

IMPLEMENTATION OF INNOVATIONS IN HIGHER EDUCATION INSTITUTIONS

IMPLEMENTAÇÃO DE INOVAÇÕES NAS INSTITUIÇÕES DE ENSINO SUPERIOR

IMPLEMENTACIÓN DE INNOVACIONES EN INSTITUCIONES DE EDUCACIÓN SUPERIOR

Maxim GARANIN¹

ABSTRACT: The article shows the importance of human capital in the innovative university model. Education is considered a special commodity and a socially significant service that determines the technological leadership of the State and the well-being of its citizens. The article justifies the necessity of State financing of higher education, presents a model of financing scientific and innovative activities, as well as shows the current situation and the place of university science in the development and implementation of innovations. The contradictions, existing at universities in scientific and innovative work are formulated and analyzed, indicating the directions of removing these contradictions.

KEYWORDS: Scientific and innovative activities. Human capital. University model.

RESUMO: O artigo mostra a importância do capital humano no modelo de universidade inovadora. A educação é considerada uma mercadoria especial e um serviço socialmente significativo que determina a liderança tecnológica do Estado e o bem-estar de seus cidadãos. O artigo justifica a necessidade de financiamento estatal do ensino superior, apresenta um modelo de financiamento de atividades científicas e inovadoras, bem como mostra a situação atual e o lugar da ciência universitária no desenvolvimento e implementação de inovações. As contradições existentes nas universidades no trabalho científico e inovador são formuladas e analisadas, indicando as direções para a remoção dessas contradições.

PALAVRAS-CHAVE: Atividades científicas e inovadoras. Capital humano. Modelo universitário.

RESUMEN: El artículo muestra la importancia del capital humano en el modelo universitario innovador. La educación es considerada un bien especial y un servicio socialmente significativo que determina el liderazgo tecnológico del estado y el bienestar de sus ciudadanos. El artículo justifica la necesidad del financiamiento estatal de la educación superior, presenta un modelo de financiamiento de actividades científicas e innovadoras, así como muestra la situación actual y el lugar de la ciencia universitaria en el desarrollo e implementación de innovaciones. Se formulan y analizan las contradicciones existentes en las

¹ Samara State Transport University, Samara – Russia. Vice-Rector for Research and Innovation. ORCID: <https://orcid.org/0000-0002-9773-5294>. E-mail: garanin@samgups.ru

universidades en el trabajo científico e innovador, indicando las direcciones para remover estas contradicciones.

PALABRAS CLAVE: *Actividades científicas e innovadoras. Capital humano. Modelo Universitario.*

Introduction

Human capital, embodied in knowledge, skills, and abilities, as a result of education, is the basis of personal, social, and economic well-being. The importance of education as the basis for human capital in the economy is enormous. According to (KIM, 2018; THE WORLD BANK, 2018), about 50% of the differences between countries' incomes are determined by human capital.

According to K. Marx (2019), the general formula of capital for production has the form $M-C \dots P \dots C' - M'$ (M is money, C is commodity, and P is profit). While applying this approach to the system of higher education, the constituent elements of the formula will have the following meanings: M is the capital (money), or investments in the higher education system and science, including budgetary and extra-budgetary sources, M' is the capital or the financial result, obtained due to the provision of services, $C \dots P \dots C'$ is the production process of the educational service. At that, in this case, we have more complex components "V ... P ... C' and M', since we are talking about investments in human capital.

The technological leadership of the state is largely determined by the quality of national education. The quality of education, rather than its duration, has a much greater impact on GDP growth. This conclusion is made based on comparing the correlation coefficients between the factors (AKINDINOVA *et al.*, 2019): 55% characterizes the correlation between GDP growth and the results of testing graduates, versus 2% characterizing the correlation between GDP growth and the duration of training.

Thus, education is a special commodity that ensures the well-being of both individual citizens and the state in general. This means that the state must bear the burden of financing education.

Results and Discussion

Model of financing scientific and innovative activities

The university represents two processes (GARANIN, 2019a.; 2019b; 2020a; 2020b; GARANIN; SANDLER, 2020), namely, "Education" and "Science and Innovation". Respectively, the model provides for the financing of scientific and innovative activities of the university as two consecutive processes. Similarly, the model provides for the financing of educational activities of the university as three consecutive processes: the development of educational programs (EP), the implementation of EP, and certification. These processes are described in detail in (GARANIN, 2019a; 2019b; 2020a; 2020b; GARANIN; SANDLER, 2020).

The investment model of university financing can be represented as follows (Figure 1).

The main process of "Science and Innovation" represents two consecutive business processes: the scientific activity

- the transformation of money into knowledge and innovation, and innovative activity
- the transformation of innovation into money.

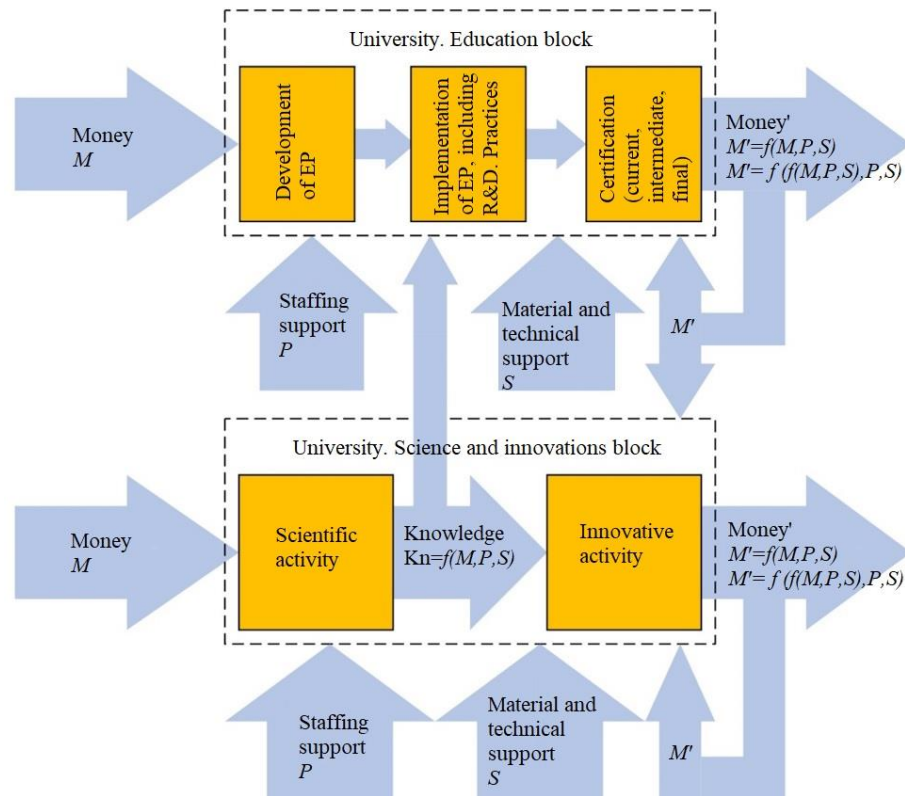
This allows assessing the effectiveness of each activity:

- scientific activity: $E_1 = K/M$,

- innovative activity: $E_2 = M'/K$.

However, a problem of an objective assessment of the results of scientific activity arises most often, therefore the comprehensive assessment-based approach of scientific and innovative activity is usually used:

$$E = M' / M \quad (1)$$

Figure 1 – The multi-channel investment model of university financing

Source: Devised by the author

Figure 1 shows that the implementation of scientific and innovative activities, as well as educational activities, requires resources such as personnel support and material and technical support. The quality of the main business processes of the university, such as the quality of the implementation of the EP and the quality of scientific and innovative activities depends on these resources. At the same time, there are limitations of resource provision, which consist in the minimum resource parameters that allow starting implementation of business processes.

A significant difference between the contemporary system of higher education in the Russian Federation and the world is the close interrelation of education, science, and business. This means that the university should act as an integrator of scientific and innovative activities, stimulating the development of scientific schools, without which high-quality education is impossible.

Contradictions of scientific and innovative work

For a long time, during the late Soviet period of 1970-1990 and the initial Russian period of 1990-2000, universities survived, while financing scientific activities on the part of the business was carried out relatively easily. However, the results of scientific work have not always been translated into innovations in the branches of the national economy. A significant part of the scientific works ended with research reports that had no further implementation. The main indicators of the effectiveness of the research were the scientific level of work, economic and technical outcomes, as well as the facts of obtaining documents on the registration of intellectual property objects within the country, and scientific publications. Funding was allocated mainly on a non-competitive basis. An important role was played by the authority of the heads of scientific schools and their relationship with employers who allocated funds for scientific work. There was practically no competition in scientific work.

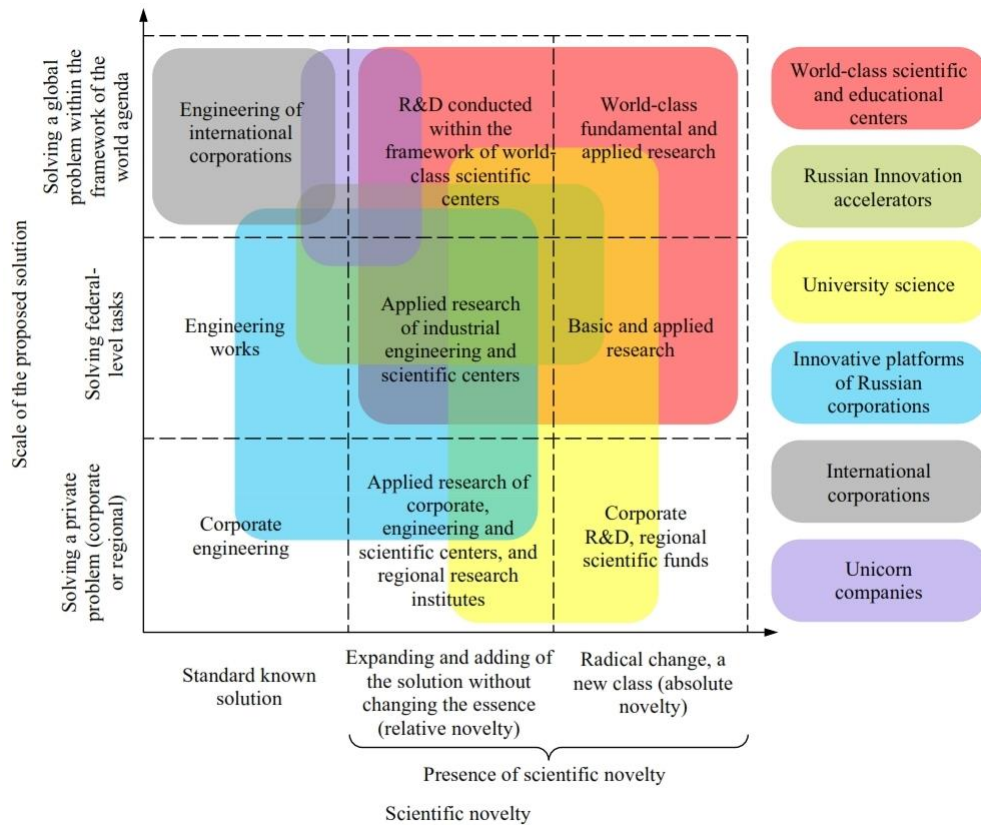
At the beginning of the 21st century, university science found itself in an unusual situation. The market economy gradually led to competition in the scientific community. Almost all types of scientific works began to be distributed on a competitive basis. The achievement of target indicators and the economic efficiency of the research became the main criteria for the evaluation of scientific work, on which the tender documentation was based. The effectiveness of the innovations resulted from the work, such as reducing customer costs, increasing labor productivity, increasing profits etc. became the target indicators of the scientific work. Indicators, such as the level of the scientific study of the problem, the number of scientific publications etc., have ceased to be of value to the customer since they were not end results, but only intermediate. Personal ties have become less important. The customer became less interested in scientific work, focusing on the innovations as the result.

Let's consider the current situation and the place of university science in the development and implementation of innovations. It can be schematically depicted in the diagram shown in Figure 3, where the abscissa axis shows the conditional level of scientific novelty of the work being done, while the scale of the work is shown on the ordinate axis.

Figure 2 shows the place occupied by participants involved in scientific and innovative work. They include world-class scientific and educational centers, Russian innovation accelerators, universities (university science), innovation platforms of Russian corporations, international corporations, and unicorn companies. Unicorn is a private company, a startup, valued at \$1 billion and more. For the first time, this term was coined in 2013 by the famous

venture entrepreneur, the founder of Cowboy Ventures, Eileen Lee, who chose this mythical animal as a vivid image to represent the statistical rarity of such successful companies.

Figure 2 – Intersections of the spheres of interests of participants involved in scientific and innovative activities



Source: Devised by the authors

Figure 2 shows the contradictions of scientific and innovative work carried out by universities. They can be formulated as follows:

1. The lack of an innovation market in Russia. The state should undertake to stimulate large businesses, including state-owned corporations, to develop the innovation market.
2. The lack of tools for creating technologically ready innovations that are in demand among businesses. Universities can bring most of the developments to the level of technological readiness that is not in demand among businesses.
3. Low interest of businesses in innovations and scientific work aimed at obtaining new knowledge used to create innovations. The state can take over the financing of scientific work, while businesses can financially support innovation activities.

4. Small and medium-sized businesses cannot afford to participate in scientific and innovative activities. Special mechanisms are needed to simplify the potential participants' entry into scientific and innovative activities for creating collaborations.

5. The world-class scientific and scientific-educational centers being created in Russia can occupy a niche of university science in the next 10-15 years. The most successful university academic staff can become the personnel resources of such centers.

Conclusion

Let us carry out a synthesis and analysis of the identified contradictions. They can be conditionally divided into internal and external. Internal contradictions are caused by the peculiarities of the university operation and can be removed by the internal transformation of the management model and the approaches used. External contradictions are caused by the existing external system of the university, which is based on the state's approach to the higher education system.

Internal contradictions arise from the university model used, which does not correspond to the rapidly changing technological structure and, as a result, to the needs of society. Three key factors are underlying the internal changes of the university: 1) the priority of scientific and innovative activities, scientific and innovative activities are the basis for educational activities; 2) the priority of innovative activities and the building of effective tools for converting new knowledge obtained in the course of scientific work into innovations for business; 3) comprehensive management of EP based on new knowledge obtained in the framework of scientific activities.

The approach to universities as "storage chambers" for future society members and the basis for professional education was justified in the 20th century, during the period of the industrialization of society. With this approach, the university does not need to create new knowledge, while needing to translate knowledge acquired in society within the professional field. However, such an approach will not ensure the technological leadership of the state and the business needs for qualified personnel. The external changes are based on the formation of a system of multi-channel financing of educational, scientific, and innovative activities, as a driver of subsequent internal changes of universities. The multi-channel financing system includes mechanisms for stimulating business, creating an innovation market, as well as creating and developing university endowment funds. Higher education is a socially significant service, and the financing of this service in modern society is the responsibility of

the state. With this approach, the financing of universities should be considered as an investment in human capital.

The removal of the identified internal contradictions is a prerequisite for the necessary transformation of the university. The contradictions themselves are the tasks to be solved, namely, the contradictions of scientific and innovative work, the contradictions of the existing approach to managing EP, and the contradictions associated with the lack of tools for creating technologically ready innovations demanded by business.

REFERENCES

- AKINDINOVA, N. V. *et al.* Scenarios for the growth of the Russian economy taking into account the contribution of human capital. *In: INTERNATIONAL SCIENTIFIC CONFERENCE ON PROBLEMS OF ECONOMIC AND SOCIAL DEVELOPMENT*, 20., 2019, Moscow. **Proceedings** [...]. Moscow, Russia: Publishing House of the Higher School of Economics, 2019.
- GARANIN, M. A. **Industrial Transport University, as the center of the space for innovation and territorial development**. Samara, Russia: SamGUPS, 2019a.
- GARANIN, M. A. University management model as a center for competence development. **Creative Economy**, v. 13, n. 1, p. 183-194, 2019b.
- GARANIN, M. A. Institutional aspects of resource management of branch universities. **Economics and Entrepreneurship**, v. 7, n. 120, p. 1150-1156, 2020a.
- GARANIN, M. A. Model of interaction between the Ministry of Science and Higher Education and the Ministry of Transport in terms of personnel support for transport. **Creative Economy**, v. 14, n. 6, p. 1055-1078, 2020b.
- GARANIN, M. A.; SANDLER, D. G. The system of supporting managerial decision-making at the university as exemplified by the "Science and innovation" group of processes. **Prospects of Science and Education**, v. 3, n. 45, p. 527-543, 2020.
- KIM, J. Y. **The human capital**. Gap getting governments to invest in people. Foreign Affairs, 2018. Available: <https://www.foreignaffairs.com/articles/2018-06-14/human-capital-gap>. Access: 10 May 2021.
- MARX, K. **Capital**. Moscow, Russia: AST, 2019.
- THE World Bank. **Investing in people to build human capital**, 3 August 2018. Available: <https://www.worldbank.org/en/news/immersive-story/2018/08/03/investing-in-people-to-build-human-capital>. Access: 10 May 2021.

How to reference this article

GARANIN, M. Implementation of innovations in higher education institutions. **Revista online de Política e Gestão Educacional**, Araraquara, v. 26, n. esp. 2, e022072, Mar. 2022. e-ISSN: 1519-9029. DOI: <https://doi.org/10.22633/rpge.v26iesp.2.16571>

Submitted: 09/11/2021

Required revisions: 22/12/2021

Approved: 19/02/2022

Published: 31/03/2022