

## **MECHANISMS FOR SCIENTIFIC RESEARCH COMMERCIALIZATION: AN INDUCTIVE ASPECT**

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**Abstract:** Universities are playing an increasingly important role in the development of innovative technologies, so the subject of university scientific research results implementation is extremely important. Obviously, the mechanisms for innovations commercialization need to be reformed by identifying weaknesses and growth factors, analyzing statistical data arrays, and comparing the findings with the subjective understanding of the current situation. After counting statistics in accordance with the current state of the economy and conducting polls, key issues in the current situation for commercialization were formulated. Patent activity was reviewed for classical universities.

We have discovered that for the execution of the “third mission” in universities, it is necessary to form media field of innovation, develop the concept of innovative structures interaction, motivate students and staff, and use the potential of student associations. The results of the analysis have practical interest and need approbation in universities’ centers for technological transfer.

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**Keywords:** commercialization mechanisms, entrepreneurial university, innovative university

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### **Introduction**

In the current situation of the global economy, the role of research results, new ideas, and technologies as guarantee factors of success in the market increase significantly. The degree of success in the process of knowledge and technology transfer is often the determining factor of competitiveness of individual market actors and entire economies. The success of the country development is determined by the rate, called the speed of commercialization, which transfers research results into new technologies and technological products in the market. The importance of commercialization mechanisms improvement for the Russian Federation is determined not only by a low 62<sup>nd</sup> place in the Global Innovation Index 2013 (2014), but also by negative dynamics compared with 2012 (a drop by 11 positions in the ranking as well).

### **Mechanisms for innovations commercialization and key challenges**

Currently, federal laws and development programs include goals of increasing universities-awarded innovation activities, including training for innovative growth. An important role in the commercialization of innovations belongs to specialized structures in higher education—technology transfer centers, technology parks, and business incubators. In this article, we have analyzed the experience of innovative structures in Russian and foreign universities. Goals, objectives, and structure of the centers for knowledge and technology transfer vary considerably. According to Vladyka (2009), some common elements include management of intellectual property rights, establishment of subsidiaries, and links between universities, industry, and business. Challenges include a lack of common assessment methodology for innovative potential for the university, the value of intellectual property, and commercial potential of innovation. Training system for work in innovative structures of the university is still not developed—university needs managers with a business mindset and the ability to communicate with scientists and business representatives.

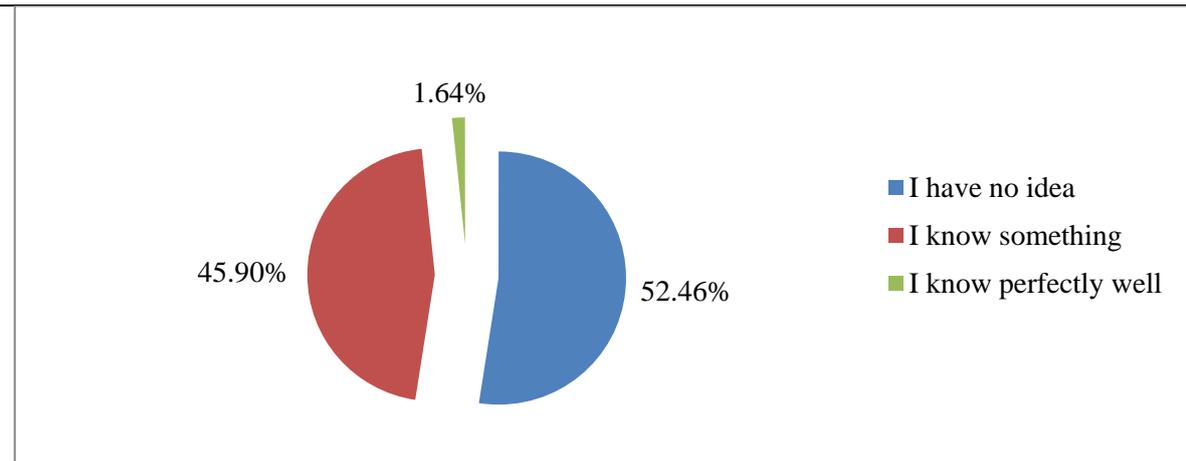
Commercialization mechanism for intellectual activity usually includes an idea generation stage, business plan preparation, marketing research, registration of intellectual property, and the stage of small innovative enterprises creation. Commercialization of intellectual, scientific and technical activities of the universities includes such forms as: joint (University and at least two partners) and

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contract research; sales of licenses for all types of patented industrial property; programs of additional vocational training; transfer of technology in materialized form; sale of patents; consulting activities. An important element for improving efficiency of the mechanism for commercialization is involving teachers and students of the university into innovation activities. According to the questionnaire results, involvement level of students within the educational process is extremely low, less than 10% of the students surveyed, across 12 different areas of training between the ages of 18 to 23 years, consider themselves involved in the innovation of high school. Figures 1 and 2 present the survey results.

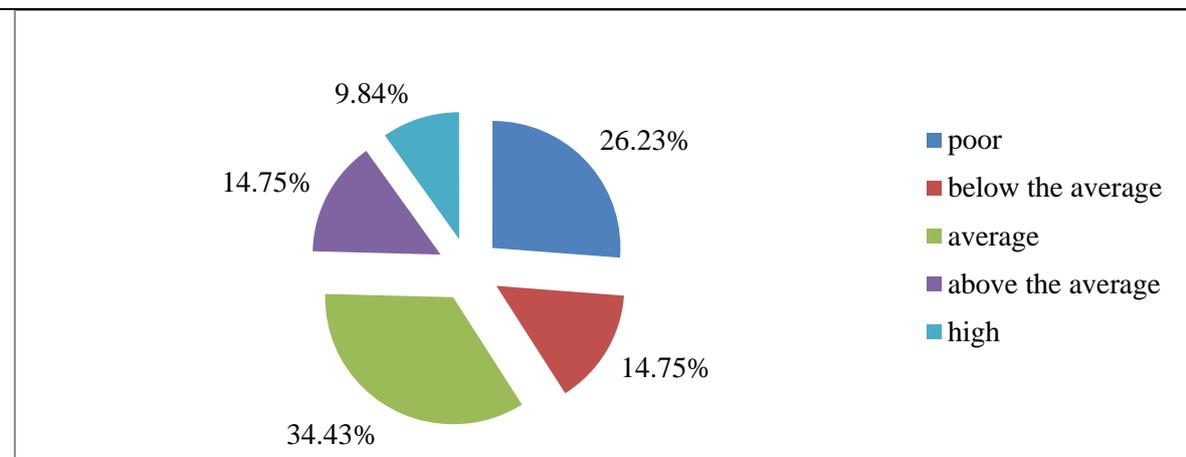
Figure 1. Results from students' questionnaire: potential of the University



Source: Author

At the same time, students need to understand the essence of technology transfer. More than 80% have a comprehensive knowledge of the process. The nature of the innovative work, whether for business or research, does not affect the decision to innovate. Only a small fraction of students involved in the innovation of high school growth are informed about ongoing projects, while more than half of the respondents have no idea about the innovative potential of the university. Moreover, 67% would like to obtain permanent information about activities in this field. Survey results show that more than a half of the students are not prepared to innovate, and this aspect is first that we need to change.

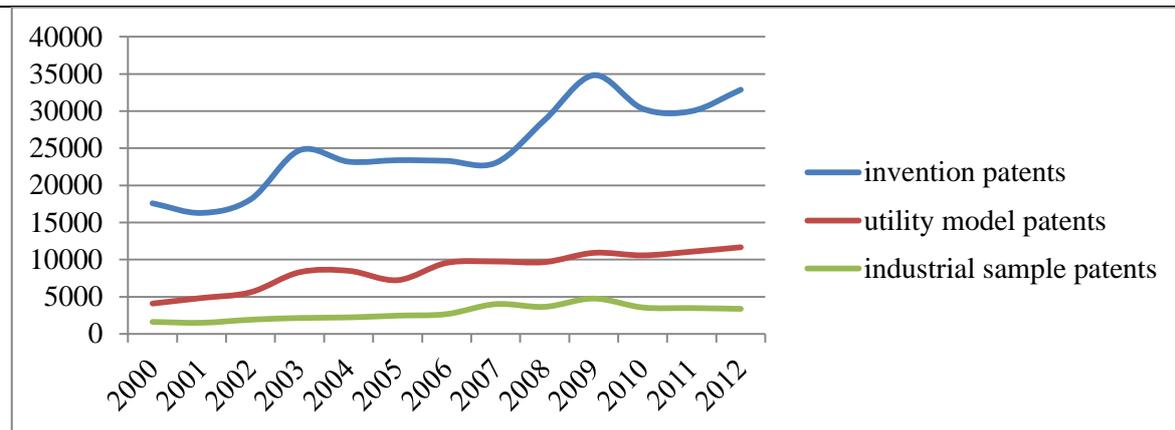
Figure 2. Results from students' questionnaire: innovation capacity



Source: Author

Technology and knowledge transfer is based on a number of documents and belongs to the category known as the “third mission of innovative universities.” Despite this fact, measuring the success of technology transfer at universities varies considerably. Ilyin (2013) stated that American model is based on income from intellectual property. The British model consists of financial and non-financial indicators including publication activity. The lack of unified approach to evaluate the effectiveness of knowledge and technology transfer puts its imprint on the entire process of innovations commercialization.

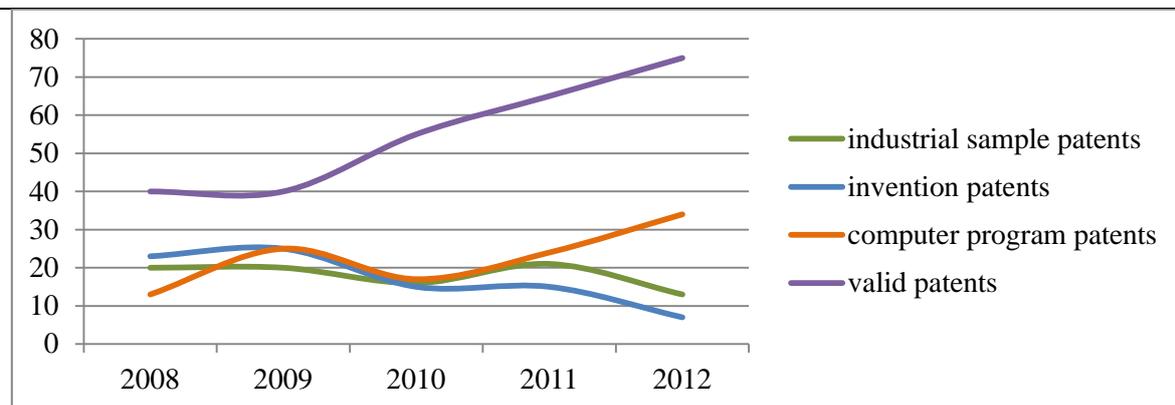
Figure 3. Patenting activity in Russia



Source: Author

Unfortunately, there are no reliable statistics on the degree of commercialization for various patents. It is necessary to rely on statistics and conduct research in this field. Therefore the number of registered intellectual property, apparently, does not involve qualitative growth of technology transfer performance. Patenting activity in Russia is shown in Figure 3.

Figure 4. Patenting activity of Tyumen State University



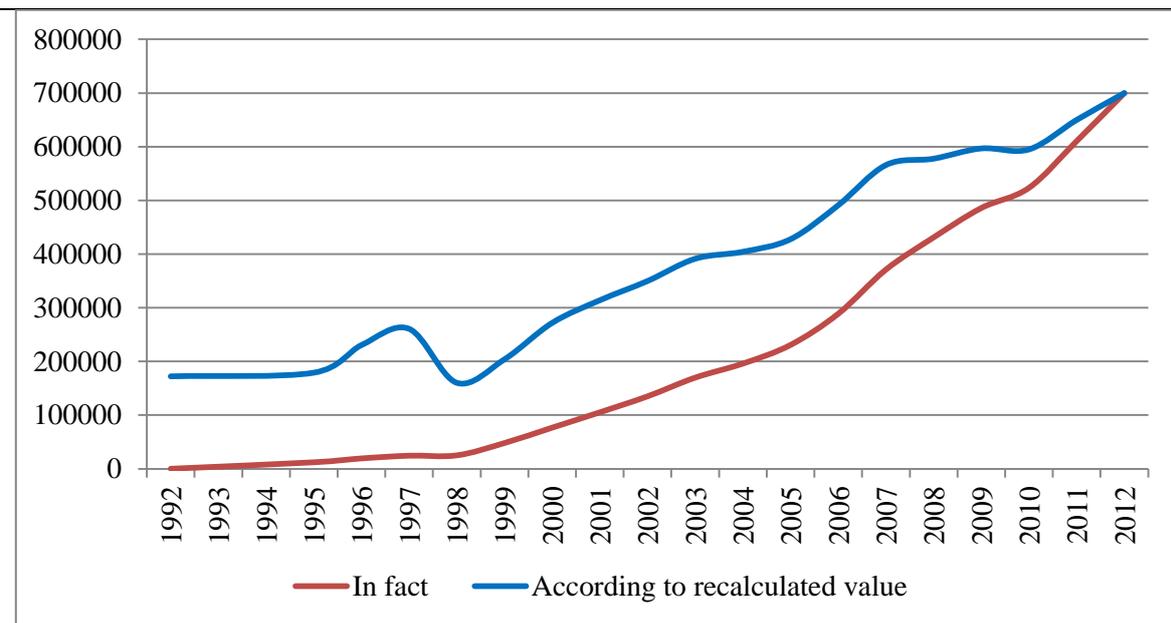
Source: Author

### Entrepreneurial university model as the ultimate goal for high school

Acceleration of technology transfer from university research based on the market needs in foreign universities occurs by some methods, such as: support for start-up companies by research parks and incubators; liberalization of intellectual property rights; support for high-tech companies in cluster around student cities and university campus due to the venture capital community. All of these methods are important in practice.

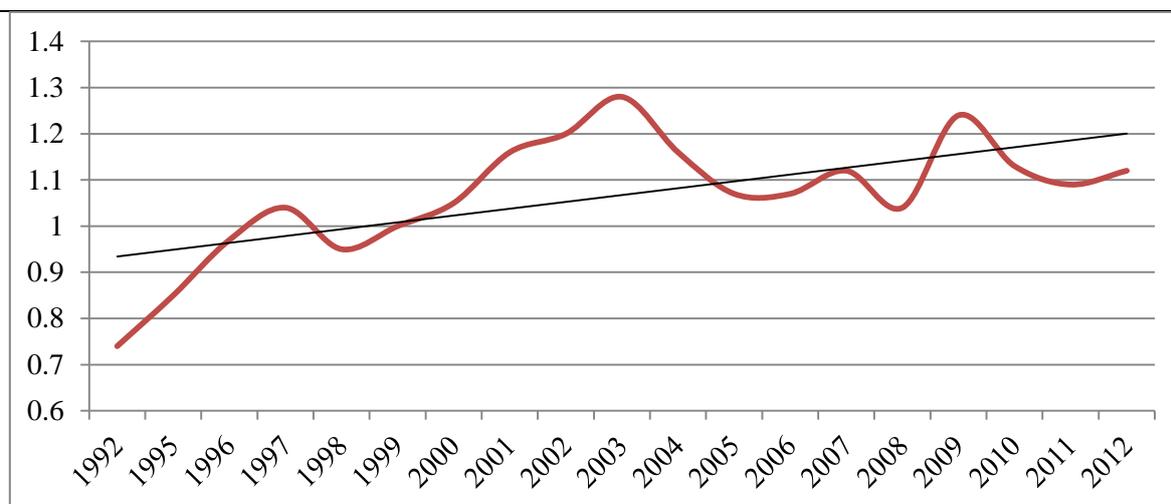
Successful technology transfer must balance between fundamental, applied, and potentially commercializing researches to a particular university. Scientific understanding of the phenomenon of the “entrepreneurial university” was introduced by Burton R. Clark in 1998. According to Clark (1998), the concept of “the entrepreneurial university” motivates the universities to form the entrepreneurial culture, implement special training programs, and create a system of motivation for students and staff to participate in activities within the sphere of knowledge and technology transfer. Universities are capable of attracting additional financial resources to support its activities and work closely with business, in which university researchers’ developments can be introduced. However, the results of our surveys conducted show that students’ involvement in innovation via educational process remains very low; the majority of students are not prepared to innovate, so that only one third is ready to innovate and evaluate their own innovative potential.

Figure 5. Scientific research funding (ML Rubles in fact values and December 2012)



Source: Author

Figure 6. Scientific research funding (percent of GDP)

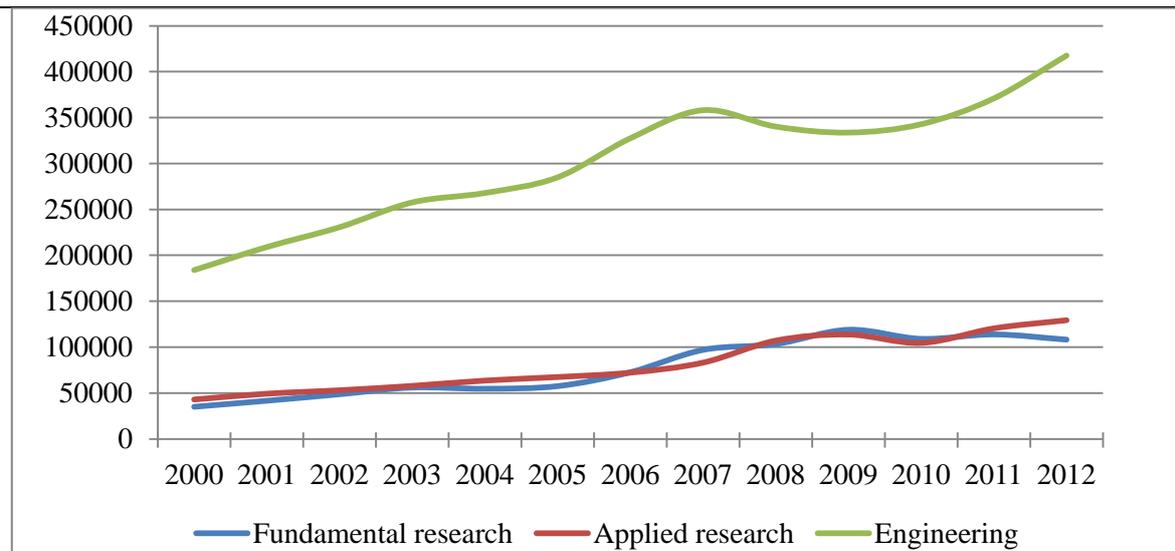


Source: Author

### Russian science funding results and growth factors

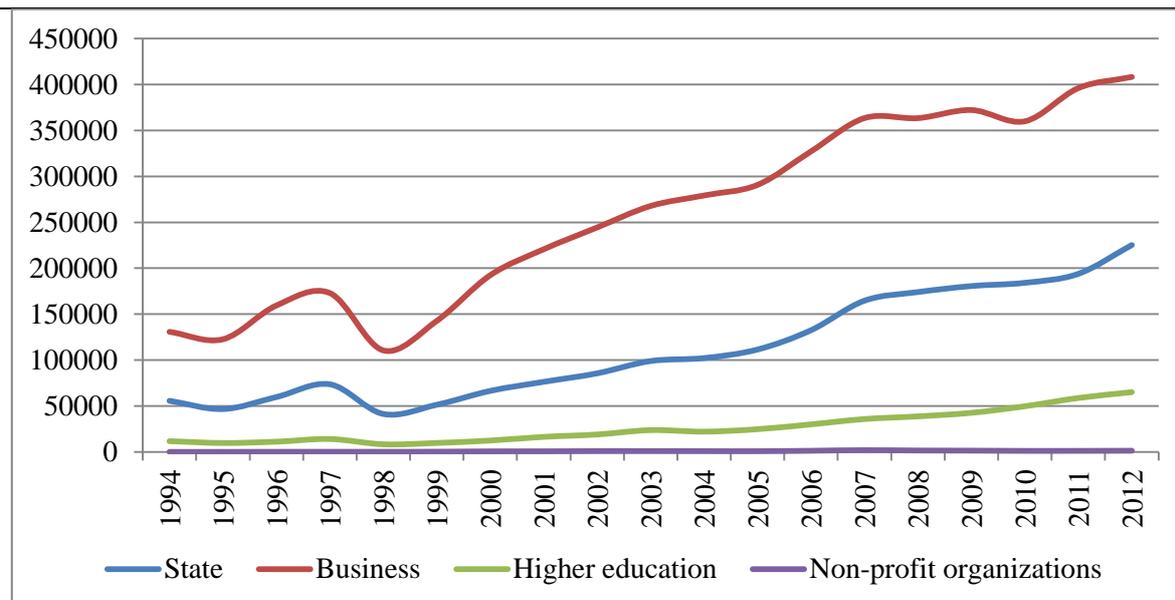
The basic problem of the Russian technology transfer according to the “Statistical Yearbook of Russia” is the fact that overall positive growth of science funding is not reflected in relevant research. The other key point is that in recent years the amount of basic research funding is reducing in general positive dynamics of other scientific sectors financing. Thus, there exists an imbalance between high science and applied research. All data are given in values as of December 2012; calculation was carried out using inflation tables and calculators. Despite the seemingly significant growth in research funding, in general it is only about 1% of GDP. The good news is that in accordance to Clark’s concept, universities are beginning to invest significantly more in funding for science.

Figure 7. Funding of scientific fields (ML Rubles in December 2012)



Source: Author

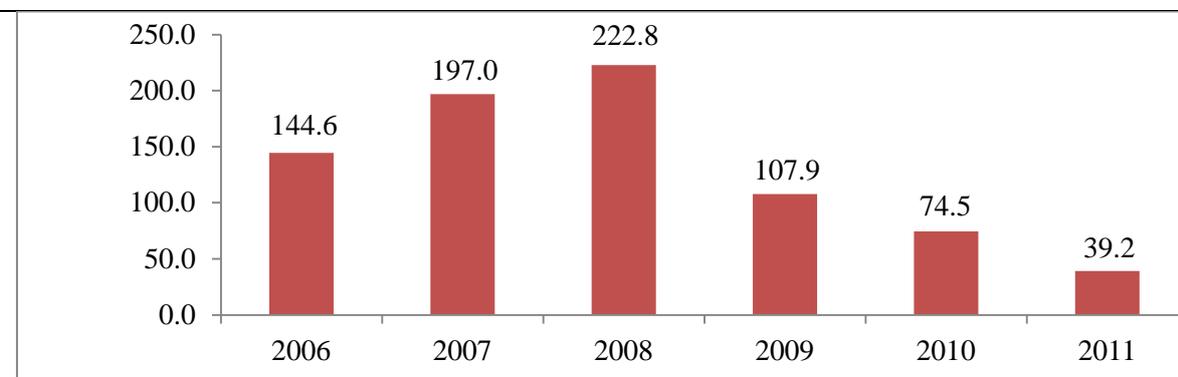
Figure 8. Financing by source (ML Rubles in December 2012)



Source: Author

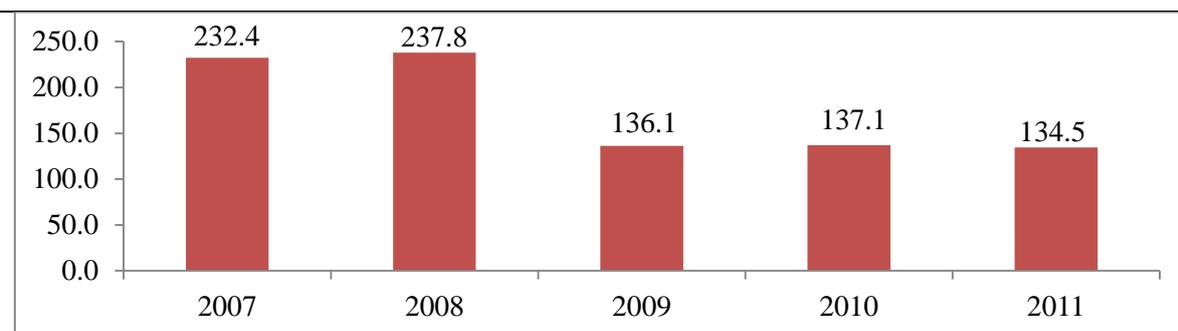
The reduction in funding grants in the business sector of economy and competitive financing in the sector of non-profit organizations are also to be noted. However, the greatest concern is the situation in the field of technology trade with foreign countries. Preponderance of export over import is in trend concerning the sale of industrial designs, provision of engineering services and scientific research. In the areas of purchase trademarks, know-how, utility models, patent licenses and patents for inventions, Russia imports much more than exports. This fact allows us to conclude that the Russian economy is characterized by sale of ideas and the purchase of ready-made intellectual property, which indicates the absence of an effective mechanism for commercialization of scientific developments. Analyzing the ratio of total funding of research and contract research in Tyumen State University as the example, we can conclude that after the global financial crisis, business invests less in research. Nowadays, the main source of funds is from the state. On the one hand, it allows for maintaining the quantity and quality of research; on the other hand, there is an assumption that researches, sponsored by the state, are performed not for real business needs. It means that the potential of commercialization is reduced.

Figure 9: The quantity of contractual research (March 2013 in ML Rubles)



Source: Author

Figure 10. The total quantity of research (March 2013 in ML Rubles)



Source: Author

## Conclusion

The results of this work show that it is necessary to create an information sphere for greater involvement of staff and students of the university in innovation. Despite the significant increase in funding for scientific sector, insufficient mechanisms for commercialization nullifies the efforts of intellectual activity implantation results. Consideration of such aspects of commercialization like diversification of intellectual property portfolio, training for technology transfer, creation of communication media field for interested to transfer knowledge persons, and building innovative lift “from the idea to business” allow us to draw general conclusions about the state of affairs into

innovation activities. In the implementation of research and development work results in Russian universities, the dominated model is “repulsion from technology.” Potential for educational programs and student associations in creating innovations in the areas of idea generation, business planning, and marketing support projects is substandard. Intellectual products commercializing by centers for technology transfer can be protected by creating industries based on know-how in the subsidiaries of the university. Thus, implementation of “third mission” in universities will allow them to come closer to the concept of “entrepreneurial university.”

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