ПРОСТРАНСТВО ОБРАЗОВАНИЯ

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«За» и «против» проекта закона о многолетнем программировании научных исследований – механизма долгосрочного государственного регулирования НИОКР во Франции

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Аннотация: Жесткая конкурентная борьба за инновации и таланты идет во всем мире. А талантливые компетентные кадры, как известно, формируются в высшем образовании и научных исследованиях. Конкурентоспособность страны сейчас зависит и от способности реализовать инновационный потенциал, и ответить на глобальные вызовы – экологические, социальные, эпидемиологические и т.п.

В этой связи представляется интересным опыт Франции, связанный с амбициозными целями европейского лидерства в сфере НИОКР, обновления механизма формирования внутри страны и привлечения талантливых исследователей, наращивания исследовательского потенциала, развития институциональных форм поддержки инноваций, привлечения государственных и частных инвестиций. Однако самое главное: для нас важен конкретный инструментарий для разрешения противоречий, накопившихся проблем во французском обществе по приданию динамизма процессам исследований и инноваций в целом. В настоящее время разгорелась жаркая дискуссия по обсуждению правительственного проекта Закона о многолетнем программировании научных исследований, ее результаты мы представляем в настоящей статье.

Ключевые слова: программный подход, научные исследования, высшее образование, закон о многолетнем программировании исследований, инновации, смешанное финансирование инновационных проектов, цифровые технологии, НИОКР

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"PROS" AND "CONS" OF THE DRAFT LAW ON LONG-TERM PROGRAMMING OF SCIENTIFIC RESEARCH – A MECHANISM FOR LONG-TERM STATE REGULATION OF R&D PROJECTS IN FRANCE

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Abstract: There is a fierce competitive fight for innovation and talent all over the world. As we know, talented and competent personnel appear in higher education and scientific research. Now, the country's competitiveness depends both on its ability to realize the innovative potential, and on the ability to respond to global challenges – environmental, social, epidemiological, etc.

In this regard, the experience of France, associated with its ambitious goals, to take a leading position in the field of R&D, to update the formation mechanism within the country and attract talented researchers, to strengthen research potential, to develop institutional forms of support for innovation and to attract public and private investment, looks quite interesting. The most important thing for us is a specific toolkit for resolving the contradictions of accumulated problems in French society to develop the processes of research and innovation as a whole. At present, serious discussions are underway on the government's draft Law on the long-term programming of scientific research, and in this article, we present the results of these disputes.

Keywords: programmatic approach, scientific research, higher education, law on long-term programming of research, innovation, mixed financing for innovative projects, digital technologies, R&D

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Increasing global competition for innovation and innovators

Science must find ways and tools to solve the problems facing humanity today because they will be useful for solving the challenges of the near and distant future. The issue here is about climate change, the use of new types of energy, energy-saving technologies, the preservation of biodiversity, food security, population migration, global public health, epidemiological crises, population aging, as well as promotion of digital technologies, Big Data management, and the development of artificial intelligence.

The creation and implementation of innovations depends on many factors. The point here is, firstly, how many human talents with creative thinking are in each country, how many innovators can pass from the development of a new idea to its implementation, and, secondly, how strongly the institutions for supporting and providing resources for innovation are developed. The level and condition of science and technology, the economic and social development of the country are unquestionably important, however, we agree with the classics – "cadres decide everything", but for our part we will add – with the support of institutions.

There is a competitive fight in the world for innovations and innovators, because in the end it is on them that the competitiveness of countries in the world economy depends. In developed countries, innovation support institutions are being introduced and steadily updated. In France, the necessary conditions have appeared for the application of a programmatic approach in the sphere for creating a mechanism for the long-term management of R&D.

Today, France is one of the leading countries in the field of research and innovation. Here are some of the most significant indicators of 2017-2019.[1]

1) ***France is ranked 9th among most innovative countries*** in the Bloomberg Innovation Index 2018, ***with South Korea in the 1st place and Sweden in the 2nd***.

The French Alternative Energies and Atomic Energy Commission (CEA) ranks first place in Europe and second in the ranking of the most innovative public organizations in the world of 2017 (Thomson Reuters rating).

Eighteen French universities ranked among the 100 most innovative universities in Europe (Thomson Reuters 2018 ranking).

France is ranked fourth place in the world for the number of Nobel Prize winners (the last was received in 2018 and awarded to physicist Gerard Moore) and second place in the world for the number of Fields Medalists (the highest award in the world in mathematics).

2) ***After Germany and Great Britain, France ranks 3rd in the number of researchers among the EU countries***.

More than 600 thousand people are involved in research activities (604,700 people), 58,000 post-graduate students (doctoral students); about 300,000 people (277,600) are professional researchers, and almost a third of them (27%) are women. Half of the researchers can devote up to 50% of their time to research in business companies.

3) France is ranked 4th in the world for ***patent applications to the European Patent Office***. Every year, 16,000 patent applications are filed to the bureau: 22% come from small and medium-sized enterprises, 57% from large companies. In 2018, over 2,250 patent applications were filed by government research institutions.

4) ***French Institutional research structures***. CNRS (National Centre for Scientific Research) ranks first place in the world ranking among European research institutes and second in the world (Nature Index 2017). There are 99 research infrastructures in the country.

With the support of government research programs for over 20 years, 2,400 companies have created more than 38,000 jobs and a capitalization of 12 billion euros.

5) ***Funding*** for research and development is 49.8 billion euros or 2.2% of GDP, which is lower than that of the leading countries.

R&D is carried out both in public and private structures. Most of the public research is carried out in universities and national research organizations; this includes 3200 own research and joint university units. These organizations are significant participants in international research programs; they have partners in more than 250 structures around the world: CNRS, Institut Pasteur, Cirad, INRA, INRIA, INSERM, CNES[2], as well as large research universities.

France is an attractive country for private research, which offers several incentive instruments, namely, a tax credit for research, direct assistance in financing private research and development, etc. France devotes almost 0.4% of GDP to government support for private research and development, and thus ranks second among the OECD countries.

The country has developed such technological research as the development of accelerometers used in airbags (CEA-Leti), production of smart cards (R. Moreno), ultra-low consumption electronic components (SOITEC - CEA), production of high-speed trains TGV, production of launch vehicles of the family Ariane, many computer data processing languages used around the world.

French research has also contributed to the emergence of many innovations in the medical sphere. Over the past 60 years, 127 international innovations have been presented at French hospital teaching centers.

1 Vers une loi de programmation pluriannuelle de la Recherche. URL: https://cache.media.enseignementsup-recherche.gouv.fr/file/Recherche/91/7/dp-loi_programmation_1069917.pdf

2 CNRS (National Centre for Scientific Research), Institut Pasteur, (Pasteur Institute); Cirad (The French Agricultural Research Centre for International Development), INRA (National Institute of Agricultural Research), INRIA (The National Institute for Research in Computer Science and Automation), INSERM (the French National Institute of Health and Medical Research), CNES (The National Centre for Space Studies – French space agency)

Problems accumulated in the R&D sphere

Along with recognizing the achievements and implementing the developments in practice in the field R&D, in the last decade, French experts began to recognize some problems and concerns about the loss of dynamism in the promotion of French innovations in European and world markets. Many problems are related to underfunding of R&D, low incentives in scientific work, which is especially critical for young researchers.

The total expenditure on research carried out by both public and private entities is measured by the percentage of R&D expenditure to GDP, and in France, this share is about 2.2%.

As can be seen from **Diagram**, the highest proportion of R&D funding to GDP (almost 4%) is in Israel and South Korea, followed by Sweden, Japan, Austria, and Germany, with 3% of GDP. France, with its level of funding (2.2%), is inferior to the "leaders".

This fact pushes France away from the implementation of the Lisbon goals of achieving 3% of GDP allocated to scientific research, which European countries set themselves in 2000, to move towards a knowledge-based economy.

Both the government circles of the Republic and the scientific university community are working to solve this problem.

In 2017, after the appointment of new Government, the Minister of Higher Education, Research and Innovation of France, Frederic Vidal, initiated projects with a significant increase in the budget for scientific research. The state budget for R&D increased by 8% in two years. From the Big Investment Plan, 3.5 billion euros were allocated for cutting-edge (breakthrough) research and 4.6 billion euros for innovation technologies (development of artificial intelligence, the use of big data, nanotechnology, cybersecurity, etc.).

This decision was accompanied by defining the ***priority research programs*** using already allocated budgets, including those provided for in the Future Investment Plan-3 (PIA-3):

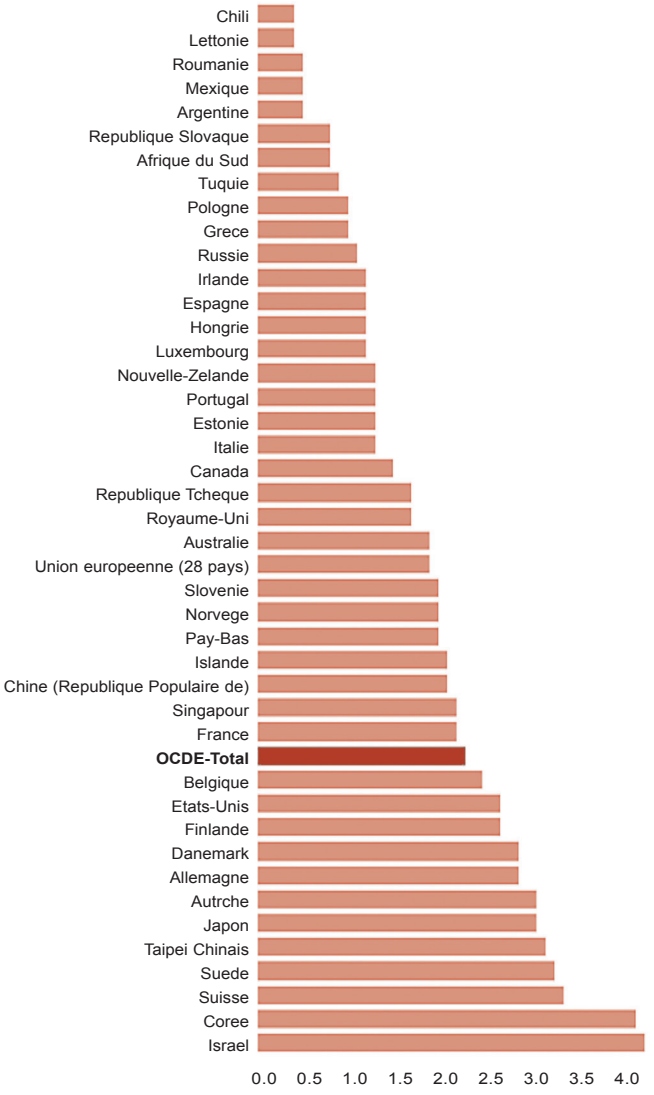
- Make Our Planet Great Again – over 60 million euros, led by CNRS;
- All for Humanity – 1 billion euros, including 665 million euros from state budget, led by INRIA;
- Alternative to chemicals in agriculture – 30 million euros, led by INRA;
- Tackling antimicrobial resistance – 40 million euros, led by INSERM.

The decision contributed to an increase in the budget (by 25 million euros per year) aimed at supporting laboratories, 20% of which are in the humanities and social sciences.

These government measures of 2017-2019 slightly improved the current situation, but do not solve the most acute problems of underfunding of scientific research, the instability of their provision in the long term, weak incentives, and low salaries for researchers. This became a major obstacle in the way of France achieving a leading position in the field of research and innovation in Europe, greatly increasing the competitiveness of industrial production and services.

Diagram. R&D funding in countries around the world in 2018, % of GDP*

* Vers une loi de programmation pluriannuelle de la Recherche. Février 1, 2019. dp-loi programmation, P. 7



The draft Law on long-term programming of scientific research – "pros" and "cons"

For a long time, there has been a discussion in French society about science, about its tasks and results, the need to consider the outcome of scientific discoveries in the long term (the effect of many discoveries is visible over time, sometimes it takes less, and sometimes a lot of time). Therefore, the support of scientific schools, laboratories, promotion of the research centers' staff requires sustainable resource provision, and long-term investments.

That is why, in 2019, the French government proposed a ***draft Law on the long-term programming of scientific research***. According to the developers of the law, the tools prescribed in the document will make it possible to accurately determine the amount of investment (calculated for ten years), as well as to lay a solid legal and institutional foundation for this financing. The idea here is about creating a long-term tool for managing research and development

carried out by both the public and private sectors.[3] The law will enter into force in 2021 and sets out further directions in planning until 2030.

The announcement of the completion of the government's draft law on long-term programming of scientific research caused an ambiguous reaction among numerous scientific and research organizations, trade unions, parliamentarians, and various civil society organizations, which was interrupted by the global pandemic but resumed in June 2020.

In the spring of 2019, online consultations were held with people showing interest in the law, as well as a lot of publicity in the media. Three working groups were established, including one headed by Antoine Petit, President of CNRS.

In March 2020, the newspaper Le Monde published an article titled "France needs a long-term research law" signed by eight presidents of the country's leading universities, including Jean Chambaz, president of the University of Sorbonne.

University heads note that "over twenty years, according to the Organization for Economic Co-operation and Development (OECD), French investment in research and development has declined in comparison with most developed countries." Within the framework of research investments, the gap with Germany, Denmark, and the Netherlands is growing, Spain is making more and more investments in science, and France has remained at the same level. Therefore, President Macron's announcement of investing 3% of gross domestic product (GDP) in research (up from 2.2%) and the launch of a law on the multi-year (long-term) programming of scientific research has become encouraging for the scientific community. The scientific community has been talking about the need for these changes twenty years ago. And finally, the economic and political conditions appeared for the implementation of such an important task.

It is noted that the goal of raising R&D funding to 3% of GDP is not so much to allocate several billion euros in the state budget to achieve a state share of 1% of GDP in this area but to simultaneously increase the part of co-financing of private research up to 2% of GDP. The tax credit for research Investment (CIR), more than 6 billion euros per year, needs to be not a disguised form of government subsidies to private companies, but, as in other countries, to encourage investment in research partnerships with government agencies.

Experts note that "the atmosphere of distrust to current policies, concern under the influence of the controversial pension reform ("violation of the social contract"), referring to the words of the Minister of Higher Education, Research and Innovation Frederic Vidal, oppose this law even before its provisions were made public and discussed.

The project was opposed by several laboratories, committees, and unions for higher education and research. Among them: the national committee, CNRS, and the collective of the scientific academic communities of France.[4] They described their fears in the Le Monde newspaper[5]: "The scientific community does not want this so-called reform, which we are very well aware of, that it brings Darwinism, unhealthy competition, the bureaucracy of constant evaluation." Jerome Aust, a professor at Sians Po, analyzes the dangers of increased competition between laboratories that this law has created.[6]

According to the unions, the commitments will only apply to subsequent governments, since the bulk of the budgetary effort falls on a period of ten years. In their opinion, the law contrasts the personnel of higher education and research institutions.

Now, there are two models of funding research organizations: regular, funds are allocated on a permanent basis to laboratories or institutions for ongoing research (funding has dropped over the past 30 years); and the second, funds are allocated on a competitive basis, through the selection of projects.

Critics of the draft law believed that the government intends to strengthen the second, competitive method of financing. The most ardent opponents of the draft law consider it "unfair and Darwinian" aimed at undermining stability and managerial control.

CESE (Economic, Social and Environmental Council is a public association of representatives of patronage, unions, and associations) has issued a highly critical opinion on the draft law, which "does not correspond to the large-scale challenges facing our country".[7] The conclusion says that "only 400 million euros are planned for 2021, while we are talking about billions for a recovery plan from the health sphere crisis that has demonstrated the vulnerability of our country!"

On June 7, 2020, twenty four articles and 1560 pages of the text of the draft law were submitted by representatives of the scientific community. On June 19, this text was urgently discussed by the National Council for Higher Science Education (CNESER), and issued a positive opinion on the draft law. On July 8, 2020, the draft law will be presented to the Council of Ministers, and, by its critics, it is interpreted as a certain pressure and coercion.[8]

3 "It is research that allows our society to remain mobile, and not be paralyzed by the challenges of our time [...]. It is research that allows us not to stand still, but to act." said Minister of Higher Education, Research and Innovation, Frederic Vidal, to the community of Higher Education, Research and innovation in January 2019.

4 "Recommandations prioritaires pour la Loi de programmation pour la recherche", Juin 28, 2019. URL: https://societes-savantes.fr/sondages/

5 "LPPR: les chercheurs aussi descendent dans la rue", Janvier 27, 2020. URL: https://www.lemonde.fr/sciences/article/2020/01/27/lppr-les-chercheurs-aussi-descendent-dans-la-rue_6027419_1650684.html

6 Jérôme Aust, "La recherche à l'épreuve de la mise en concurrence", sur The Conversation. Février 12, 2020

7 "Le Conseil Économique, Social et Environnemental vote un avis défavorable à la LPPR", sur Academia. Juin 24, 2020

8 "Projet de loi LPPR: un "passage en force", sur France Culture. Juin 15, 2020.

"Cadres decide everything...", but with the state support

The government announced that in 2021, an additional 92 million euros will be allocated to increase the salaries of all personnel in the field of higher education and scientific research, and the young researchers will be paid more than 2 minimum wages. The new measures will increase income in 8,000 euros per year for people whose wages today are 1.3 times lower than the minimum wage. For young associate professors and researchers, the income will average from 2,600 to 2,800 euros per month.

The goal is to create a "shock of attractiveness" for the research professions.

Among the new incentives for scientific and research activities, the government sets in the law both three main goals and ways to achieve them.

1. ***Strengthening resource capacity*** to fund research projects, programs, and laboratories:

Funding should enable researchers to benefit from the support they need to carry out their work, in particular, the most original and innovative projects that are sometimes the most difficult to finance. In France, successful selection rates for competitive projects (especially from the French National Research Agency (ANR) are much lower than in Germany, Japan or the United States.

Providing research laboratories with new equipment, with the help of which they will be able to implement a scientific strategy through the availability of the necessary equipment and technological platforms.

Develop research programs in priority strategic areas to meet the challenges facing society and the economy.

2. ***To increase the attractiveness*** of scientific jobs to ensure that the best national and international scientific talents will participate in the national research system.

Researchers who are beginning their scientific careers face two main problems: an increase in the age of obtaining the first stable job (about 34 years) and a low level of wages at the beginning of their careers (1.3 to 1.6 minimum wages). The average salary after contributions and deductions of a research teacher is less than 3,500 euros at the age of 50.

Increasing the attractiveness of a scientific career also implies a greater variety of tasks that can be performed by the teaching researcher or a researcher at all stages of their career (teaching, research, innovation, or fulfilling public duties). Elaboration of the analysis includes the issue of jobs and career support for research staff whose role couldn't be neglected for the proper functioning of laboratories.

3. ***Enhancing the competitiveness of industry*** by combining research through partnerships of the French innovation model, leveraging the benefits of public research collaboration from various private entities.

According to the government, significant progress has been made over the past decade, but the link between the public and private sectors is lagging. For example, in France, only 4.7% of public research funding comes from the private sector, while in Germany, this figure is 12.2%. The goal is to integrate PhDs into the business environment since only 12% of researchers in business have this degree.

Conclusion

Concluding, we would like to note that this law will have significant consequences for the French national economy, as well as for society as a whole.

The government's law on long-term programming for research and development involves the implementation of a constructive mechanism to make the French research and development system sustainable. The law combines elements of government regulation, the advantages of competitive selection of projects, stimulation of creative personnel and innovators, and strengthening the innovative potential of the French industry in the long term. The mechanism for long-term R&D management is based on a programmatic approach.

A toolkit has been developed to guarantee sufficient funding for French projects, programs, and laboratories; ensuring the attractiveness of jobs and careers in the scientific field, both nationally and globally; consolidate public-private research, and ensure the most efficient use of their results. All this had to be done to strengthen the French industry and increase the country's competitiveness, both for the present as well as for the future of the nation.

The pandemic has demonstrated the need for large investments in research (not only in the medical field); at the same time, public finances are needed to overcome the consequences of the crisis in many directions; also, the French government is faced with a lack of understanding of the significance of the new law among a significant part of the research community. Probably nothing will be able to interfere with the further fate of the new law, and it will be adopted in September of 2020 and will come into force on January 1, 2021.

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