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Crucial factors providing sustainable development of industrial clusters in a priority social and economic development area of single-industry towns

Factores cruciales que proporcionan el desarrollo sostenible de los clusters industriales en un área prioritaria de desarrollo social y económico de las ciudades monoindustriales

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Content

ABSTRACT:
The research focuses on the priorities in social and economic development of those areas in Russia that are considered single-industry towns. We show that it is difficult to attract efficient residents and investors there. The paper also discusses the possibility of synergy provided by the benefits of priority social and economic development area and cluster approach to support the development of these areas in single-industry towns. Factors of sustainable development of intraregional industrial clusters of a priority social and economic development area in Russian single-industry towns are systematized, their mutual influence is determined. The influence of a priority social and economic development area on improving sustainable development factors relevant for industrial innovation clusters viewed as potential residents in this area are considered on an example of the single-industry town of Yurga (Kemerovo region).
Keywords: Interregional cluster, factors of sustainable development of clusters, priority social

RESUMEN:
La investigación se centra en las prioridades en el desarrollo social y económico de aquellas áreas en Rusia que se consideran ciudades de una sola industria. Mostramos que es difícil atraer residentes e inversionistas eficientes allí. El documento también discute la posibilidad de sinergia proporcionada por los beneficios del área de desarrollo social y económico prioritario y el enfoque de clúster para apoyar el desarrollo de estas áreas en ciudades de una sola industria. Se sistematizan los factores del desarrollo sostenible de los grupos industriales intrarregionales de un área prioritaria de desarrollo social y económico en las ciudades rusas de una sola industria, se determina su influencia mutua. La influencia de un área prioritaria de desarrollo social y económico en la mejora de los factores de desarrollo sostenible relevantes para los clusters de innovación industrial vistos como posibles residentes en esta área se consideran en un ejemplo de la ciudad de industria única de Yurga (región de Kemerovo).

and economic development area, single-industry town, potential for cluster-formation in the priority social and economic development area

Palabras clave: Clúster interregional, factores de desarrollo sostenible de clusters, área prioritaria de desarrollo social y económico, ciudad de industria única, potencial para la formación de agrupaciones en el área prioritaria de desarrollo social y económico

1. Introduction

To date, Russian single-industry towns have been facing a serious and hard-to-solve challenge caused by the dependence on inefficient town-building enterprises. The first activity in the list of measures to support 319 single-industry towns in Russia (On the integrated list of measures to support single-industry towns, issued 01.04.2016 №9154-СН/Д14, Ministry of Economic Development of the Russian Federation) is establishment of priority social and economic development areas (PSEDA) in single-industry towns experiencing social and economic difficulties**: Federal Law, issued** 30.03.2014 № 473–ФЗ «On priority social and economic development areas in the Russian Federation» (Government of Russia, 2014), Government Resolution of the Russian Federation, issued 22.06.2015 № 614 «On specifics of establishing priority social and economic development areas on territories of mono-profile municipalities of the Russian Federation (single-industry towns)» (Rossiyskaya Gazeta, 2015).

A status of a priority social and economic development area was given to 11 single-industry towns of the Russian Federation in 2016: Naberezhnye Chelny, Republic of Tatarstan, Gukovo, Rostow Region, Usolye-Sibirskoye, Irkutsk Region, Yurga, Kemerowo Region, Krasnokamensk, Zabaykalsky Krai, Nadvoitsy, Republic of Karelia, Anzhero-Sudjensk, Kemerowo Region, Krasnoturyinsk, Swerdlowsk Region, Togliatti, Samara Region, Belebey and Kumertau, Republic of Bashkortostan. Priority social and economic development areas were established in January – June 2017 in single-industry towns: Chusowoy, Kaspiysk, Bakal, Dorogobuzh, Kirowsk and Emwa. At the meeting of Commission on Establishment and Function of PSEDA in June 2017 a decision was made to establish priority social and economic development areas in 9 single-industry towns (Ministry of Economic Development, 2017a). Implementing investment projects with amount of investments about 50 billion rubles, more than 13.000 permanent working places are planned to create in these 9 areas over 10 years.

This process of establishing PSEDA seems to be quite successful. However, the critical indicator of intensity and success of PSEDA development in single-industry towns – number of registered residents – is far from being sufficient now (Ministry of Economic Development, 2017b).

The measures taken by Fund of Development of single-industry towns together with Sberbank are also aimed at advancing projects of PSEDA residents. As a consequence, businesses in single-industry towns can obtain financial recourses from Sberbank at a mid-market rate, from Fund of Development of single-industry towns per annum 5% (Gorobzor, 2017).

However, some companies willing to obtain a status of a PSEDA resident fail to do it. One of the reasons for turning down a request might be that the project didn’t meet legislation requirements for the number of working places: the main enterprise employs approximately 500 people. However, only 30 working places could be provided, according to the project. An innovative character of production and labor resource saving came into conflict with social requirements of the PSEDA establishment program.

A cluster is not connected with special economic zone both in dirigiste and liberal cluster models, but it is necessary to investigate the influence of special conditions, favorable to business development and aimed, in particular, at solving social and economic problems of single-industry towns, e.g. PSEDA, at stimulating successful formation and further development of clusters as elements (residents) of such territories. Despite an available experience of establishing clusters in the Russian Federation, there is no special practice of forming them in the framework of implementing PSEDA programs in single-industry towns. Furthermore, clustering failed in territories with a single-sector economy (**Ulbusiness,**

2017). It is necessary to reveal and systematize factors of sustainable and successful development of interregional industrial clusters in PSEDA of single-industry towns and also determine which of them are intensified in conditions of a PSEDA.

2. Methodology

Objects of the research reported in this paper are factors of successful and sustainable development of clusters on PSEDA of single-industry towns, the influence of PSEDA characteristics of single-industry towns on formation and implementation of cluster initiatives in a single-industry town, interests of PSEDA residents of single-industry towns, cluster initiatives, and experience of cluster-formation in industry.

Mainly, scientists focus on the development of methods to determine clusters but potential of enterprises, e.g. in single-industry towns to become a core of a cluster is not in the scope of their investigations, in particular, methods of cluster formation are considered only as methods of their identification (Karaeva, 2014). No studies are available which deal with a character, tendencies and results of the two-way influence of cluster approach and establishment of special economic areas aimed at diversification of single-industry towns and attraction of PSEDA residents.

The study is based on findings of research into foreign and domestic experience in cluster development, international experience of cluster management (European Cluster Excellence Initiative), processes of business and high-tech cluster formation, selection criteria of pilot clusters in Russia, officially published statistics about functioning and support of clusters, establishment and activities of PSEDA in the Russian Federation, empirical data obtained in questionnaires, surveys and interviews given by actual and potential PSEDA residents, potential participants of clusters in the PSEDA of a single-industry town of Yurga, Kemerovo region, expert assessments obtained, in particular, using Foresight methodology in the process of identifying cluster initiatives and promising PSEDA tendencies of a single-industry town of Yurga Kemerovo region, statistics, expert assessment of sustainable development factors of clusters in PSEDA of a single-industry town of Yurga, Kemerovo region. A method based on calculation and analysis, system analysis, and method of expert assessment are used.

3. Results

3.1. Analysis of a possibility of using a cluster approach in developing and implementing programs of PSEDA advancement in single-industry towns

A cluster is considered as a «group of interrelated companies, which use benefits of their nearby location» (Ketels et al., 2006). The concept by Porter (2000) is focused on the interaction between participants of a cluster (main manufacturing companies, supplementary (accompanying) production, universities, research centers and state organizations). Breault (2000) defines cluster as “an inter-sectoral concentration of firms that creates jobs, exports goods and services, has common basic economic needs and unites a public sector of economic development, legislatures of different levels, universities, colleges, an educational community, foundations and all other stakeholders”.

Industrial clusters are a special form of spatial organization based on geographical concentration of interrelated enterprises, which are oriented on efficiency, productivity and competitiveness, networks and relations with key interested parties (Boja, 2011). For the purpose of further investigations it is suggested to consider the following main properties and characteristics of a cluster: geographic localization, interconnection, cooperation and competition between companies, technological interconnectedness of industries, technologies common to cluster members, markets, distribution channels, labor markets, human capital, complex combination of competition and cooperation (Porter, Bergman & Feser, 1999).

Cluster-formation provides a possibility to solve problems of territories, in particular facilitates both growth and competitive ability of their economy owing to the access of special recourses (including human capital and information), improves innovation possibilities due to the competition inside the cluster, and channels of effective cooperation (Uskova, 2008; Kovaleva, 2011; Bergman & Fesser, 1999; Ksenofontova, 2015; Kutsenko, 2016). Anbumozhi, Thangavelu & Visvanathan (2013) consider the key advantages of industrial clusters, such as encouragement of national and regional economic development, since industrial clusters consolidate the potential for creating jobs and improvement of living standards in the area; poverty reduction, etc.

The synergy of cluster approach and mechanisms of special territories, e.g. PSEDA, establishment and advancement of intraregional clusters in PSEDA to resolve problems of single-industry towns via diversification, (Kutsenko, 2015). For instance, in 2012–2013 European Cluster Observatory and PwC developed a methodology of identifying so called emerging industries in EU, which are possible due to formation of new or absolute transformation of existing value chains (European Cluster Observatory, 2012), as well as instruments for assessment of their advancement in different regions and realiability of creating world-ranked clusters (European Cluster Observatory, 2013). It is becoming apparent that clusters are involved into formation and implementation of regional strategies (smart specialization). The development of principal competencies in clusters furthers long-termed competitive ability of regions (Gokhberg & Shadrin, 2013).

Therefore, from our point of view, main characteristics of this cluster comprise:

• form of an industrial company characterized by concentration of entrepreneurial activity and limited by geographical factors (urban district);

• combination of competition and cooperation, market and organization;

• spatial-local economic structure that unites interaction of socio-cultural and production-technological factors, ensuring competitive ability of both a cluster as a whole and its participants;

• participants – enterprises of a single-industry town specializing in production of competitive products, suppliers of raw materials, services, infrastructure of a cluster, which together create a value added;

• internal competition, which distinguishes a cluster from integrated entities.

The most successful and dynamically developing clusters formed due to creation of special economic zones, technology parks and business incubators include clusters in single-industry towns: a cluster of automobile manufacturing industry - Togliatti and Naberezhnye Chelny, establishment of a «titanium valley» in Verkhney Ufaley of Sverdlovsk Region, a chemical cluster in Nizhny Tagil, a cluster for woodworking equipped with the latest technology in Sokol, Vologda Region and others. Clusters are self-organizing forms of integration. As admitted, the most efficient clusters are formed naturally as a consequence of self-organization, e.g. in Silicon Valley, California, the USA, etc. (Huhrin et al., 2014). Taking the world practice for analysis, e.g. the experience of the USA, efficient clusters are self-organized for long periods of time (over 10 years), which is not appropriate for the Russian economy. Their two or three year formation requires new technologies and organization principles (Huhrin et al., 2014).

Therefore, a scenario-based approach is preferable for establishment of clusters in a PSEDA, which gives a priority of a downright movement involving the development of a cluster strategy and its support in conditions of a PSEDA. For instance, M. Wickham points at importance of a state in cluster-formation and considers infrastructure for cluster advancement and formation of new companies (Wickham, 2005). From the point of view of synergy it is possible to form a cluster naturally and artificially – by purposeful establishment of efficient clusters, which is seen as the most rational and probable way (Huhrin et al., 2014). Furthermore, it is said that clusters are initiated more frequently by governments (32%), business (27%) and together by business and state (35%), clusters are financed by state (54%), business (18%), by their joint efforts (25%) (Sölvell, Lindgvist & Ketels, 2003).

3.2. Systematization of sustainable development factors of clusters for establishment of PSEDA in single-industry towns and their two-way influence

Factors of successful and sustainable development of a PSEDA in a single-industry town are conditioned by specific features of these territories. The establishment of PSEDA in single-industry towns is aimed at creation of conditions for attracting investments, overcoming of a single-dependence. Owing to the implementation of projects with a multiplicative effect it will be possible to improve living standards of population, since new social infrastructure will be developed, new working places appear, and a taxable base will be increased.

It is natural to assume that conditions formed in a PSEDA of single-industry towns and peculiarities of single-industry towns can influence factors relevant for successful sustainable development of clusters. What are these factors?

Factors of successful sustainable development of a cluster revealed in analyzing successful foreign and domestic experience of cluster development, foreign experience of cluster management of European Cluster Excellence Initiative, research results into formation of business and high-tech clusters, and selection criteria for pilot clusters in Russia (Stringer & Le Heron, 2016; Kutsenko, 2015; Toledano, 1978; Porter, 2001; Gokhberg & Shadrin, 2013; Ministry of Economic Development, 2012; Enright, 2003; Perry, 2005; Braunerhjelm, 2006; Valdaliso & Wilson, 2015; Wickham, 2005; Sölvell, Lindgvist & Ketels, 2003; Storper & Walker, 1989; Freeman & Lundvall, 1998), are as follows.

A level of development of the territory's infrastructure (transport, energy, engineering, housing and social) presupposes not only a quantitative assessment of financing the development of the cluster infrastructure and its territory from different budgets, but also a qualitative assessment of problems in the development of transport, engineering, housing and social infrastructure in cluster development. In particular, advancement of the business environment and basic infrastructure (social, engineering, energy and transport) are encountered in more than half of programs of established innovative territorial clusters (Gokhberg & Shadrin, 2015).

A level of development of production potential. First of all, it is necessary to assess total revenues of enterprises – cluster participants, which are made in selling non-raw materials on internal and world markets, a share of small and middle innovative companies in economy of a cluster, large (anchor) companies among participants of a cluster, outlooks of parts of technological chains on the territory of a cluster and diversification of cluster production. It should be said that innovative territorial clusters established in the Russian Federation consider nearly a half of all threats in programs of their development in the field of «Development of production potential» (Gokhberg & Shadrin, 2013).

A critical number of participants – companies, which are engaged in a profile field and implementing closely-related and supporting activities. The more enterprises are engaged in manufacturing of the same product, the more efficient is the market mechanism of a cluster, and the lower the production costs of a final product are. The economic effect is also caused by a critical number of companies, suppliers and skilled employees in a sectoral cluster, as well as by information flows, knowledge, technologies and skills in a cluster (Lund-Thomsen & Nadvi, 2010). However, established Russian clusters are characterized by a small number of participants, 20 to 40 (Gokhberg & Shadrin, 2015). In materials of studies conducted by Greenbook 2.0 an average number of participants in 356 investigated foreign clusters are 80 companies (Lindqvist, Ketels, Sölvell, 2013). It is proposed to assess a number of companies and their branch structure, number of employees.

A high share of small and middle-sized companies in a cluster. Small and middle-sized companies with the most innovative production process are of big importance. In this case, number, branch structure of small and middle-sized companies, a share of small and middle-sized companies, including innovative ones, number and characteristics of start-ups and spin-offs are to be assessed. A third of programs of clusters established in the Russian Federation aims at support of small and middle-sized businesses, including start-ups and

spin-offs (Gokhberg & Shadrin, 2015). Mainly, Russian clusters are formed on the base of former soviet enterprises in traditional high-tech industries (aircraft-space engineering, nuclear technologies etc.). Therefore, a share of small and middle-sized businesses in them is small, although they are an active part of clusters established abroad. Despite a small number of innovative clusters supported by Ministry of Economic Development of Russia, there are some chains connecting small and middle-sized companies (information and pharmaceutical clusters in Saint Petersburg and Novosibirsk) (Bortnik et al., 2015).

Research and education potential of a town. In this case important factors are both the number of employees in enterprises and organizations engaged in research and development and its share in the total number of employees, as well as qualifications and quantity of engineers and research workers, availability of Universities to train these specialists, laboratories and their equipment for carrying out research and development activities. When studying particular characteristics of educational and research activities of organizations – participants of clusters, e.g. it is suggested (Association of Innovative Regions of Russia, 2015) to use quality assessments: world-ranked, close to world-ranked, world-lagged. The potential of research and educational institutions as cluster elements can be described by financial parameters, e.g. total revenues of the University per one employee engaged in training and research.

Human resources and innovation infrastructure of clusters in the Russian Federation are crucial factors for the development of human resource potential and strengthening of educational infrastructure, therefore, these factors as well as development of innovation infrastructure are included in the majority of programs of innovative territorial clusters developed in the Russian Federation (Gokhberg & Shadrin, 2015). However, the main point of the developed programs of innovation clusters in the Russian Federation is establishment of primary parts of an innovative chain, and distribution of technologies and innovations, increase in innovative production are less mentioned factors (Gokhberg & Shadrin, 2015). The effect of this factor on PSEDA of a single-industry town is determined not only by PSEDA conditions, but also by peculiarities of the town itself.

The behavior of this factor on PSEDA of a single-industry town depends on existing and new raising productions. As high-tech businesses require skilled personnel and representatives of creative industries, PSEDA favorable investment and preferential tax conditions stimulate an increase in the number of working positions for such categories of employees, and, therefore, attract them to the town, and contribute to development of clusters. In addition, scientific and technological and potential of the territory is the factor which affects attractiveness of the territory for highly qualified and creative specialists.

Conditions for the development of internal strong competition. According to Storper & Walker (1989), in the economy of developed and developing countries two types of emerging competition are formed – “strong competition” and “weak competition”. It is strong competition that is a factor in sustainable development of efficient clusters in economically developed countries, which leads to development of innovative products ("strong competition" between quality-competitive firms) but not to the production of cheap goods. This development vector provides a high level of competition between the cluster members (Freeman & Lundvall, 1988). For arising and active influence of this factor on the sustainable successful development of clusters on TOSER of the single-industry town, a high level of scientific, technological and educational development is needed.

In the case of quality of management, the presence of specialized independent management bodies is positive, for example, in the form of a cluster council or other collegial representative bodies, whose function is strategic management, estimation of key development vectors, overall coordination. Analysis of regional development programs for innovative territorial clusters in the Russian Federation shows that foundation and development of a specialized organization are mentioned in half of the program documents (Gokhberg & Shadrin, 2015). In addition, an important factor is the high qualification of cluster managers.

A balanced composition of collegiate management bodies of the cluster, overall representation of all cluster members, including small and medium businesses, availability of

formal procedures and criteria for selecting projects, affiliation and disaffiliation with the cluster, and the existence of a code (rules) for the interaction of cluster members. All of the clauses listed depend directly on the partnership nature in the cluster. However, in the existing innovative territorial clusters in Russia, issues of regulation optimization are not considered important and are not practically mentioned in cluster development programs (Gokhberg & Shadrin, 2015). Of course, membership of the management bodies directly depends on the nature of partnership in the cluster, determined by the quality of management, qualification and motivation of the management teams of PSEDA of the single-town.

A level of networking and cooperation, intensity and quality of communications between organizations and individual specialists of different organizations. For diffusing innovation, advent of new products in the cluster, it is important to ensure conditions for networking, forming of project teams. Perry believes that key characteristics of successful clusters are not only the combinations of business types, enterprises types, enterprise managers' expectations from participation in the cluster, but also interactions, business networks between the cluster members. The continuity of cooperation depends to a large extent on the positive attitude that arises from "organizational learning" and mutual responsibility (Perry, 2005). To build trust between participants, it is important to consider the system of values, principles, standards, transparency of procedures (Boguslaw, 2015). To identify communication and networking development potential, traditions of cooperation in the cluster should be analyzed.

Analysis of regional development programs for innovative territorial clusters in the Russian Federation (Gokhberg & Shadrin, 2015) shows that stimulating in-cluster self-organization and communication are mentioned in half of the program documents. While problems of networking ties between employees of firms are missed in the program documents of domestic clusters, in contrast to foreign ones. To date, Russian pilot innovative territorial clusters do not have the experience of in-cluster interaction. There is an opinion that it is difficult to be assessed at the stage of identifying the possibility of cluster arising. In foreign practice, the priority is to establish interaction between different companies within the cluster, in Russia communication of enterprises-participants of the cluster with authorities, universities, organizations that are elements of innovative infrastructure, for example, business incubators, are considered to be the most important.

Publicity of the cluster, including feedback from actual and potential participants, investors, subjects of innovation infrastructure through, for example, social networking sites, feedback sites (for example, Sarov, Dimitrovgrad, Khabarovsk clusters created pages on social networks for free communication).

Publicity should ensure transmission of possible benefits from functioning within the cluster, including potential participants. When forming a cluster, at the design stage, it is necessary to identify interests, benefits, factors, trends, obstacles. Based on their analysis and assessment, conditions for cluster arising should be developed and implemented. The cluster will be formed quickly enough if the benefits of joining the cluster for potential participants are significant and obvious, and information is available and unambiguously interpreted by all players. In this case, the participants will join the cluster readily (Huhrin et al., 2014).

It should be emphasized that the specific character of PSEDA is to attract new industries, investors, residents: that causes a strong impact of this factor on opportunity of successful sustainable development of clusters on the single-industry town area. Before analyzing the mutual influence of the PSEDA conditions in the single-industry towns and factors of successful sustainable development of clusters let us consider the situation the single-industry town of Yurga before it was awarded the status of PSEDA.

Analysis of the single-industry of Yurga (Kemerovo region) development before being awarded the status of PSEDA

At the end of the nineteenth century the town of Yurga was just a small settlement situated not far from Kuznetsky Road, the main road from Tomsk to Kuznetsk. But after Stolypin’s agrarian reform thousands of small farmers migrated to Siberia and the town started growing. Construction of the Siberian Mainline Railway (Transsib) designed for delivering

coal from Kuznetsk mines to the European part of the country also contributed to the fast development of the town. Start of the war in 1941 determined the accelerated construction of the plant and increased need for qualified engineers who arrived to Yurga from other towns and cities. The machine-building plant became the local economic mainstay. On July 15, 1953 the town of Yurga was included into the category of oblast cities. In 2004 the town of Yurga was granted the status of an urban district, new borders of the municipal entity were established.

The area of the municipal entity is 4481 hectares including 1673.2 hectares of land for housing development, 297.42 hectares – for agricultural exploitation, 396.85 hectares – for institutional and commercial use and 778.28 hectares – for industrial use. The population in 2016 was 81.3 thousand people.

Yurga has a number of competitive advantages that ensure its potential for developing clusters. Awarding the status of PSEDA to the town in 2016 allows diversifying and clusterizing the economy of the single-industry town and attracting investors.

Yurga has an advantageous geographic position. First, the town is at the junction of three federal highways between Kemerovo, Tomsk and Novosibirsk, and at a short distance from these three cities. Second, there are mineral resources (gravel, sand and break stone) extracted in the Yurginsky area. Besides, the largest military training area in the Western Siberia is situated in the nearby countryside.

Analysis of the data on social-economic development of the town presented on the official site of the Administration of the town of Yurga brings us to the following conclusions (Ivanova, Antonova & Antonov, 2016).

First, the growth of economic development ratios of the single-industry town in 2011-2012 was replaced by the dramatically negative trend in 2013, with insignificant recovery in 2014. Positive trends of economic development were observed under the generally favorable economic situation in 2011. The physical index of industrial production was 122% (12.1 billion rubles), sales volume was 7 billion rubles. In 2012 the physical index of industrial production was 103.2 % (13.6 billion rubles). The sales volume was 7.7 billion rubles (quantum index was 100.4 %). But in 2013 the trends of economic development became negative. In 2013 the index of industrial production reduced to 75.6 % and sales volume reduced to 75.2%. In 2014 the given index made 96.6% (see Table 2). The shift from the positive to the negative development trend is observed for the factory output of the town especially for the manufacturing activity (Table 1) while for electricity production and distribution the given index changes insignificantly during the considered period (Ivanova, Antonova & Antonov, 2016).

Table 2
Dynamics of industrial production in a municipality “Yurga urban district”

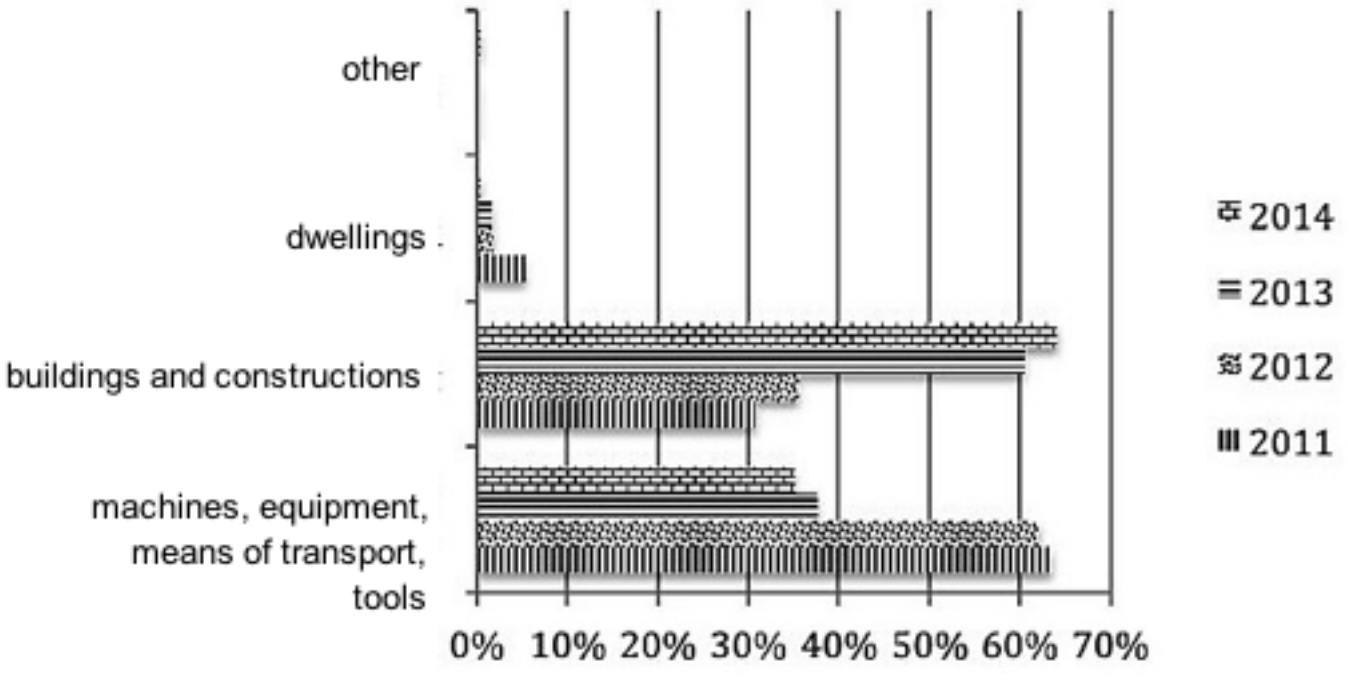
	Types of economic activities	**2011**	**2012**	**In % to 2011**	**2013**	**In % to 2012**	**2014**	**In % to 2013**
1	Industrial output of the town, million ruble							
	total	12401	13593	110.2	10662	78.4	11331	107
	large and middle-sized enterprises	1717	12907	109,6	9924	76,9	10657	107
2	Processing industries, million ruble	10751	11944	111	9018	75.5	9632	108

	large and middle-sized enterprises	10071	11263	111.8	8281	73.5	8977	109
3	Production and distribution of electricity, gas and water, million ruble	1650	1649	99.9	1643	99.7	1696	102
	large and middle-sized enterprises	1646	1644	99,9	1643	99.9	1680	102

Second, the structure of industrial production by type of economic activity changed in 2011-2014. The share of manufacturing reduced insignificantly: from 87.85% in 2011 to 84.24% in 2014. Reduction of shipping volume was observed for the metallurgical production (by 14% in 2011-2014 from 4186 to 3681.9 million rubles) and for production of machines and equipment (growth by 26% in 2012 as compared to the previous year and general reduction by 84% during 2011-2014 from 3218 to 510.1 million rubles) while manufacturing of non-metallic mineral products showed growth by 51% in 2011-2014 (from 1912 to 2893.9 million rubles) (Ivanova, Antonova & Antonov, 2016). The growth of non-metallic mineral products manufacturing is taking place within the development of the construction materials industry in Yurga. The change in the structure of industrial output is also influenced by the change in the structure of investments made into the town's capital assets.

Third, the structure of real investments changed: the investments into buildings and structures increased in 2011-2014. It became possible due to implementation of Complex investment plan of modernization developed by the authorities of the town. During the period of 2011-2014 we observe the change in the ratio between the investments into buildings and constructions (its share in 2014 was over 60% in comparison to slightly over 30% in 2011) and those into machines, equipment, means of transport and tools (reduction of the share from 64% to 35.1% during the same period) (see Fig. 1) (Ivanova, Antonova & Antonov, 2016).

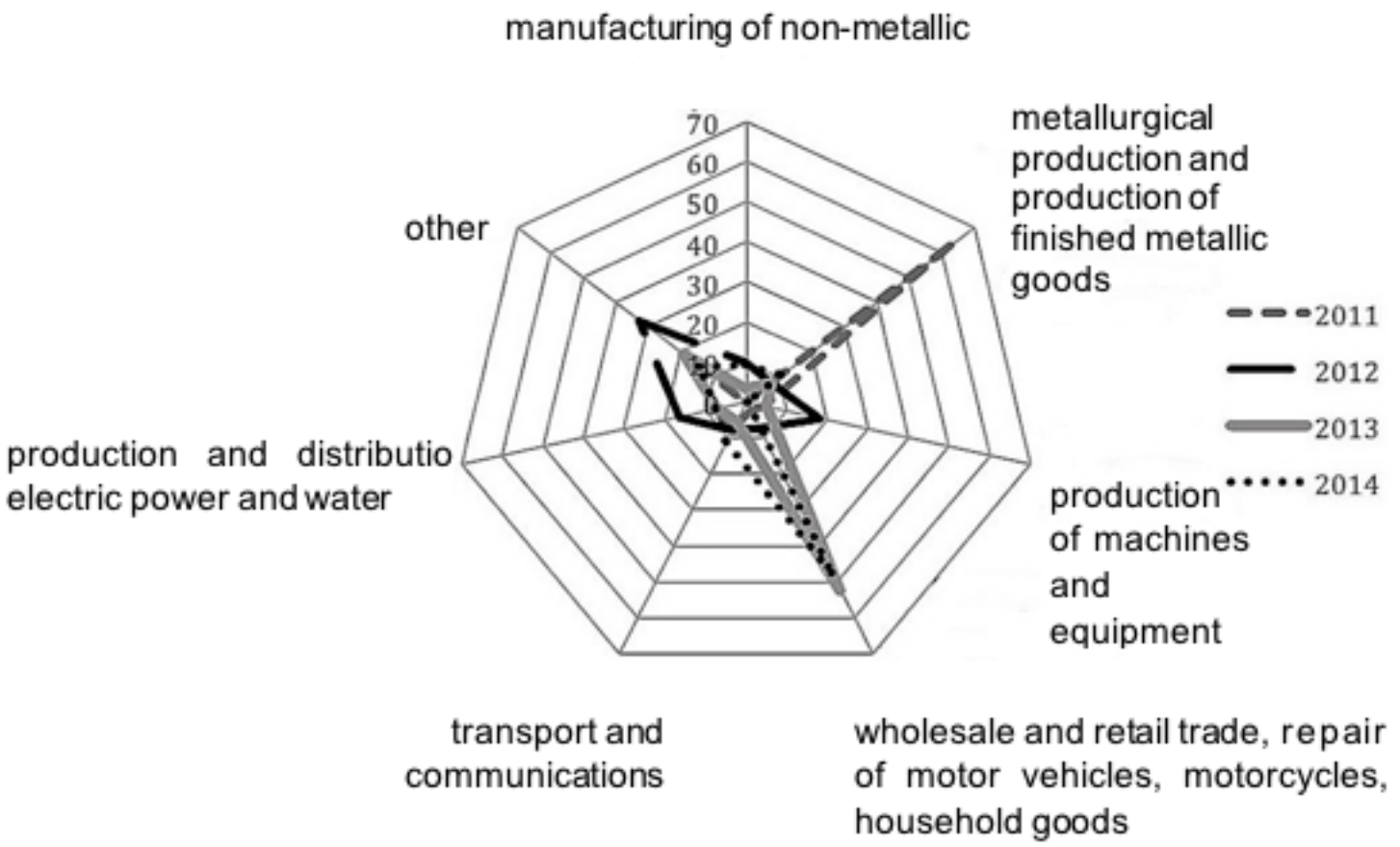
Figure 1
The dynamics of changes of investment structure
by the types of basic funds in 2011-2014



Fourth, the structure of investments by the type of economic activity changed: the share of investments in the metallurgical production decreased, that in the wholesale and retail trade, motor vehicle and motorcycle repair, production of household goods and personal appliances grew in 2011-2014 (Ivanova, Antonova & Antonov, 2016). The change in the investment structure by the type of economic activity is indicative. If in 2011 the amount of capital investments in the metallurgic production and production of finished metal products

was 62.7% of the total amount of investments by 2014 it was only 11.02%. At the same time the amount of capital investments in the wholesale and retail trade and repair of motor vehicles and motorcycles, household goods and personal appliances grew from 2.4% in 2011 to 47.3% in 2014. The given fact reflects the forming trend for diversification of the town economy (see Fig. 2) (Ivanova, Antonova & Antonov, 2016).

Figure 2
Changes in the capital investment structure by the types of economic activities in 2011-2014



The share of local mainstays in the total shipping volume reduces from 51.2% in 2011 to 12.3% in 2014. The industrial production index was 75.6% in 2013 increasing up to 96.6% in 2014. Reduction of the share of local economic mainstays was also determined by the problems of the given companies which resulted in the significant reduction of shipping volume and industrial production index of the sector-specific company from 90.0% in 2011 to 38.2% in 2014.

The preconditions for applying the cluster approach to development and implementation of the PSEDA creation program in a single-industry town are: the need for economic diversification; the demand for attracting enterprises with technologies that enable them to enter new markets; the availability of resources for new investment projects implementation in the town.

The program of projects is a group of related projects with coordinated managing, which cannot obtain benefits and which implementation cannot be monitored under the isolated management of these projects (the American standard developed by PMI, the Standard for Program Management); a number of related projects, which management is coordinated to achieve the advantages and the degree of manageability that are unavailable when they are managed separately (Fens, 1991).

The level of infrastructure development of the territory (transport, energy, engineering, housing and social)

The total land area of the municipality is 4481 hectares, including 1673.2 hectares of residential area, 396.85 hectares of public and business buildings, 778.28 hectares of industrial buildings, and 297.42 hectares of agricultural land. There are spare land plots for industrial enterprises, housing construction. Projects are being developed and implemented for the construction of two residential areas, kindergartens, a school, a cottage community, cultural and recreational center. The key supplier of electricity is LLC “Kuzbass Electric Sales Company”, namely, its branch “Electrosbyt of Yurga” and stable operation of electric networks is ensured by LLC “Energoset”. There are 10 distribution points in the town’s

electrical networks. This allows development of energy-intensive industries in the territory of the town.

A level of productive capacity development and critical mass of participants

The Yurga urban district is an industrialized territory of Kemerovo region. The town's economy is traditionally based on manufacturing industry. In the town there are industries for production of building materials, rubber and plastic products, food processing, woodworking industries, enterprises of heat and water supply.

Constructing a cluster

The project of a cluster of "Industrial housing" (construction cluster) has been developed and is being implemented. The construction cluster will accelerate the development of the metallurgical, engineering, commercial, educational and housing sectors of Yurga. The town of the Soviet industrialization era will be transformed into a comfortable and modern industrial and business settlement with a developed infrastructure.

The construction cluster includes: production of roofing materials, extruded polystyrene foam and mineral wool slabs: "Plant TekhnoNIKOL-Siberia" LLC (production of roofing materials); woodworking enterprises: Bildau and Busman LLC (deep wood processing, laminated beam production), wooden windows and doors production, a small timber manufactory; Other building materials and products: SV-Service LLC (translucent structures made of PVC and aluminum profiles), “Star” LLC (frame house building), TeploService LLC (low-rise building), YurSroy LLC (off-form concreting), "Quarry" LLC (extraction of building materials), a masonry reinforcement mesh manufactory.

Machine-building cluster

The project of the cluster provides diversification of the town-forming enterprise Yurga Machine-Building Plant LLC., for which output of new types of machines will increase and the range of range of items is to be expanded. Priorities are modernization and reconstruction of the existing industry. The cluster also includes: Yurga HydroArmature LLC (engineering facility for air-plasma cutting of pipes, engineering facility for processing and utilization of coal-containing waste and preparation of liquid fuel), "HydroAgregat" LLC (Production of electric forklifts), "Trio" LLC (hydraulic attachments to tractors); "Yurga Agromash" LLC (production of agricultural loaders, hay-stackers), "Tom” LLC. (Aluminum boats of Economy class); "Artlife-Techno" LLC (facilities for pharmaceutical and food manufactories); "Breeze" LLC (boats and water jet engines; helicopters and water jet nozzles for outboard motors in the long term); Promselmash LLC (oil presses); "Yurga Ferroalloy Plant" (projects of modernization of existing production facilities, component parts for mining equipment).

Agro-industrial cluster

The agro-industrial cluster unites a Dairy Plant, the “YuSIL” Company producing soft drinks and mineral waters, a bakery complex and a greenhouse complex with an area of 5 hectares. By 2020, it is scheduled: a rainbow trout farming enterprise with a volume of a thousand tons per year and processing fish waste (Siberian Fish LLC), expanding the greenhouse complex ("Green Project" LLC) to an area of 20 hectares. The total cost of the projects is 2165 million rubles; 710 new jobs are expected. It is assumed that the rainbow trout farming complex will satisfy the demand for fresh fish products in the market of Kemerovo region and adjacent regions. In addition, trout will be processed (smoking, canning, etc.).

Table 3
Estimated investments, town budgetary revenues, new working places

	Years				
indexes	2017	2018	2019	2020	2025
Estimated investments, million ruble	3694.25	3799.95	4571.1	3766.1	4281.6

Town budgetary revenues from projects, million ruble	60	70	80	90	150
Additional working places	985	1109	1207	1315	1540

The development of production potential of clusters in leading industries makes it possible to forecast the production growth by their participants, and the increase of revenues to the town budget. The positive dynamics of the implementing investment projects became possible due to the investment attractive conditions of a PSEDA in single-industry towns, the influence of the currently high and potentially growing level of infrastructure development and the businesses ambitions for structural changes and the search for new industries. This gives grounds to plan the rapid achievement by clusters of the critical mass of participants necessary for diffusion of innovations.

A high proportion of small and medium enterprises in the cluster

The development of industrial clusters in a town on the basis of large enterprises and projects is important for the increase of small and medium-sized enterprises operating in related and service industries. This is facilitated by the developing infrastructure and the ambition of entrepreneurs to cooperate and network.

At the moment, more than three thousand individual entrepreneurs are registered according to statistics on the territory of the town. The number of employees in small business, including all categories, is about 11 thousand people (only in small enterprises - 5012 people), which is about 20% of the total number of employees in all sectors and spheres of the town economy. The dynamics show that the number of small and medium-sized businesses for 10 thousand people is 376.7.

The share of the average number of employees (without an external part-time worker) in small and medium-sized enterprises in the average number of employees (without external part-time workers) is 25.9% for all enterprises and organizations. In addition, small businesses expand the tax base: the share of tax revenues from small businesses in the revenue side of the town budget is about 20%. In industry, the share of small enterprises is still 14%, in construction - 6%. However, the implementation of investment projects initiated in three sectoral clusters will increase the number of small enterprises operating in them.

The economic and social effect will be achieved by increasing the number of small businesses by 2025 to 361.8 units per 10,000 population, the average number of employees of small enterprises to five thousand people, while the share of small businesses will increase to 30% of the total turnover of organizations in the municipality, the proportion of tax revenue will remain at the level of 20-22%.

A scientific, technological and educational potential of the town, attractiveness of the territory for qualified personnel and representatives of creative industries

First of all, it is necessary to emphasize that the single-industry town of Yurga historically developed as the most intellectually and technologically advanced town among single-industry towns of Kemerovo region, since the city-forming enterprise required highly qualified engineers, and the location close to the recognized scientific centers of Western Siberia - Novosibirsk and Tomsk, as well as Tomsk Polytechnic University in the town, which now has the status of a national research university, makes it possible to evaluate the scientific and technological and educational potential. This means that there is a high influence on the emergence and development of internal competition in the PSEDA clusters of a single-industry town, the development of a strategic orientation toward structural changes and innovations, attractiveness for qualified personnel and creative specialists.

This is confirmed by the following facts. So, on the basis of the scientific and educational center of Yurga Institute of Technology, TPU Affiliate, the Center for Competences in Construction Industry and the Competence Center in Mechanical Engineering (beyond the Urals) are being created. A technological business incubator and an industrial park are being built. Scientific developments of Yurga Institute of Technology, TPU Affiliate are used by a

number of industrial enterprises on the territory of Kemerovo Region and beyond. The existing laboratory base (the laboratory of the Institute conducts development in the following areas: mining equipment, welding production, engineering technology, ferrous metals, information and critical technologies) and the availability of highly qualified specialists allow for independent technical expertise of complex investment projects.

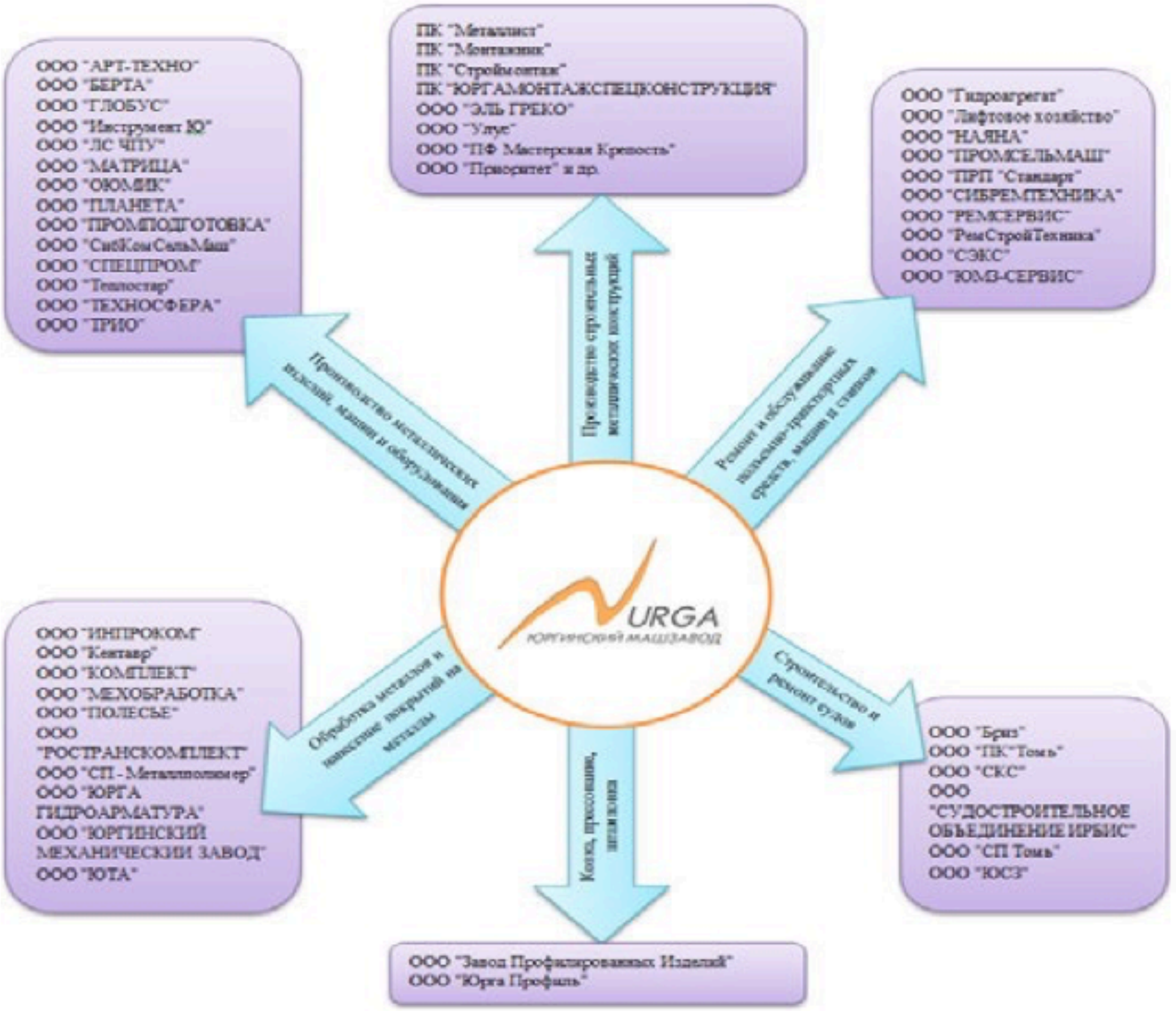
The projects are being developed in UTI TPU: (1) development and production of a new type of shield-type tunneling aggregates for multi-purpose use – geokhods; (2) development of remote control and automation systems for agricultural machinery in field work; (3) development of new import-substituting welding materials with nano-component filler for manufacturing and repairing crucial metal structures; (4) designing a modern progressive metal cutting tool for the turning group; (5) development in the field of IT-technologies.

Research work in UTI TPU is carried out in the following areas: (1) development of the fundamentals of geodynamics of underground apparatus; (2) development of principles for controlling the properties of welded joints in alloyed steels in fusion welding; (3) creation of scientific bases for designing tools and improving operations in technological processes for manufacturing engineering products; (4) physical and chemical quality control of welded joints with nano-powder components; (5) research and testing of semiconductors and semiconductor devices; (6) mathematical and software support systems for strategic decision-making; (7) innovative technologies for creation of machine-building products and managing single-industry towns on the basis of competitiveness assessments.

Conditions for the development of internal strong competition, adherence to the cluster strategy of open innovation, the level of networking and cooperation

The development of networking is evidenced by emergence of small enterprises in the machine building cluster. Small enterprises were formed around LLC “Yurga Machine-Building Plant” (see Fig. 3).

Figure 3
Small engineering enterprises in Yurga.



The quality of management that determines the balanced composition of the collegiate management bodies of the cluster and the horizontal nature of the partnership in the cluster.

Openness of a cluster

An important direction in the development of additional professional education for TPU employees is internationalization of training programs, which consists both in adaptation and implementation of the best world practices in additional training programs implemented on the basis of TPU, and in development and implementation of joint programs with leading Russian and foreign universities.

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4. Conclusions

Thus, the findings are presented how to solve problems of attracting effective residents and investors to a PSEDA in Russian single-industry towns. A possibility of synergy resulting from PSEDA benefits and cluster approach is identified for establishing such areas in single-industry towns. The factors of successful sustainable development of intra-regional industrial clusters were systematized within the framework of the establishment of PSEDA in Russian single-industry towns, quantitative and qualitative indicators of their effect on the territory were described, and their interconnection and interdependence were revealed. On the example of Yurga, Kemerovo region, the revealed influence of PSEDA features on strengthening the factors of sustainable development in industrial innovation clusters as potential residents of such a territory was demonstrated.

Further development of research is important for studying the limitations and risks of forming industry clusters on PSEDA of single-industry towns in order to develop methods for

preventing and minimizing the risks of cluster formation and enhancing synergies from the use of two approaches to diversification of clustering in single-industry towns and PSEDA.

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