity of the territory, in particular – by its resource potential. In value structure of resources of the Magadan area coal occupies 40 %, hydrocarbons 24 %, non-ferrous metals - 15 %, 16 % - noble. Therefore the prime directions of restructuring can be considered in a mineral complex.

As a result of the retrospective analysis of 80-year development and an assessment of available potential we can suggest ways to diversify regional economy of the Magadan area, as the expansion of a range of extracted resources, expansion territorial area of production and development of different types of deposits. At the result of these efforts one need to organize not only new extracting, but also processing branches that will promote to diversification of the whole economy of the Magadan area.

**Widespread minerals.** In total in the Magadan area the state balance considered stocks of all-widespread minerals in 137 fields (the general total stocks make 316802 thousand m<sup>3</sup>), including 83 fields of construction materials of a sand-gravel mix, a construction stone, ceramic raw materials, construction sand, a facing stone and 54 fields of peat. New spheres of these application caused possibility of production of resources absolutely new to the Magadan area – zeolites, basalts, perlites, etc. which can be used for intraregional needs, and can be taken out to other regions and countries.

**Non-ferrous metals.** Geological researches in the territory of area revealed some deposits of non-ferrous metals (copper, molybdenum, tungsten, lead, zinc and tin) which settle down practically in all districts of the Magadan area. Asian Pacific countries are among the biggest importers of non-ferrous metals (China, Korea, Japan, Taiwan). They can be potential consumers of the Magadan non-ferrous metals under a steady favorable environment of the world market of non-ferrous metals: growth rates of the world prices during 2000-2010 nearly 16 times on molybdenum; on tungsten and lead more than 5 times; on copper - 4 times.

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<sup>8</sup> Bomer H. Political Economy of Modernising old Industrial Areas and the Crisis of the New Economy – the Example of the Ruhr Area and the City of Dortmund. // «From Industry to Advanced Services- Perspectives of European Metropolitan Regions» 42nd European Congress of the Regional Science Association in Dortmund, August 27–31, 2002.

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Pilyasov A.N. I poslednie stanut pervymi: Severnaya periferiya na puti k ekonomike znaniya. M.: Knizhny dom «Librokom», 2009. – 544 s.



**Iron ore.** Regional geological survey in the territory of the Magadan area revealed numerous deposits of iron of the various genetic types of more than 1 billion tons. From 2000 for 2010 the price for iron ore grew in the world market 7,5 times that raises prospects of development of this type of resource in the region.

**Hydrocarbons.** Prospects for oil and gas on the Magadan off-shore territory are high.

In December, 2011 the license for geological studying, investigation and production on the continental shelf was given to the largest Russian company JSC Rosneft.

Oil and gas production in North-Okhotsk shelf can become the most large-scale direction of diversification of a mineral complex of the territory and can radically replace its profile, causing inflow of investments, new specialists, and services.

The second direction of restructuring of the regional economy can be the realized and perspective institutional, technical and technological and organizational innovations in a mineral and raw complex and economy of the Magadan area, economy of the old industrial region promoting rejuvenation through deepening of specialization and transition to production of the knowledge-intensive production.

**Gold.** In spite of the fact that gold mining in the Magadan area has been developed for 80 years, the potential of this metal has not exhausted. However for its extraction application of technical and technological, institutional and organizational innovations is necessary.

It is necessary to utilize technical and technological innovations to modify extraction of gold; extraction of all useful components from complex gold-rare-metal deposits; development of new types of deposits; use of technologies of increase of efficiency of extraction of gold.

As institutional innovations, application of the differentiated taxation depending on the geological characteristics of the deposits is offered. As an organizational innovation to increase competitiveness of gold mining in the region it is necessary to consider formation of mining clusters in Magadan area utilizing all necessary preconditions: resource potential, the reserve of the cheap electric power and existence of the regime of the Special economic zone, system of learning for the qualified personnel<sup>9</sup>.

**Fuel and energy resources.** Reserve of coal in the deposits of Magadan area is estimated to be 672 million tonnes as stone coal and 1451 million t as brown coal<sup>10</sup>. Escalating of coal mining can be connected only with the use of coal as raw materials for manufacture of high technology production – liquid motor fuels, a methanol, extraction of a complex of the components applied in agrochemical and pharmaceutical industries, that is application of innovative technologies of processing of coal.

Peat resources in Magadan area are considerable, but they were studied only in the south of region. In total in Magadan area there are about 50 deposits with the general stocks of 51 million t, from them in 10 deposits it is concentrated 43 million tonnes of peat. Prospects of use of the richest potential of peat are connected with possibility of its complex processing for fertilizers, sorbents for clearing of the polluted waters, peat carpets, peat pots and blocks for sprouts, peat wax, etc.

As a result of two basic directions of re-structuring – diversification and introduction of innovations - six scenarios of development of the economy of region are developed, in different degree and through different mechanisms allowing to overcome depressive state of territorial development. Scenarios are generated on the basis of the following principles:

- 1) scenarios include only directions of re-structuring supported by investment projects or pre-design calculations;
- 2) the sequence of inclusion in the scenario of directions of diversification and innovative development is caused by probability of their realization: realized; expected in the near future

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<sup>9</sup> Goryachev N.A., Galtseva N.V. Kompleksnoe rasvitiye kraynego Severo-Vostoka Rossii/ Trudy nauchno-prakticheskoy konferentsii «Sozdanie novykh gornorudnykh rayonov v Sibiri i na Dalnem Voctoke; problemy i puti resheniya». – M.:FGUP «VIMS», 2011, S.75-85.

<sup>10</sup> Mineral'no-syr'evye resursy Magadanskoj oblasti: perspektivy rasvitiya: Analiticheskaya informatsiya/Magadanstat.-Magadan, 2009. – 33s.

(1–3 years); expected during the period of 5–7 years; dependent upon the scales of necessary investments in the basic projects.

On the basis of estimations of the different ways of the mineral development six scenarios are generated (tab. 3).

Table 3

Directions of diversification of the mineral complex of the Magadan area

| Number of scenario | Type of resource        | Project   |
|--------------------|-------------------------|---|
| 1.                 | Gold (basic)            | Introduction of the Natalkinskoe gold-ore field                                 |
| 2.                 | All widespread minerals | Extraction and processing of peat, gypsum, zeolite, cement                      |
| 3.                 | Brown coal              | Extraction and processing of Lankovskoe and Melkovodnenskoe brown coal deposits |
| 4.                 | Non-ferrous metals      | Mining of zinc, tungsten and molybdenum   |
| 5.                 | Iron                    | The development of fields in the South District of iron Omolon                  |
| 6.                 | Oil                     | Development of the North Sea of Okhotsk shelf                                   |

1) **Gold** for the Magadan area – the resource of traditional specialization extracted from a subsoil of the territory more than 80 years. An example of an introduced innovation is development of the Natalkinsky gold-ore field - the first experience of development of type new to the territory – bolsheobjemny, that is with large stocks, but with very low contents of gold in ore. Gold mining volumes on which are planned in a range of 24,7-37 tons per year (in calculations level 24,7t is accepted), the beginning of production of 2013-2014.

2) **Brown coal.** Some years in the Magadan area the project of development of Lankovsky and Melkovodnensky Brown coal fields for the purpose of processing and receiving gas in volume 230 million cubic m /year, motor fuel and coal briquettes, and also mountain wax is discussed. (mechanism of innovations).

3) **All-widespread minerals.** As prime types of all-widespread minerals are considered peat, with receiving from it peat briquettes, peat kipovanny and organo-mineral fertilizers; zeolites for the purpose of production of mineral fertilizers; cement (receiving cement and cement mixes) and plaster (for production of dry construction mixes of plaster knitting and pazogrebnevy plates)<sup>11</sup>. This scenario includes the diversification mechanism).

4) **Non-ferrous metals.** From 61 objects profitable for development 3 objects of zinc, 2 - tungsten and 1 – molybdenum are recognized<sup>12</sup>. This scenario assumes the diversifikatsionny mechanism of restructuring of economy.

5) **Iron.** According to experts, after carrying out prospecting works and opening of fields production of iron ore raw materials in the Southern Omolon iron ore area will make 8,5 million tons. For the organization of the finished iron ore cycle iron and steel works construction in capacity of 4,5 million t of iron is supposed, and for ensuring technological process being coked coals of nearby fields (diversification) will be used.

6) **Oil.** Experts assume two options of development of North Okhotsk shelf: it can be predominantly oil or gas. The minimum potential at which extraction is profitable is 2,8 million tons of oil or 2,5 billion cubic meters of gas. As the oil option is preferable for the regional

<sup>11</sup> Gal'ceva N. V., Davydova A.A. Istoriya i perspektivy dobychi obcherasprostranennykh poleznykh iskopaenykh Magadanskoy oblasti.// ESSJ (Evropeyskiy jurnal socialnykh nauk), 2011, №9. – S. 431– 442.

<sup>12</sup> Gal'ceva N. V., Sharypova O.A. Perspektivy diversifikatsii mineral'no-syr'evogo kompleksa Magadanskoy oblasti: tsvetnye metally// Mineral'nye resursy Rossii. Ekonomika i upravlenie. M.: №5–6, 2006r., S. 50–55.

development, it is considered in this research. In this scenario the other diversifying tools are also utilized.

Influence of the directions (and specific projects) of restructuring on economic and social situation in the territory was estimated with the help of classical economic indicators of gross regional product (GRP), the income of the regional budget, employment and population<sup>13</sup>.

The results of modeling of the gross regional product according to development scenarios for the mineral resources sector have showed that in comparison of 2009, growth of this indicator will be in a range from 1,1 to 1,43 times. The smallest growth of GPR will be reached in the case of implementation of projects on the widespread minerals, the greatest – under implementation of the oil project –1,41 times (fig. 3).

As the considered directions of a diversification aren't alternative, implementation of all projects will provide 2,35 times increase in GPR.

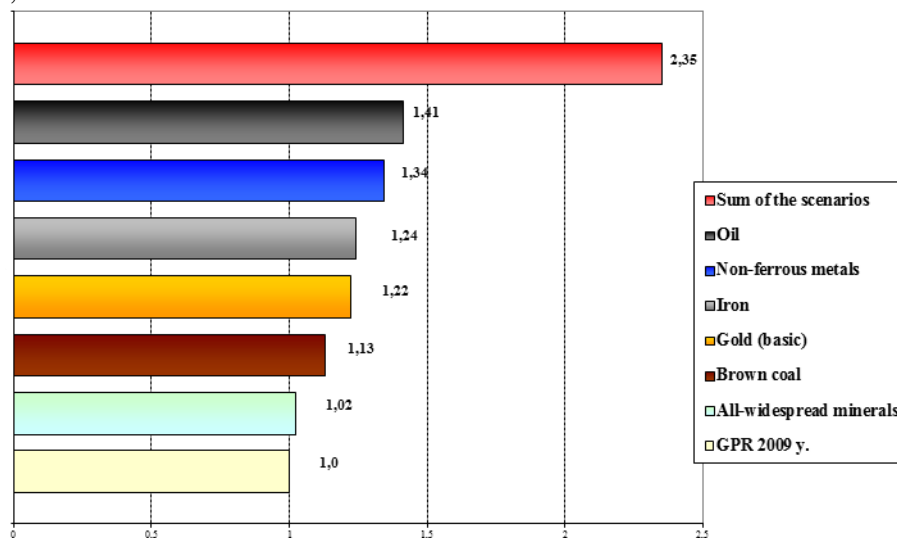


Fig.3 Growth of GPR of the Magadan area according to scenarios, times

In the case when the majority of projects and first of all the development of North-Okhotsk offshore oil and gas will be realized, the share of federal transfers in the regional budget will decrease from contemporary 56,2 % to 24,7 % (table 4). Implementation of all the projects will increase the total income 1,4 times.

Table 4

Change of structure of the regional budget depending on scenarios of restructuring (billion roubles)

| Parameter      | 2009г.<br>(fact) | Number of scenarios, type of resource |                      |                                       |                                  |             |            | Sum<br>of the<br>scena<br>rios |
|----------------|------------------|---------------------------------------|----------------------|---------------------------------------|----------------------------------|-------------|------------|--------------------------------|
|                |                  | 1<br>(Gold)                           | 2<br>(Brown<br>coal) | 3<br>(All-<br>widespread<br>minerals) | 4<br>(Non-<br>ferrous<br>metals) | 5<br>(Iron) | 6<br>(Oil) |                                |
| Income - total | 19,2             | 19,2                                  | 19,2                 | 19,2                                  | 19,2                             | 19,2        | 19,2       | 19,2                           |
| Own income     | 8,5              | 11,0                                  | 10,5                 | 8,7                                   | 13,1                             | 11,0        | 14,5       | 26,4                           |

<sup>13</sup> Gal'ceva N. V., Sharypova O.A., Davydova A.A. Povyshenie konkurentosposobnosti otrasli spetsialisatsii ekonomiki Magadanskoy oblasti// Upravlenie ekonomicheskimi sistemami: elektronny nauchny zhurnal, 2011. №12. URL: <http://www.uecs.ru>

|                                       |             |             |             |           |             |             |             |          |
|---------------------------------------|-------------|-------------|-------------|-----------|-------------|-------------|-------------|----------|
| Taxes                                 | 7,6         | 10,1        | 9,6         | 7,7       | 12,2        | 10,1        | 13,5        | 25,3     |
| The growth of tax expenditures, times |             | 1,3         | 1,3         | 1         | 1,6         | 1,3         | 1,8         | 3,3      |
| Proportion of own revenues,%          | 44,2        | 57,4        | 54,6        | 45        | 68,1        | 57,3        | 75,3        | 137,3    |
| Subsidies                             | 10,8        | 8,2         | 8,7         | 10,6      | 6,1         | 8,2         | 4,7         | 0        |
| Proportion subsidies,%                | <b>56,2</b> | <b>42,6</b> | <b>45,4</b> | <b>55</b> | <b>31,9</b> | <b>42,7</b> | <b>24,7</b> | <b>0</b> |

Implementation of the above-mentioned projects will demand additional number of workers and that will respectively lead to the growth of population of the Magadan area (tab. 4).

Table 4

#### Increase in economic and demographic indicators in different scenarios

| Scenarios for the economic restructuring of the Magadan region | Volume of employment in the economy, thousands of people | The population of the Magadan region, thousands of people | Growth, % <sup>14</sup> |
|--|--|---|-------------------------|
| <b>2009 r. (fact)</b>  | <b>97,0</b>  | <b>161,2</b>  | -                       |
| 1 scenario (gold)  | 98,3   | 163,4   | 101,3                   |
| 2scenario (brown coal)   | 98,4   | 163,5   | 101,4                   |
| 3 scenario (All widespread minerals)                           | 98,0   | 162,9   | 101,0                   |
| 4 scenario (Non-ferrous metals)                                | 102,0  | 169,5   | 105,2                   |
| 5 scenario (Iron)  | 99,8   | 165,8   | 102,8                   |
| 6 scenario (Oil)   | 102,0  | 169,5   | 105,2                   |
| <b>Sum of the scenarios</b>                                    | <b>113,5</b>   | <b>188,6</b>  | <b>117,0</b>            |

It is necessary to emphasize that only direct effects from the considered projects are considered, taking into account indirect effects their importance for the territory will essentially increase in serving branches and fields of activity.

Thus, on the example of Magadan region we can work out methodology of a new approach to the problem of the old industrial resource regions, which allows us to benefit from all available tools in the world at "work" with the old industrial areas in order to overcome the economic depression of Russian old resource regions. This approach can be used for restructuring of the specialization of old resource regions in the Russia and abroad.

#### Conclusion

It is possible to add one more type of regions into the group of old industrial territories, that is, old industrial regions with resource specialization. And Magadan Oblast located in the North-East of Russia is such type of region. Its economic age can be determined by the age of the major branch of its gold-dependent economy, we mean gold production. We can reveal three period in the history of Magadan gold mining – young, mature, and old. And each period did influence several key age-dependent indicators of the regional economy like the volume of gold production, average concentration of the gold in placer deposits, ratio between placer and ore deposits where gold had been extracted.

We suggested the following key directions of restructuring which are considered as rejuvenation mechanisms: diversification, introduction of innovations, and development of new

<sup>14</sup>Population is increased in proportion to growth of number of employees in the economy.

competences for transition to non-gold branches and fields of activity. Then we describe projects from each type of activity and understand that all these projects can be packed under six scenarios. In the case of implementation of all scenarios of development contemporary indicators of the Magadan Oblast economy would be more than 1,5-2,5 times bigger than it is now according to different economic and social indicators.

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