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## **Trends for the Development of Entrepreneurial and Innovative Activity in Krasnoyarsk Agglomeration**

**Svetlana A. Samusenko<sup>a\*</sup>, Evgenia B. Bukharova<sup>a</sup>,  
Vladislav N. Rutsky<sup>a</sup> and Dmitry A. Maslodudov<sup>b</sup>**

<sup>a</sup> *Siberian Federal University,*

*79 Svobodny Pr., Krasnoyarsk, 660041, Russia*

<sup>b</sup> *Ministry of Economic and Regional Development  
of the Krasnoyarsk Territory,*

*110 Mira Pr., Krasnoyarsk, 660009, Russia <sup>1</sup>*

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*The article deals with the measurement of entrepreneurial and innovative activity in Krasnoyarsk agglomeration in the context of international procedures applied by the Organization for Economic Cooperation and Development (OECD). The study investigates the tendencies of measuring entrepreneurship and innovation complex indicators. It makes a conclusion on the dependence of entrepreneurship and innovation development trends on the organization and effective functioning of the regional innovation system based on the conducted analysis.*

*Keywords: innovation, entrepreneurship, innovative activity, Organization for Economic Cooperation and Development.*

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The Organization for Economic Cooperation and Development (OECD) is an international economic organization of the developed countries whose government's policy is based on the principles of democracy and free market economy.

It was founded in 1948 and now has 34 member countries, which account for over 60 %

of the world's gross domestic product (GDP). OECD membership stands for the country not only obtaining the international status of the economically developed state, but also promotes negotiations on economic problems that integrate the national economy in the global space.

The Russian Federation aspires to the OECD membership starting from 1996. At

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\* Corresponding author E-mail address: sv\_sam@bk.ru

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present it is classified as a country that has sufficiently implemented tax standards that are internationally accepted. Cooperation with OECD is connected with the information openness: Russia participates in the annual reviews for comparative ratings formation. In 2011-2012 the investigations for the development of the Territorial Review on social and economic status of Krasnoyarsk agglomeration were carried out by the OECD procedure<sup>1</sup> in the context of international comparisons at the Institute of Economics, Management and Environmental Study of Siberian Federal University. When calculating indicators it was proposed to rearrange data and official static observations formed by Russian methods. All indicators are combined in 3 measuring blocs: production scales by the gross value added in the context of the three and six- segment model of economics<sup>2</sup>; entrepreneur's activity indicators; indicators of innovative development according to the procedures of the Maastricht Economic and Social Research and Training Centre on Innovation and Technology<sup>3</sup>.

The subject of the study is Krasnoyarsk agglomeration – a territorial unit with high concentration of resources and potential of rural and urban areas located nearby Krasnoyarsk that are united by cultural and production relations, common consumer market and capital market.

### **The structure and dynamics of the gross value added by Krasnoyarsk agglomeration sectors**

Initially we have identified trends in the development and current state of entrepreneurship in Krasnoyarsk agglomeration. In particular, the scope of value-added production and concentration of businesses by economic sectors, individual entrepreneurial activity and the total dynamics of turnover in business were analyzed.

Data on the gross value added (GVA) of the structure of Krasnoyarsk agglomeration in the context of the three-sector model of economy is given in Table 1.

The analysis shows that the tertiary sector generating services is stably dominated in the structure of the gross value added production and this tendency corresponds to the world trends of post-industrial transformation of economy. The increase of primary sector GVA is supported by the resource mining activity and is connected with the implementation of projects in the oil and gas sector. More than 70 % of GVA in the secondary sector is generated by the processing industry, where metallurgy and oil refining are dominated. The distribution of activities in the tertiary sector is relatively even, however in 2011 a pronounced increase of trade activity has been observed due to the general market revival.

The overwhelming share of all sector's GVA is produced in the metropolitan area –

Table 1. The structure of Krasnoyarsk agglomeration gross value added in the context of the three-sector model of economy \*

Sector	2007	2008	2009	2010	2011
Primary	0,77%	0,98%	1,67%	4,33%	4,65%
Secondary	47,46%	40,82%	41,22%	47,78%	47,57%
Tertiary	51,77%	58,19%	57,11%	47,88%	47,78%

\*Calculated by: socio-economic indicators of the Krasnoyarsk Territory urban sectors and municipalities in: Report. Krasnoyarsk : Krasnoyarskstat 2012, page 165.

Krasnoyarsk city. In the primary sector, due to the development of agriculture, the shares of Berezovsky (6.4 %), Yemelyanovsky (4.85 %) and Sukhobuzimsky (1.65 %) regions are evident. More than 86 % of the secondary sector's GVA is the share of Krasnoyarsk, in Berezovsky region (1.99 %) the secondary sector develops due to the timber processing, and in Divnogorsk (2.48 %) – due to power industry and production of electrical equipment and metal. More than 96 % of GVA in the tertiary sector is created by the Krasnoyarsk business community.

### **Entrepreneur activity in Krasnoyarsk agglomeration**

Enterprises concentration was analyzed based on the six-sector model. In 2005-2010 there was unidirectional increase in the number of enterprises in Krasnoyarsk and Krasnoyarsk agglomeration by economic sectors of industry, construction, trade and financial activities against decrease in the number of agricultural and service enterprises. A significant share of the

industrial and construction facilities is observed in the production structure of Krasnoyarsk agglomeration, which proves agglomeration to be the center of the concentration of the real economic sector. High share of trade, transport and communications enterprises, as well as the financial activity shows the infrastructure development and good opportunities for further development of agglomeration as a logistics and industrial centre of Siberia. (Table 2, Fig. 1).

The share of large and medium-sized enterprises in the total number of legal entities of Krasnoyarsk agglomeration in 2010 was 2.22 % (4.21 %, in the Krasnoyarsk Territory and 1.94 % in the Russian Federation). The maximal concentration of large and medium enterprises of Krasnoyarsk agglomeration is in agriculture, industry, service. Construction, trade, transports and communications are mostly presented by the small-scale business.

The concentration of large and middle-scale business in agriculture is typical for agglomeration and Krasnoyarsk Territory and differs from the

Table 2. Quantity and share of enterprises of Krasnoyarsk agglomeration, Krasnoyarsk Territory and Russia in 2010\*

Sector	Number of enterprises, units			% of enterprises in the sector		
	Krasnoyarsk agglomeration	Krasnoyarsk Territory	Russian Federation	Krasnoyarsk agglomeration	Krasnoyarsk Territory	Russian Federation
Agriculture	1450	4217	202600	2,87	5,70	4,20
Industry	4924	7294	450100	9,75	9,85	9,34
Construction	5548	7361	431800	10,98	9,94	8,96
Trade, transport, communications	22388	29280	2145300	44,32	39,54	44,52
Financial activity, real estate business	11083	14075	965100	21,94	19,01	20,03
Services	5127	11818	624200	10,15	15,96	12,95
Total enterprises	50520	74045	4819100	100,00	100,00	100,00

\*Calculated by: (1) Socio-economic status of Krasnoyarsk Territory in 2010: Report. Krasnoyarsk: Krasnoyarskstat, 2011. p.191. (2) Institutional reforms in the Krasnoyarsk Territory: statistical digest Krasnoyarsk: Krasnoyarskstat, 2011. p.12. (3) Russia in numbers: statistical digest. M.: Rosstat. 2011. p.581. (4) Regions of Russia: socio-economic indicators: statistical digest. M.: Rosstat. 2010. p.990.

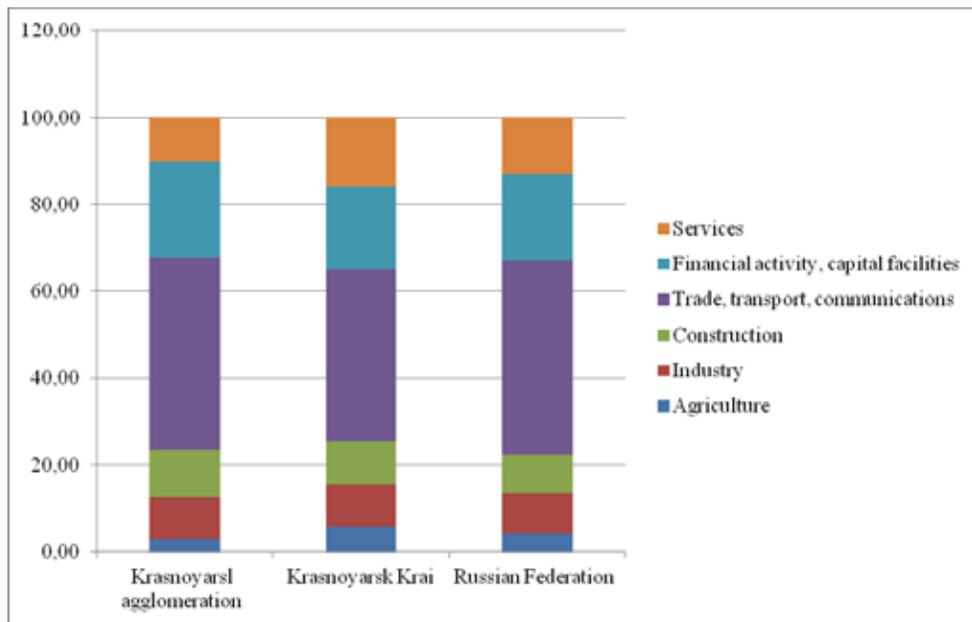


Fig. 1. Structure of economic sectors by the number of enterprises in Krasnoyarsk agglomeration, Krasnoyarsk Territory (Krai) and Russian Federation in 2010.

all-Russian one that indicates the trend of the regional policy towards supporting large farms. The concentration of large and middle-scale business in the industrial sector of Krasnoyarsk agglomeration and Krasnoyarsk Territory including the high-technological sector is lower than in Russia. This reflects the perspective of creating new innovative businesses in the small business environment.

80 % of large and middle enterprises of the processing industry of Krasnoyarsk agglomeration are concentrated in Krasnoyarsk. Low-tech enterprises are located in peripheral areas, high-tech, medium-tech and moderately low-tech enterprises operate mainly in the metropolitan area (Table 3).

Krasnoyarsk agglomeration is the entrepreneurial centre of the Krasnoyarsk Territory, which is confirmed by common trends of the business environment development. The resultant dynamics of new companies' entry into the market both in the Krasnoyarsk Territory

and Krasnoyarsk agglomeration has a positive tendency: on average 12 % of new businesses are registered in the Territory each year and about 14 % are registered in agglomeration. The entry process is characterized by the slow-down growth. Indicators of dynamics of enterprises withdrawal from business in Krasnoyarsk agglomeration and specifically in the Krasnoyarsk Territory are lower than indicators of the entry dynamics. On average 5.8 % of existing agglomeration enterprises and 6.4 % of the Krasnoyarsk Territory companies are liquidated each year. The process of enterprises entry in business is more active in Krasnoyarsk (there is 14.3 % of new companies at average), the process of withdrawal is more active in Mansky region (8.4 % of companies are liquidated annually)

Independent entrepreneurial activity in Krasnoyarsk agglomeration is more than 10 % of employment in the economy, which is much higher than the indicator for the Krasnoyarsk Territory – about 5 % ( Fig. 2).

Table 3. Large and middle scale enterprises of the processing industry\*

Technological level	Number of enterprises, units		The share in the total enterprises number, %	
	Krasnoyarsk agglomeration	Krasnoyarsk	Krasnoyarsk agglomeration	Krasnoyarsk
High-tech industry	10	8	8,13	8,08
Middle-tech industry	11	8	8,94	8,08
Moderately low-tech industry	47	43	38,21	43,43
Low-tech industry	55	40	44,72	40,40
Total	123	99	100,00	100,00

\*Calculated by: Socio-economic indicators of urban districts and municipalities of Krasnoyarsk Territory in 2011: Report. Krasnoyarsk. Krasnoyarskstat, 2012. p.165.

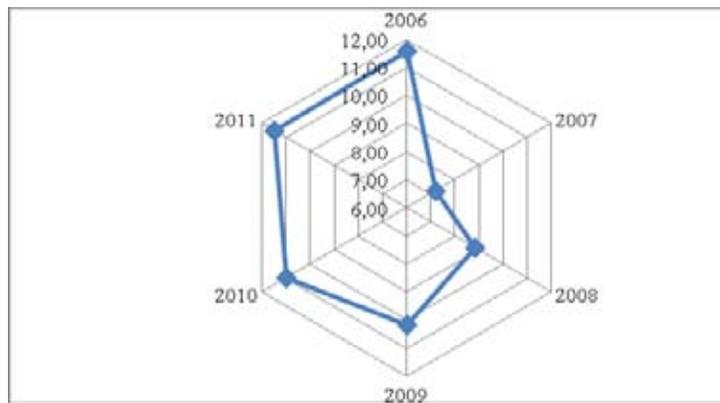


Fig. 2. Independent entrepreneurial activity, in percents

The largest share of independent entrepreneurs is specific for Sosnovoborsk – about 21 %, the lowest – for Yemelianovsky region that is 6.4 %. The largest share of entrepreneurs in agglomeration's employment structure was recorded in 2006, and the lowest (7.23 %) was fixed in 2007, then a trend of business activity stable growth is observed.

#### **Innovative activity in Krasnoyarsk agglomeration**

If we address to the process production specifications, we would see that the share of high tech industry is less than 20 %, which is

insufficient. Implementation of the innovative development strategy becomes the basic factor for the further industrial growth of agglomeration and the Krasnoyarsk Territory. The innovative sphere of the Krasnoyarsk Territory economy is focused in Krasnoyarsk agglomeration areas, first of all in Krasnoyarsk city. The economic crisis of 2008-2009 gave a positive impulse to the enhancement of the regional innovation system.

An overwhelming source of funding research and development works (more than 86 %) in the Krasnoyarsk Territory and agglomeration is the resources of federal, regional and local budgets. These funds are spending for creation of the

Table 4. Costs for innovations and the volume of innovative products of the Krasnoyarsk Territory enterprises\*

Indicator	2005	2006	2007	2008	2009	2010
Costs for innovations ,million rubles, including:	1422.7	1893.0	5967.3	9928.7	8317.4	15956.6
Technological	1422.7	1756.8	5265.3	7921.1	8030.9	14617.7
Marketing	...	36.7	507.8	406.1	2.3	2.5
Managerial	...	99.5	194.2	1601.5	284.2	1336.4
The volume of innovative goods, works, services, million rubles	4534.7	9472.8	12317.1	8708.3	3895.5	4957.2
Percentage of the total volume of shipped goods, works, services	1.2	1.8	2.0	1.5	0.7	0.5

\*Indicator of innovative activity – 2011: statistical digest. Krasnoyarsk: Krasnoyarskstat, 2011. p. 40.

innovation infrastructure: business-incubators, scientific centers, industrial parks.

There are about 70 organizations located in the Krasnoyarsk Territory that deal with the innovation activity. Innovative human resources potential of the Krasnoyarsk Territory is lower than that of Novosibirsk, Omsk and Tomsk regions both in the number of R&D staff and the number of researches. But the results of R&D activity in the Krasnoyarsk Territory are higher, as evidenced by the number of patent applications and granted patents and utility models.

In particular, domestic expenditures on R&D increased in the Krasnoyarsk Territory within the period 2005-2010 by 157 % with an average increase of the Siberian Federal District costs by 126 %. Costs of research and development in the Krasnoyarsk Territory in 2010 are focused mainly in technical sciences (88.18 %) and natural sciences (10.05 %) as in previous years, indicating that regional economy is specialized in mining and processing industries.

The effectiveness of innovation activity in the Krasnoyarsk Territory and Krasnoyarsk agglomeration increases due to technological innovations and application of advanced foreign technologies. Enterprise costs for innovation as well as the volume of innovative goods, works and services have reduced during the period of

crisis 2008-2009. In this case, the tendency to the predominance of the costs of technological innovations (product and process) has become stronger, and the costs of marketing and organizational innovations reduced (Table 3). In the post-crisis period a significant growth by all indicators has been observed. The number of advanced borrowed production technologies applied for design and engineering, production, communications, management: the number and the value of agreements on technologies import surpass the similar indicators on technologies export.

The development of the regional innovation system that is coordinated by the Ministry of Innovations and Investments of the Krasnoyarsk Territory will support further development of the innovation activity within Krasnoyarsk agglomeration and the Krasnoyarsk Territory. The regional innovation system includes infrastructure and innovations development programs.

Innovation infrastructure is formed by three groups of subjects that compose an educational center, research and scientific complex and infrastructure of innovations commercialization.

Educational complex is presented by institutions of higher education, 90 % of which locate in Krasnoyarsk. More than 40

small innovative enterprises (Spin-Offs) were established by universities from 2009 to 2012 under the special-purpose governmental support to promote its scientific researchers to the market.

Research and scientific complex of Krasnoyarsk agglomeration is presented by the Krasnoyarsk Scientific Centre of Siberian Branch of Russian Academy of Science (KSC SB RAS) that includes 7 scientific enterprises. The main research activity is conducted in the territory of Krasnoyarsk agglomeration; the positive dynamics of patents and publications is noticed.

Infrastructure of innovations commercialization in Krasnoyarsk agglomeration is presented by combination of business-incubators, design offices, technology parks, venture capital, and innovation activity of enterprises. Krasnoyarsk regional innovation and technological business-incubator (KRITBI), Krasnoyarsk city innovation and technological business-incubator (KCITBI), remote business-incubator of the Krasnoyarsk Territory are currently operating in the territory of agglomeration. Under their support knowledge-intensive businesses are being developed in the priority fields of science and techniques such as: medicine, biotechnology, information technology, mechanical engineering.

The positive experience of the past on creating design offices and central laboratories of production plants is revived in Krasnoyarsk agglomeration; the innovative activities of enterprises grow.

### **Summary and recommendations**

Thus, it was found that Krasnoyarsk agglomeration is the business center of the

Krasnoyarsk Territory, and its entrepreneurial activity is steadily increasing: the dynamics of entry in business exceeds the dynamics of exit, a percentage of private enterprises and a percentage of the individual entrepreneurship activity's increase. High concentration of large and middle-scale companies in industry, trade and services points to further development perspectives of agglomeration as industrial and logistics centre of the Territory and Siberia.

The negative trend in the entrepreneur field is the small share of high tech business in agglomeration industrial structure. This problem can be overcome by further integrated development of the regional innovation system. In particular, it is necessary to develop projects involving public-private partnerships that would reduce government financing of R&D and increase the cost of the business sector. Another way of stimulating innovation activity is a change in the cost structure of enterprises on innovation activity: reduction of costs for purchasing foreign equipment and technologies and the increase of costs for own research and development.

The development of innovative sphere of Krasnoyarsk agglomeration is under great attention of the state which is a logical stage of innovative systems establishment. The further development of the regional innovation system is connected with the affiliated territory – Zheleznogorsk city, where the regional innovation nuclear and space cluster is being currently formed. This important process gives an additional impact to the development of the related fields of education, science and high-tech industry within agglomeration.

<sup>1</sup> <http://www.oecd.org/eco/economicsurveysandcountryveillance/22350184.pdf>

<sup>2</sup> Three-sector model of the economy (three-sector hypothesis) considers economy as the combination of branches (enterprises), conventionally divided into three sectors - primary sector, secondary sector and tertiary sector. Primary sector integrates industries related to raw materials extraction and its processing into semi-products. Secondary sector integrates

productions of industries dealing with final products manufacturing. Tertiary sector include services (transport, communications, trade, tourism, healthcare).

Six-sector model of economy according to the international ISIC classification (version 3.1) supposes the selection of sectors: agriculture, industry; construction; trade, transport and communication; financial activity, real estate operations; services (including education and health care).

- <sup>3</sup> European Innovation Scoreboard 2008. Comparative Analysis of Innovation Performance [Electronic resource]: materials of Maastricht Economic and social Research and training centre on Innovation and Technology. EU, 2009. URL: [www.prino-europe.eu/metrics](http://www.prino-europe.eu/metrics), free access.

## **Тенденции развития предпринимательской и инновационной активности в Красноярской агломерации**

**С.А. Самусенко<sup>а</sup>, Е.Б. Бухарова<sup>а</sup>,  
В.Н. Руцкий<sup>а</sup>, Д.А. Маслодудов<sup>б</sup>**

*<sup>а</sup> Сибирский федеральный университет*

*Россия 660041, Красноярск, пр. Свободный, 79*

*<sup>б</sup> Министерство экономики и регионального развития*

*Красноярского края*

*Россия 660009, Красноярск, пр. Мира, 110*

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*Рассмотрены вопросы измерения инновационной и предпринимательской активности Красноярской агломерации в контексте международных методик, применяемых Организацией экономического сотрудничества и развития (ОЭСР). Исследованы тенденции измерения комплексных индикаторов предпринимательства и инноваций. По результатам проведенного анализа сделан вывод о зависимости трендов развития предпринимательства и инноваций от организации и эффективности функционирования региональной инновационной системы.*

*Ключевые слова: инновации, предпринимательство, инновационная активность, Организация экономического сотрудничества и развития.*

*Работа выполнялась в рамках проекта «Разработка методики для проведения сопоставительных международных исследований социально-экономического развития региона и подготовки научного отчета для Организации экономического сотрудничества и развития (ОЭСР) «Территориальный обзор по Красноярской агломерации» № КФ-262 при поддержке КГАУ «Красноярский краевой фонд поддержки научной и научно-технической деятельности».*

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