Development of Innovative Activity and Supply Chain Strategy of Enterprises in the Age of Digital Economy

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***Abstract*-The article presents the analysis of the dynamics of innovative activity and supply chain strategy of enterprises in the Republic of Tatarstan. The authors analyzed the innovative activity of enterprises and small businesses of the Republic, detailed the innovative activity of enterprises by types of economic activity, reviewed the indicators of shipped innovative goods. The article reveals the role of research and development in the activation of innovative processes and summarizes the results of innovative activity of enterprises at the regional level.**

***Key words*-** *innovations, innovative activity, level of innovative activity, volume of innovative goods and services, supply chain strategy, scientific researches and developments, type of economic activity.*

1. Introduction

Innovative strategies have become an integral part of the development of Russian regions in recent years. Innovations provide the basis for new ideas and technologies, become a strategic tool for exploring new growth opportunities. At the present stage of economic development, the contribution of science, innovation and new technologies is very significant. Innovative activity implies a complex of scientific, technological, organizational, financial and commercial activities. Thus, innovations and new technologies ensure growth of the gross regional product as well as its qualitative, progressive change. Scientific base, intellectual and information resources, the ability of economic entities to use them optimally for creating innovative products and services, as well as the ability to develop new competencies and strengthen competitive advantages have become key factors in the development of digital economy.[1] The Republic of Tatarstan aims at contributing most of the resources to developing areas of federal priorities such as «innovation economy» and «ecosystem of innovations» according to the Strategy of Social and Economic Development of the Republic of Tatarstan till 2030. Building new effective economy based on knowledge, development of innovative activity, high – tech sectors of the economy and small business as the main transmitter of mass innovation are considered the priority areas of innovation policy of the Republic of Tatarstan.

2. Research methods

To ensure coordinated operation of the stakeholders of innovative activity, improve the efficiency of state regulation of innovative activity in the region and achieve its main objectives, it is necessary to analyze the indicators of innovative development. The analysis of the state of affairs in the Republic of Tatarstan was carried out on the data of the last 10 years provided by the Regional body of the Federal State Statistics Service. Application of comparative indicators of innovative activity in the Republic act as a method of research. Assessment of the dynamics of innovative activity of enterprises in the Republic for the ten years (20017-2017) shows that the number of enterprises active in application of innovations increased annually in the period. The level of innovative activity of enterprises in the Republic over the period increased from 14.1% in 2006 up to 22.2% in 2017, Table 1.

Table 1.Level of innovative activity of enterprises in the Republic of Tatarstan (%)

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Share of enterprises proactive in innovations in the total number of analyzed enterprises	14,1	14,3	14,5	14,9	18,1	19,1	21,0	20,5	20,5	21,3	22,2

Share of innovative goods in the total volume of shipped goods of enterprises proactive in innovations	23,5	22,9	25,2	21,2	20,2	18,4	18,7	19,5	21,3	20,9	20,5

167 organizations, or 22.2% of all analysed enterprises and organizations, were engaged in the innovative activity in the Republic of Tatarstan in 2017, Figure.1. Innovative processes in the Republic are typical mainly for industrial enterprises, 76% of all companies proactive in innovations.[2]

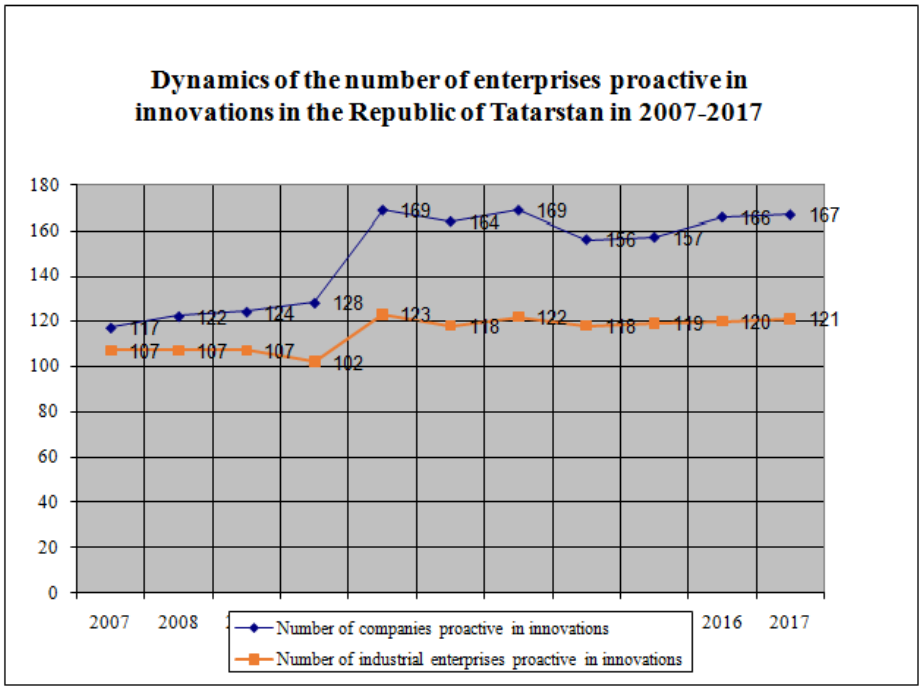

Fig. 1.Dynamics of the number of enterprises proactive in innovations in the Republic of Tatarstan

Development and utilization of innovations in the Republic is carried out by a small number of industrial enterprises, while only a few activities show positive indicators. [3] Innovation activities are mainly focused on manufacturing enterprises (52.7%), enterprises engaged in scientific and technical research and development (17.3%), enterprises extracting mineral resources (9.6%), organizations in the sphere of information technology and communications (6.6%), agriculture and fisheries (6.0%), enterprises producing and distributing electricity and gas (4.8%), Figure.2.

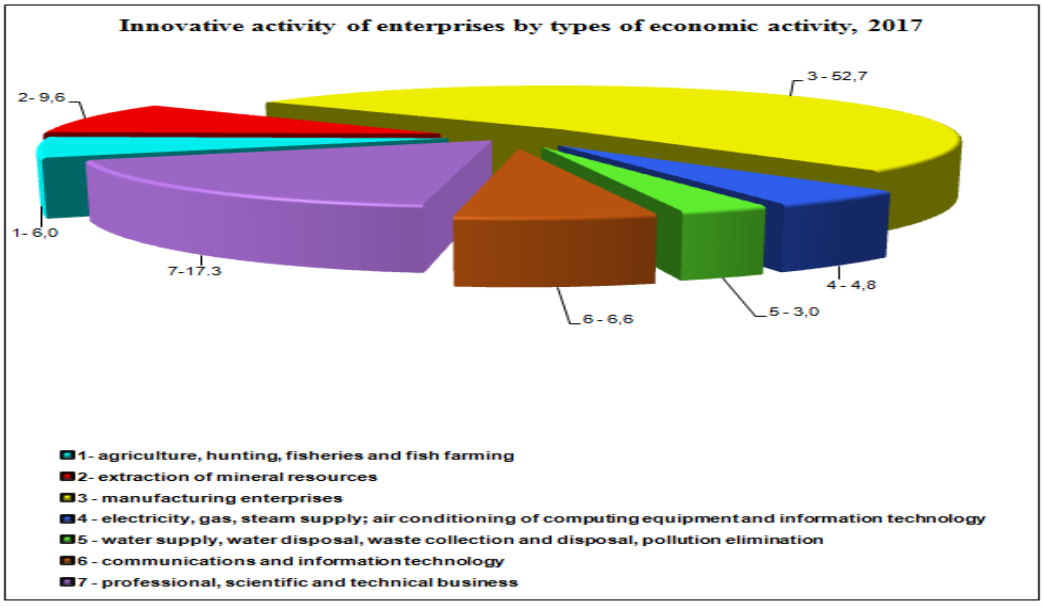

Fig. 2. Innovative activity of enterprises of the Republic of Tatarstan, by types of economic activity

The outcome of innovative activity is amplification of more efficient technologies, raw materials and creation and improvement of existing products. In 2017, enterprises and organizations in the Republic produced innovative goods, works and services in the volume of 435557.7 million rubles. Over the past five years, the growth of this indicator amounted to 1.5 times. The share of innovative goods, works and services in the total volume of shipped products of enterprises of the Republic of Tatarstan is 19.6%. Nowadays small business plays a crucial role in the intensification of innovation processes. Small businesses are characterized by the following specifics: flexibility, the ability to quickly adapt to new requirements and provide more efficient development and production of small-scale innovative goods, rapid penetration into new market segments. [4] In 2017, the number of small businesses engaged in innovative activities reached 43 units (in 2015 – 33 units, in 2009 – 28 units, in 2011 – 39, in 2013 – 36). The share of innovative goods, works and services in the total volume of shipped products in 2015 amounted to 4.8%, an increase of 0.5 percentage points compared to 2013, Table 2.

Table 2 .Innovative activity of small business

	2007	2009	2011	2013	2015	2017
Number of small businesses proactive in innovations	30	28	39	36	33	43
Volume of shipped manufactured products and provided services, mln rub	71,4	1182,1	37577,8	37559,2	40806,4	
Including innovative goods, works and services	56,0	159,8	995,9	1604,8	1945,6	1936,2
Share of innovative goods, works and services in the total volume of shipped goods, %	78,4	13,5	2,7	4,3	4,8	

The volume of shipped innovative products of small businesses amounted to 1936.2 million rubles in 2017 and showed a noticeable growth rate at 21.1%in actual prices compared to 2013. The shipped innovative products mainly consisted of newly introduced products or that subjected to significant technological changes over the past three years (73.7%). The volume of capital and current expenditures on technological innovations of small businesses in 2017 amounted to 882.9 million rubles, which accounts to 128.4% of the volume of 2013 in actual prices. In 2017 (compared to 2013) the cost structure of expenditures on innovations changed significantly in small businesses. The share of equity amounted to 57.6% of the total cost of technological innovation (84.8% in 2013), the Federal budget funds – 12.2% (1,8% in 2013), other funds – 30,2% (12.3% in 2013). In 2015, the structure of expenditures on innovations in small businesses did not include funds of the National Budget and off-budget funds (1.2% in 2013). In 2015, small businesses spent most of their funds on the purchase of machinery and equipment related to technological innovation – 44.7%, research and development of new products, services and methods of their production (transfer), new production processes – 24.2% (17.1% and 33% in 2013respectively). [2] The economic shift to an innovative way of development requires a new approach to the assessment of the role and place of science. The purpose of basic research is to obtain new knowledge about patterns in nature and society; the purpose of applied research – the ability to apply new knowledge to improve production efficiency. Analysis of the dynamics of the number of employees of scientific organizations showed that for the period from 2012-2014 it decreased from 13.7 thousand people to 12 thousand people. In 2015 the number reached 12.7 thousand people (increase - 0.7 thousand people). 0.4 thousand people (2.8%) had doctoral degrees, 1.4 thousand people (10.6%) – a PhD degrees (2.8% and 11.1% in 2014 respectively). The total number of employees conducting research and development consisted of 6.8 thousand researchers (53.5%), 2.6 thousand support staff (20.8%), 1.4 thousand technical staff (10.9%), Fig. 3.

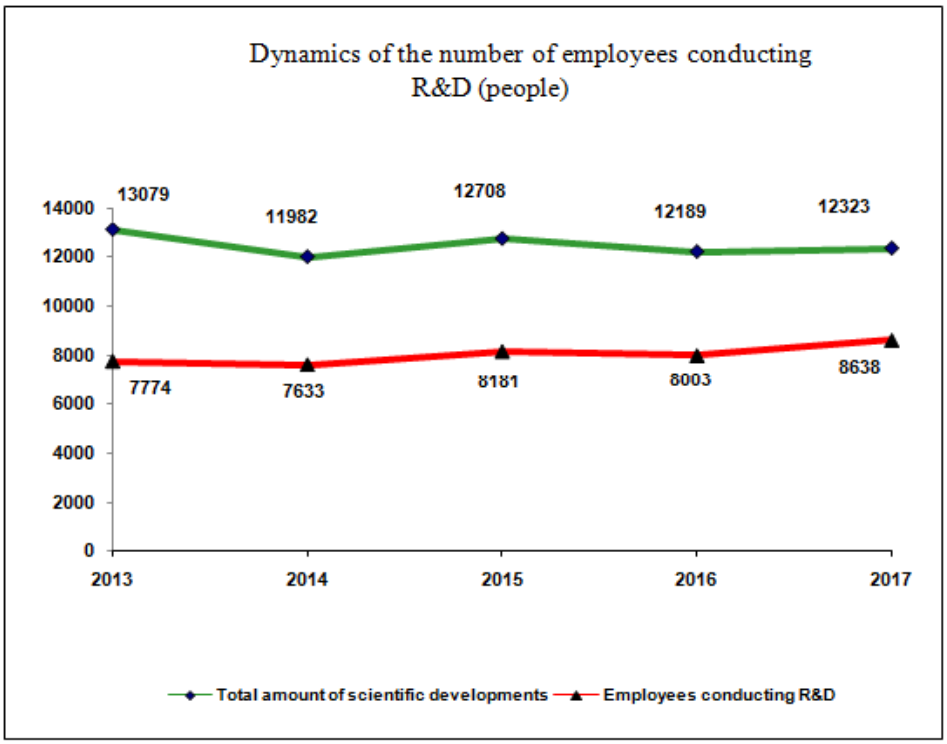

Fig. 3. Dynamics of the number of employees conducting R&D (people)

One of the most important drivers of scientific developments is the scale of its financing. The funding structure of Russian science based on funding types of scientific activity (development, fundamental and applied research) differs from the structure of developed countries with a lower share of basic research. [5] The cost of research and development in 2017 reached 20611.2 million rubles, demonstrating an increase at a rate of 8.6% compared to 2014. The reason of such changes lies in the growth of external costs (increased by 39.1%). Table 3 presents the statistics on the costs of research and development.

Table 3. Expenditures on Research and Development (mln rubbles)

	Expenditures on R&D	Including	
		Internal expenditures	External expenditures
Total			
2013	14169,2	11125,8	3043,4
2014	15079,7	12180,8	2898,9
2015	16233,9	12202,2	4031,7
2016	16089,5	12569,2	3520,3
2017	20611,2	16221,4	4389,8

Internal expenditures on research and development in priority areas of science, technology and engineering in 2017accounted for 16,221. 4 million rubles (12180.8 million rubles in 2014). Analysis of the structure of internal expenditures demonstrated that the largest share accounted for the expenditures on R&D in transport and space systems – 56.7%, environmental management – 11.9%, energy efficiency, energy saving, nuclear energy – 10.1% (57.6%, 10.1% and 8.9% in 2014 respectively) [6]. Development has become the prevailing type of scientific activity in the Republic of Tatarstan. In 2017, the share of development costs in the total volume of current domestic expenditures on research and development reached 72.3% (67.4% in 2014), Figure. 4.

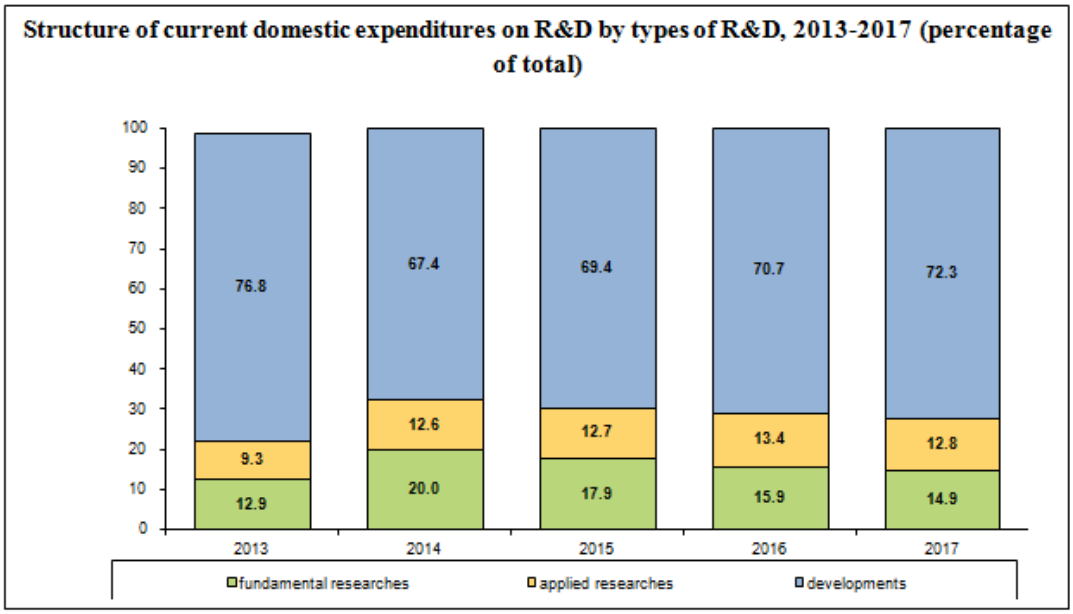

Fig. 4. Structure of current domestic expenditures on R&D by types of R&D, 2013-2017 (percentage of total)

Tender funding, grant and scholarships act as the most common forms of financing of science in innovative economy. In 2015, 876.1 million rubles was allocated on tender funding of science, numbers increased by 2.1 times in actual prices compared to 2014. The value of grants and scholarships, by contrast, declined from 1180,2 million rubles in 2014to 703,5 in 2017, Table 4.

Table4. Performance of companies conducting R&D in nanotechnology

	2013	**2014**	**2015**	**2016**	**2017**
Number of companies m conducting R & Din nanotechnology	18	16	15	14	15
Number of researchers conducting R & Din nanotechnology	418	370	340	281	212
Internal expenditures on R & Din nanotechnology, mlnrub	255,2	438,7	348,0	419,1	341,2
Grants, scholarships from funds supporting science, science and technology, innovations, mlnrub	459,7	1180,2	492,1	593,8	703,5

One of the most important indicators of the development of science is the ratio of research and development costs and gross regional product. In 2017, it amounted to 0.97% (0.69% in 2007). [7, 8] The low value of domestic research and development expenditure (as a percentage of GRP) indicates a lack of science funding. However, since 2007 the value of the indicator increases annually, showing positive trend. The value reached its maximum twice: 0.91% in 2013 and 0.97% in 2017, Figure. 5.

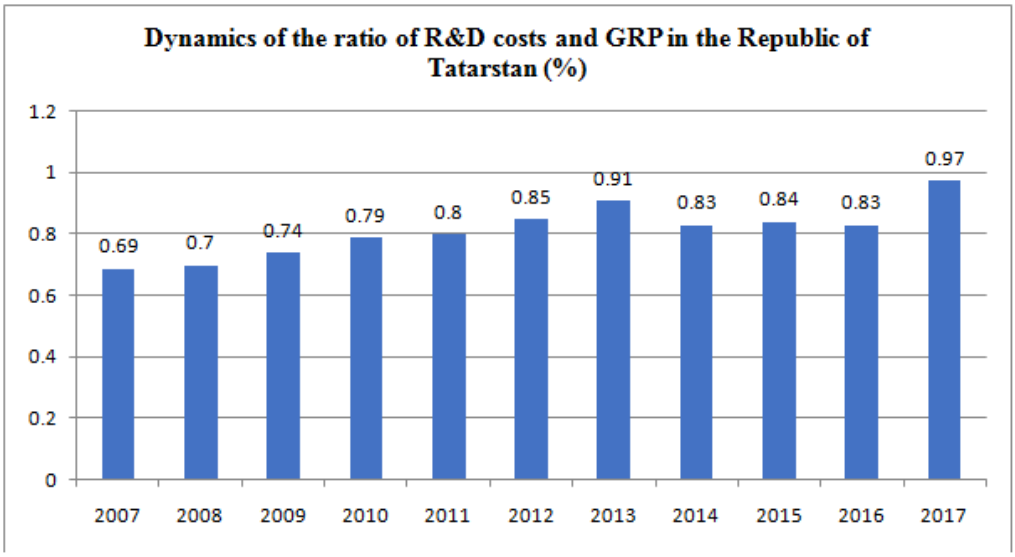

Fig. 5.Dynamics of the ratio of research and development costs and GRP in the Republic of Tatarstan (%)

The ratio of domestic current expenditure on research and development to GRP in 2017 accounted for 0.76%. Starting in 2012, the ratio of the analyzed indicators demonstrated a downward trend: from 0.67% in 2012 to 0.63% in 2014. The value of this indicator in Russia was higher in 2014-2015 - 1.07% and 1.1% respectively[9, 10].

3. Summary

It is possible now to take stocks of the results of the development of innovative activity of enterprises of the Republic of Tatarstan:

• 167 organizations, or 22.2% of all analyzed enterprises and organizations were engaged in innovative activity in the Republic of Tatarstan in 2017 (14.9% in 2010, 20.5% in 2014);

• Innovations are mainly developed in manufacturing enterprises (52,7%);

• The number of small businesses engaged in innovative activities in 2017 amounted to 43 units (28 units in 2009, 39 units in 2011, 36 units in 2013,33 units in 2015).

• Enterprises and organizations of the Republic produced innovative goods, works and servicesfor the sum of 435557.7 million rubles in 2017.

• The share of innovative goods, works and services in the total volume of shipped products of enterprises of the Republic of Tatarstan is 19.6%.

• The volume of shipped innovative products of small businesses in 2017 amounted to1936.2 million rubles and increased by 21.1% in actual prices compared to 2013.

• Internal expenditures on research and development in priority areas of science, technology and engineering in 2017 amounted to 16221.4 million rubles.

• The ratio of current domestic expenditures on research and development and GRP in 2017 was 0.76%.

4. Conclusion

The analysis of innovative activity of enterprises of the Republic of Tatarstan shows that the pace of innovative activity of enterprises is insufficient. Transition to innovative model of development, creating modern mechanism of effective management of innovative processes become the main directions of improvement. Enterprises with the systematic nature of innovative activity and high level of competitiveness should become the engine of innovative development of the economy of the Republic and ensure the quality of economic growth.

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