ФІНАНСОВЕ ЗАБЕЗПЕЧЕННЯ НАУКОВОЇ ДІЯЛЬНОСТІ В КОНТЕКСТІ СТРАТЕГІЧНОГО РОЗВИТКУ НАЦІОНАЛЬНОЇ ЕКОНОМІКИ

Актуальність. Сучасна система фінансування науково-дослідних робіт в Україні покликана забезпечити ефективне та всебічне вирішення таких нагальних завдань, як створення необхідних інституційних передумов для своєчасного впровадження інновацій в усі сфери національно-господарського комплексу країни, забезпечення технологічної перебудови; створення необхідних умов для розвитку науково-освітнього потенціалу, запобігання виїзду наукових кадрів країни за кордон та створення умов для повернення тих, хто вимушений був покинути країну внаслідок російської агресії в Україні. Сьогодні на всіх рівнях управління все більше постає питання щодо ефективного використання коштів, які виділяються в Україні на наукову та інноваційну діяльність. Тому створення ефективної системи фінансування наукової діяльності, результатом якої є створення творчого, інноваційного продукту, є важливим і актуальним завданням.

Мета та завдання. Метою статті є визначення сучасних проблем фінансування наукових досліджень і розробок в Україні та обґрунтування шляхів їх вирішення.

Результати. В статті використані методи статистичного аналізу даних про стан розвитку наукової діяльності, елементи системного аналізу виконання наукових досліджень і розробок за джерелами фінансування в Україні. Результати аналізу свідчать, що загальний обсяг фінансування наукових досліджень і розробок за період 2018-2020 рр. збільшився в Україні лише на 2%, а розподіл фінансування в НАН України здійснюється, виключно з чисельності наукових працівників в науковій установі, у зв’язку із чим, певною мірою
пов’язана і недостатня висока ефективність використання фінансових коштів окремими науковими установами. При цьому фінансування за рахунок коштів державного бюджету зросло на 22% та фінансування за рахунок коштів організацій підприємницького сектору зменшилися на 36%. В останні три роки в Україні найбільший обсяг фінансування здійснювався у науково-технічні (експериментальні) розробки, але їх питома вага у 2020 році скоротилася у порівнянні з 2018 р. і становила 51,7%.

Висновки. Розвиток науки в Україні неможливий без достатнього та своєчасного її фінансування та зміни принципів, і з урахуванням яких, слід вибудовувати систему фінансування наукових досліджень та науково-технічних розробок, що включає: створення при НАН України Центру форсайтних досліджень з відповідними завданнями і експертними функціями; швидке й ефективне впровадження результатів досліджень; економічна обґрунтованість і защищеність прийомів і механізмів залучення інвестицій; множинність джерел фінансування; комплексність і гнучкість, що передбачає здатність одночасно фінансувати заплановані технічні та технологічні нововведення, ефективно перерозподілюючи грошові потоки. Сама система управління в НАН України має сприяти ефективному управлінню бюджетними коштами, а зміни в організації досліджень може істотно збільшити фінансування пріоритетних напрямів досліджень. Фінансування наукових досліджень повинно стати одним із пріоритетних напрямів стратегічного розвитку України порад з потребами зміщення її обороноздатності.

Ключові слова: наукова діяльність, фінансування, науково-технічні розробки, інноваційний розвиток, науково-освітня інфраструктура.

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FINANCIAL PROVISION OF SCIENTIFIC ACTIVITIES IN THE CONTEXT OF THE STRATEGIC DEVELOPMENT OF THE NATIONAL ECONOMY
**Topicality.** The modern system of financing research studies in Ukraine is designed to provide an effective and comprehensive solution to such urgent tasks as creating the necessary institutional prerequisites for the timely innovations introduction in all areas of the national economic complex of the country, ensuring technological restructuring; creating the necessary conditions for the development of scientific and educational potential, preventing the departure of the country's scientific personnel abroad and creating conditions for the return of those who were forced to leave the country as a result of Russian aggression in Ukraine. Today, at all levels of government, the matter of the effective use of funds allocated in Ukraine for scientific and innovative activities is increasingly emerging. Therefore, the formation of an effective system for financing scientific activities, the result of which is the creation of an innovative product, is an important and urgent task.

**Aim and tasks.** The purpose of the article is to identify current problems of financing research and development in Ukraine and justify ways to solve them.

**Research results.** The article uses methods of statistical analysis of data on the state of development of scientific activity as elements of a systematic analysis of the implementation of scientific research and development by sources of funding in Ukraine. The results of the analysis show that the total amount of research and development funding for the period 2018-2020 increased in Ukraine by only 2%, and the distribution of funding in the National Academy of Sciences of Ukraine is based on the number of scientific workers in a scientific institution, in connection with which, to a certain extent, it is also associated with the insufficient efficiency of the financial resources use by individual scientific institutions. At the same time, funding from the state budget increased by 22% and funding from the funds of business sector organizations decreased by 36%. In the last three years in Ukraine, the largest amount of funding was provided to scientific and technical (experimental) developments, but their share in 2020 decreased compared to 2018 to 51.7%.

**Conclusion.** The development of science in Ukraine is impossible without sufficient and timely funding and changes in the principles and taking into account which it is necessary to build a system for financing scientific research and technical developments, which will include: the creation of a Foresight Research Center under the National Academy of Sciences of Ukraine with appropriate tasks and expert functions; fast and efficient implementation of research results; economic feasibility and security of methods and mechanisms for attracting investments; multiple sources of funding; comprehensiveness and flexibility, which implies the ability to simultaneously finance planned technical and technological innovations, effectively redistributing cash flows. The management system of the National Academy of Sciences of Ukraine should contribute to the effective management of budgetary funds, and changes in the organization of research can significantly increase funding for priority areas of research. Financing of scientific research should become one of the priority directions for the strategic development of Ukraine along with the need to strengthen the defense capability.

**Keywords:** scientific activity, financing, scientific and technical development, innovative development, scientific and educational infrastructure.

**Problem statement and its connection with important scientific and practical tasks.** For today, there is no doubt that the role of scientific knowledge in the development of various spheres of society and the individual is constantly growing. Today, Ukraine is among the countries with the lowest level of "research capitalization" of GDP. Thus, in 2019, research and development performed in the country amounted to only 0.18% of GDP, while in the EU this figure averages 2% of GDP and the task is to increase the level of funding for science to 3% of GDP. The largest amounts of research and development funding have been observed recently in Korea - 4.24%, Switzerland - 3.37%, Sweden - 3.25% of GDP [1]. Therefore, the analysis of the current state of funding and prospects for the development of science in Ukraine is a social and cultural phenomenon is relevant.

Creating an effective system of financing innovation processes, and hence research, is an important and urgent task of the state. At the same time, the ways and methods of its solution have significant differences at different levels of government - state, regional and at the level of individual enterprises. The modern system of financing research in Ukraine is designed to ensure effective and comprehensive solution of such urgent tasks as creating the necessary institutional conditions for timely implementation of innovations in all areas of the national economic complex, ensuring technological restructuring; creating the necessary conditions for the development of scientific and educational potential, preventing the country's scientific personnel from going abroad and creating conditions for the return of those who were forced to leave the country as a result of Russian aggression in Ukraine.

The identified tasks can be solved through direct budget funding, grant funding from non-governmental organizations and foundations, including foreign ones, as well as through the creation of modern institutional and legal conditions that would encourage commercial structures to finance research.

The system of financing research and development at the level of individual business entities aims, above all, to finance such innovative projects that can provide the competitive advantage of the enterprise. But today, for all levels of government there is a growing question of the effectiveness of the use of funds
allocated in Ukraine for research and innovation. Without their solution it is impossible to achieve a higher level of socio-economic development of our country.

**Analysis of recent publications of the problem.** Problems of financial support of research and development in Ukraine, the issue of investing in innovation for many years are studied by domestic scientists: Burkinsky B., Laiko O. [2], Geets V. [3], Burdonos L. [4], Landina T., Melnychuk I. [5], Onyshko S., Krupka M., Antonyuk L., Osetsky V., Fedulova L. [6].

The state of financial support of scientific research, ways of its optimization and prospects of development, conceptual principles of efficiency of financial support of innovative development of Ukraine are considered by such scientists as Koycheva T. [7], Ovcharova L., Bodeko V. [8], Kuzhelev M., Zhytar M. [9].

**Allocation of previously unsolved parts of the general problem.** In the works of these scientists are considered mainly the issue of expanding sources of funding, and the problems of efficient use of funds in the implementation of scientific research remain insufficiently covered. At the same time, in the conditions of growing crisis phenomena in the economy, the state budget deficit, the issue of efficient use of funds in the scientific sphere is becoming increasingly important.

**Formulation of research objectives (problem statement).** The purpose of the article is to identify current problems of financing research and development in Ukraine and justify ways to solve them.

**An outline of the main results and their justification.** Modern science has become a powerful socio-economic institution with significant financial flows, which, however, are not sufficient (only 0.18% of GDP). Expenditures on scientific and scientific-technical activities are protected items of expenditures of the State Budget of Ukraine. Most of these expenditures are financed from the state budget (see Tables 1 and 2).

### Table 1

<table>
<thead>
<tr>
<th>Sources financing</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2020 compared to 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget funds</td>
<td>6222735,4</td>
<td>6724744,9</td>
<td>7411791,4</td>
<td>1,19</td>
</tr>
<tr>
<td>of them the state budget</td>
<td>6020886,6</td>
<td>6603856,1</td>
<td>7344736,8</td>
<td>1,22</td>
</tr>
<tr>
<td>Own funds</td>
<td>1610011,8</td>
<td>1725112</td>
<td>2105454,1</td>
<td>1,31</td>
</tr>
<tr>
<td>Funds of organizations including:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- funds of public sector organizations</td>
<td>5116997,1</td>
<td>4852644,1</td>
<td>3353794,2</td>
<td>0,65</td>
</tr>
<tr>
<td>- funds of business sector organizations</td>
<td>1141575,7</td>
<td>798621,8</td>
<td>799810,6</td>
<td>0,70</td>
</tr>
<tr>
<td>- funds of organizations in the higher education sector</td>
<td>3947379,8</td>
<td>4035650,1</td>
<td>2527767,2</td>
<td>0,64</td>
</tr>
<tr>
<td>- funds of private non-profit organizations</td>
<td>6764,9</td>
<td>3709,6</td>
<td>15764,3</td>
<td>2,33</td>
</tr>
<tr>
<td>Funds from foreign sources</td>
<td>3642585,7</td>
<td>3856175,0</td>
<td>4083258,5</td>
<td>1,12</td>
</tr>
<tr>
<td>Funds from other sources</td>
<td>181394,5</td>
<td>95953,7</td>
<td>68121,1</td>
<td>0,38</td>
</tr>
<tr>
<td>Total:</td>
<td>16773724,5</td>
<td>17254629,7</td>
<td>17022419,3</td>
<td>1,02</td>
</tr>
</tbody>
</table>

Source: calculated by the authors according to the data [10, p.72]

The data shows that the total amount of funding for research and development for the period 2018-2020 increased in Ukraine by only 2%. At the same time, funding from the state budget increased by 22% and funding from the own funds of enterprises and organizations of Ukraine - by 31%. But at the same time, the funds of business sector organizations decreased by 36%. The largest sources of funding for research are the state budget and foreign funds (Table 2).
The structure of costs for research and development by sources of funding in Ukraine in 2018-2020

<table>
<thead>
<tr>
<th>Sources financing</th>
<th>specific weight, %</th>
<th>2020 compared to 2018, (+,-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget funds</td>
<td>37.1</td>
<td>38.9</td>
</tr>
<tr>
<td>of them the state budget</td>
<td>35.9</td>
<td>38.3</td>
</tr>
<tr>
<td>Own funds</td>
<td>9.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Funds of organizations including:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- funds of public sector organizations</td>
<td>30.5</td>
<td>28.1</td>
</tr>
<tr>
<td>- funds of business sector organizations</td>
<td>23.5</td>
<td>23.4</td>
</tr>
<tr>
<td>- funds of organizations in the higher education sector</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>- funds of private non-profit organizations</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Funds from foreign sources</td>
<td>21.7</td>
<td>22.4</td>
</tr>
<tr>
<td>Funds from other sources</td>
<td>0.001</td>
<td>0.02</td>
</tr>
<tr>
<td>Total:</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: calculated by the authors according to the data [10, p.86]

In 2018, the share of the state budget was 35.9%, and in 2020 - 43.2%. Funds from foreign sources during this period increased by 2.2%, and became 23.9% of total funding. The structure of funding by type of research work during this period has changed significantly (Table 3 and Figure 1).

Dynamics of costs for research and development in terms of types of work in Ukraine in 2018-2020

<table>
<thead>
<tr>
<th>Types of work</th>
<th>th. UAH</th>
<th>2020 compared to 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018</td>
<td>2019</td>
</tr>
<tr>
<td>Basic research</td>
<td>3756,539</td>
<td>3740,428</td>
</tr>
<tr>
<td>Applied research</td>
<td>3568,336</td>
<td>3635,718</td>
</tr>
<tr>
<td>Scientific and technical</td>
<td>9448,849</td>
<td>9878,484</td>
</tr>
<tr>
<td>(experimental) developments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>16773,725</td>
<td>17254,629</td>
</tr>
</tbody>
</table>

Source: calculated by the authors according to the data [10, p.86]

In the last three years in Ukraine the largest amount of funding was provided for scientific and technical (experimental) developments. But their share in 2020 decreased compared to 2018 and became 51.7% (Fig. 1). The share of funding for basic and applied research in Ukraine increased during this period by 2.6 percentage points and 2.0 percentage points, respectively.

As noted, the main source of funding for science in Ukraine is the state budget. And one of the managers of funds provided by the budget of Ukraine for research and development is the National Academy of Sciences of Ukraine. Therefore, in the course of the research the task was set to investigate the procedure of distribution of funds in the National Academy of Sciences of Ukraine, to determine their effectiveness and existing problems.

The Laws of Ukraine "On the State Budget of Ukraine for 2020" and "On the State Budget of Ukraine for 2021" to finance the National Academy of Sciences of Ukraine in 2020 and 2021 determined funds in the amount of UAH 3945284.6 thousand and UAH 5238496.3 thousand, respectively [11, 12]. The distribution of this funding according to the program code of expenditure classification (CPCC) is given in Table 4.
Fig. 1. The structure of costs for research and developments in Ukraine in terms of types of work
Source: built by the authors according to [10, p.86]

Table 4

Distribution of expenditures of the National Academy of Sciences of Ukraine in 2020-2021 by financing funds from the general fund

<table>
<thead>
<tr>
<th>Expenditures of the National Academy of Sciences of Ukraine according to software classification</th>
<th>Amount, thousand UAH</th>
<th>2021 in % until 2020</th>
<th>Specific weight in 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPCC Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6541020 Scientific and organizational activity of the Presidium of the National Academy of Sciences of Ukraine</td>
<td>115770,0</td>
<td>144857,6</td>
<td>125,1</td>
</tr>
<tr>
<td>6541030 Scientific and scientific-technical activity of scientific institutions of the National Academy of Sciences of Ukraine</td>
<td>3322933,5</td>
<td>4372334,6</td>
<td>131,6</td>
</tr>
<tr>
<td>6541080 Training in priority areas of science</td>
<td>5400,0</td>
<td>6623,0</td>
<td>122,6</td>
</tr>
<tr>
<td>6541100 Medical care for employees of the National Academy of Sciences of Ukraine</td>
<td>90755,5</td>
<td>114919,0</td>
<td>126,6</td>
</tr>
<tr>
<td>654140 Scientific and scientific-technical activity of the Institute of Nuclear Power Plant Safety Problems of the National Academy of Sciences of Ukraine</td>
<td>46700,0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6541200 Advanced training in priority areas of science and preparation for the state certification of scientific personnel of the National Academy of Sciences of Ukraine</td>
<td>12413,4</td>
<td>15600,2</td>
<td>125,7</td>
</tr>
<tr>
<td>6541230 Supporting the development of priority areas of research</td>
<td>315312,2</td>
<td>465561,9</td>
<td>147,6</td>
</tr>
<tr>
<td>6541260 Creation of a modern specialized laboratory for working with infectious materials</td>
<td>-</td>
<td>58600,0</td>
<td>-</td>
</tr>
<tr>
<td>6541270 Providing housing for scientists of the National Academy of Sciences of Ukraine</td>
<td>-</td>
<td>60000,0</td>
<td>-</td>
</tr>
<tr>
<td>Total:</td>
<td>3945284,6</td>
<td>5238496,3</td>
<td>132,8</td>
</tr>
</tbody>
</table>

Source: calculated by the authors according to [13, p.5].

The largest amount of funds is directed, of course, to scientific and scientific-technical activities of scientific institutions of the National Academy of Sciences of Ukraine. In 2021 it amounted to 4372334.6 thousand UAH (83.5% of the total) and increased by 31.6% (Table 4). Another 8.9% of budget funds (UAH 465,561.9 thousand) were provided in 2021 to support the development of priority areas of research in the
organizations of the National Academy of Sciences of Ukraine. In general, the amount of funding from the
general fund for the National Academy of Sciences of Ukraine increased in 2021 by a third (32.8%).

Listed in table. 5 data show that the structure of funding from the general fund of the state budget in
the areas of funding has also changed somewhat in the National Academy of Sciences of Ukraine.

<table>
<thead>
<tr>
<th>Areas of financing</th>
<th>2020</th>
<th>2021</th>
<th>2021 in% until 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>thousand UAH</td>
<td>pit. weight,%</td>
<td>thousand UAH</td>
</tr>
<tr>
<td>Basic research</td>
<td>2423784.0</td>
<td>72.9</td>
<td>3077475.8</td>
</tr>
<tr>
<td>Applied research and scientific and technical developments</td>
<td>584122.5</td>
<td>17.6</td>
<td>837649.8</td>
</tr>
<tr>
<td>Financial support for the development of scientific infrastructure and scientific facilities that constitute national heritage, etc.</td>
<td>315027.0</td>
<td>9.5</td>
<td>457209.0</td>
</tr>
</tbody>
</table>

Source: calculated by the authors according to [13, 14]

As of 2021, funding has increased in all areas. At the same time, funding for applied scientific and
scientific-technical developments increased by 43.4%, and basic research by 26.9%. As a result, the share of
applied research and scientific and technical developments increased to 19.2%, and basic research decreased.

The analysis of the distribution of funding between its sections and branches is essential for
diagnosing the cost-effectiveness of financial resources allocated by the NAS of Ukraine. The results of this
distribution in 2020–2021 are presented in the Table. 6.

According to the data, the National Academy of Sciences of Ukraine will have three sections (14
branches) and 150 scientific institutions in 2021. In addition, 23 scientific institutions are administered by the
Presidium of the National Academy of Sciences of Ukraine. The largest is the section of physical, technical,
and mathematical sciences, which consists of eight departments (75 scientific institutions). The section of
chemical and biological sciences has 3 departments (43 scientific institutions). The largest number of
scientific institutions is concentrated in the Department of General Biology with 21. This raises the question:
given the rational existence of such a number, is it not appropriate to conduct an administrative audit and
consolidate institutions of this and, incidentally, other departments of the academy? After all, this will reduce
significant amounts of administrative costs and focus the released funds on research.

The methodological basis for determining the required amount of R & D funding in Ukraine is the
planning of expenditures for their implementation, the process of which is set out in the "Standard
Regulations for Planning, Accounting, and Costing of R & D”, approved by the Cabinet of Ministers of
Ukraine on July 20, 1996, No. 830. Art. 26 "The purpose of R&D cost planning is an economically justified
determination of the costs of their implementation.” It is carried out by developing estimates of estimated
value for each topic (stage), based on regulatory and estimated data ”[15].

In Art. 28 of this provision it is stated that the planning of R&D costs is carried out by the research
institution itself on the basis of calculations, the results of which are reflected in the calculation of the
estimated cost on the topic [15], and which after their completion (together with subdivision of the National
Academy of Sciences of Ukraine for their expert assessment and approval, and continue to move up the
ranks of the management hierarchy.

It is possible to optimize funding at the National Academy of Sciences of Ukraine by ensuring
openness of expert evaluation of research work, prevention of unjustified funding of low-performing
institutions and positions, optimization of overhead costs [1].

Funds for science are always limited. Even wealthy countries are forced to optimize their research
programs. This encourages the science sector to substantiate properly the priority areas of scientific,
technical and innovative economic development and, thus, to focus on breakthrough technologies of the
future [16]. For these reasons, the so-called technological foresight is used in the countries of the world, on
the basis of which national foresight research programs are formed, in which the priority directions of
scientific research are determined taking into account the peculiarities of the country's environment [17].
### Table 6
Distribution of funding from the general fund of the state budget between sections and branches of the NAS of Ukraine

<table>
<thead>
<tr>
<th>Sections, branches of the National Academy of Sciences of Ukraine</th>
<th>Volume of financing, million UAH</th>
<th>Number of institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fundamental research of scientific institutions</td>
<td>Applied scientific and scientific-technical developments</td>
</tr>
<tr>
<td>Section of Physical, Technical and Mathematical Sciences: including department:</td>
<td>1238,76</td>
<td>1587,45</td>
</tr>
<tr>
<td>- mathematics</td>
<td>40,939</td>
<td>51,747</td>
</tr>
<tr>
<td>- computer science</td>
<td>96,101</td>
<td>123,154</td>
</tr>
<tr>
<td>- mechanics</td>
<td>94,249</td>
<td>120,397</td>
</tr>
<tr>
<td>- physics and astronomy</td>
<td>231,863</td>
<td>297,149</td>
</tr>
<tr>
<td>- Earth Sciences</td>
<td>107,103</td>
<td>137,537</td>
</tr>
<tr>
<td>- physical and technical problems of materials science</td>
<td>270,937</td>
<td>346,386</td>
</tr>
<tr>
<td>- physical and technical problems of energy</td>
<td>126,740</td>
<td>163,995</td>
</tr>
<tr>
<td>- nuclear physics and energy</td>
<td>270,832</td>
<td>347,091</td>
</tr>
<tr>
<td>Section of Chemical and Biological Sciences: including department:</td>
<td>451,529</td>
<td>561,731</td>
</tr>
<tr>
<td>- chemistry</td>
<td>148,773</td>
<td>179,179</td>
</tr>
<tr>
<td>- biology, physiology and molecular biology</td>
<td>146,290</td>
<td>182,365</td>
</tr>
<tr>
<td>- general biology</td>
<td>156,466</td>
<td>200,187</td>
</tr>
<tr>
<td>Section of Social Sciences and Humanities: including department:</td>
<td>228,43</td>
<td>352,52</td>
</tr>
<tr>
<td>- economy</td>
<td>47,914</td>
<td>54,954</td>
</tr>
<tr>
<td>- history, philosophy and law</td>
<td>133,505</td>
<td>174,353</td>
</tr>
<tr>
<td>- literature, language and art history</td>
<td>47,019</td>
<td>61,510</td>
</tr>
<tr>
<td>Institutions under the Presidium of the National Academy of Sciences of Ukraine</td>
<td>40,79</td>
<td>53,92</td>
</tr>
</tbody>
</table>

Source: calculated by the authors according to [13, 14]
In one of his works, L. Giorgio identified technological foresight as a systematic tool for evaluating scientific and technological solutions that can significantly affect industrial competitiveness, quality of life and the creation of material values [18].

Today, the foresight of foresight research is widespread in the developed world. And the first to become interested in foresight research were the United States in 1950. Later, in the 70s of the XIX century their experience was adopted by such countries as Japan, Great Britain, Germany, France and others. Ukraine, albeit belatedly, must immediately join the group of countries using technological foresight.

The main tasks of the technological foresight are to study favorable situations in the future to determine the priorities of investment in science and assess the compliance of scientific and technical research needs of the country. With the help of foresight, available technological opportunities are revealed and the ability of science and economic spheres to implement the latest solutions in economic activity is assessed. Thus, foresight research identifies areas of technological breakthrough that have a high degree of reliability and are therefore of strategic importance for the development of the country's economy. By virtue of them, the country has a competitive advantage in the world. Ben R. Martin once described such research as "a systematic attempt to look into the long-term future of science and technology in order to determine the scope of strategic research to achieve the greatest economic and social benefits" [19, p. 140].

There are various methods used in foresight studies. At the same time, the most popular is the method of scanning the environment, which has prompted the emergence in the world of organizations that offer services to identify breakthrough trends in human activities. O.V. Krasovska in [20] notes that the most common methods used for this purpose in the world are brainstorming, scripting, critical technology, morphological analysis, Delphi and others. Taking into account everything stated above, we consider it is necessary to create a Center for Foresight Research at the National Academy of Sciences of Ukraine with relevant tasks and expert functions.

Determining the criteria for the distribution of funds for the implementation of the country's research needs is the second difficult task that must be solved in the near future in the system of the National Academy of Sciences of Ukraine. And the study of the experience gained by the international practice of use of criteria and standards of the organization and financing of scientific researches can help in it [21].

Funds for research should always work for the final result. Therefore, the basis for their distribution, in our opinion, should be a system of criteria in which the size of the expected effect (economic or socio-economic) from the implementation of research (development) per academic researcher involved in its implementation should be a priority.

Funding for science in Ukraine in the post-war period requires the development of new principles, but it must correlate with the recovery of the national economy as a whole. In our opinion, economic recovery in Ukraine in the postwar period should be based on the development of special programs to "revive" the country's economic activities, and to develop measures necessary to return the population and ensure decent living conditions, restore infrastructure in some regions and further its integration with other regions of the country. At the same time, the reconstruction of scientific and educational infrastructure is important. It is known that higher education institutions in Ukraine also carry out research, which is marked by their industry orientation, and therefore, the reconstruction of scientific and educational infrastructure should promote the development of research in the country. Scientific and educational infrastructure in a broad sense, being a part of the social infrastructure of the country, performs the function of implementing social policy, and therefore should be the object of state regulation.

According to the Cabinet of Ministers of Ukraine, Ukraine already has four funds for economic recovery after the war, these funds will help restore the stability of the Ukrainian economy and help Ukrainians during the war [22]. Funds will be collected in the following areas: reconstruction of destroyed infrastructure (Fund for Restoration of Property and Destroyed Infrastructure); economic transformation (Fund for Economic Recovery and Transformation); resumption of small and medium business (Small and Medium Business Support Fund); servicing of international financial obligations of Ukraine (Public Debt Service and Repayment Fund).

The development of science is a key determinant of statehood, and the existing extensive scientific and educational infrastructure has a decisive influence on the efficiency of reproduction of public capital by creating conditions for human resources development and innovation generation. The development of national science today is hampered by misuse and irrational spending of huge sums from the budget. The basic principles on the basis of which the system of financing research and scientific and technical developments should be built are:

1) foresight validity of scientific research;
2) rapid and effective implementation of research results;
3) economic feasibility and security of methods and mechanisms for attracting investment;
4) multiple sources of funding;
5) complexity and flexibility, which provides the ability to simultaneously finance planned technical and technological innovations, effectively redistributing cash flows.

We believe that the scientific and educational infrastructure in the period of economic recovery should be a key infrastructure of the country, which requires the development of a new strategy for its development. Such a strategy should be based on close cooperation between universities and academic research institutions and should include the following institutional components: regulatory and legal support, staffing, information and technological support.

1. Regulatory and legal support:
   - compliance of the regulatory framework for the functioning of the system of scientific institutions and institutions of higher education (HEE) with the needs of economic recovery in the postwar period with the possibility of its integration into the world scientific and educational space.
2. Staffing:
   - raising the prestige of scientific and educational activities through the development of a system of motivations that will improve the quality of the educational process at a high scientific and methodological level;
   - improving the tariff policy regarding the remuneration of teachers, providing them with social guarantees;
   - to involve on a permanent basis in the educational process (especially for masters) practitioners and scientists of academic institutions. As the problem of outflow of human capital is urgent in the conditions of war in Ukraine, it is necessary to develop a set of measures for the formation of a favorable scientific and educational environment and to create appropriate information and technological conditions.
3. Information and technological support:
   - attracting foreign investment to improve the logistics of research institutions and free economic zones;
   - creating conditions for the integration of scientists into international research projects, participation in international conferences offline, cooperation with professional communities, internships through teaching in foreign educational institutions;
   - widespread digitalization of the scientific and educational process;
   - development of the national knowledge base;
   - creating conditions for the implementation of measures to improve the efficiency of business activities of free economic zones and academic institutions.

The implementation of these measures can help return qualified scientists, teachers of free economic education, who were forced to leave the country because of the war, and promote the vision of higher education in Ukraine, defined in the "Strategy for Higher Education in Ukraine 2021-2031", namely - creating a competitive system ZVO, which on the basis of cooperation with scientific institutions and business representatives forms the professional and scientific-educational potential of the nation on the basis of professional and personal development, and at the same time integrated into the world educational and research space [23].

The study shows that the business sector due to high capital intensity and unprofitability of the stage of financing innovation has no incentives to invest equity. Its subjects are not interested in investing in research and development (especially at the stage of basic research) due to the unpredictability of the research process and the high risk of losing funds. Therefore, the task of the state is to create significant incentives for business sector organizations to invest their own capital in research and innovation.

**Conclusions and perspectives of further research.** Insufficient funding for research is a major problem, but it cannot be left to the state alone. At the same time, it is the prerogative of the state to develop and implement a system of incentives and incentives to attract funds from the business sector through the provision of partial or absolute property rights to own the result of scientific developments in the form of innovations or industrial designs.

Ukraine needs to identify the leading areas of research, promote the creation and development of technology startups and demonstrate that new projects can make money. It is necessary to create a Center for Foresight Research at the National Academy of Sciences of Ukraine with relevant tasks and expert functions. The management system in the National Academy of Sciences of Ukraine should promote effective management of budget funds, namely: it is necessary to conduct an audit of research and development of
scientific institutions of the country, including the institutes of the National Academy of Sciences of Ukraine and the Free Economic Zone. To conduct this audit, it is necessary to determine the operator on a competitive basis. From our point of view, it is best to be one of the leading international consulting or auditing companies. It is necessary to determine the breakthrough areas of basic research. In addition, in our opinion, due to the optimization of scientific institutes, proper organization of research and reduction of the administrative apparatus of scientific institutions of the Academy of Sciences of Ukraine, it is possible to significantly increase funding for priority areas of research.

Important achievements of scientific institutions of the Academy of Sciences of Ukraine in the field of basic, applied research and innovation contribute to the formation of the information society and knowledge economy. However, during the war a significant number of scientists went abroad. Therefore, in the conditions of economic recovery, it is necessary to implement the following priority areas of science development in Ukraine:

- reconstruction of scientific and educational infrastructure (destroyed and damaged scientific institutions and educational institutions, laboratories, purchase of modern equipment, access to international scientific libraries, etc.);
- targeted direction of applied research to solve the problems of economic recovery after the war;
- creation of mechanisms to facilitate the return of scientific personnel from abroad to Ukraine (material incentives for highly qualified and competent personnel, the availability of institutional and logistical conditions for research);
- development of international scientific cooperation with the possibility of free internships in European scientific and educational institutions;
- formation of mixed models of research funding (public, private, grant funding, foreign investment);
- control by scientific institutions of the processes of transformation of scientific research into innovative developments.

The implementation of these areas will contribute to the preservation of scientific potential and further development of basic and applied research in the country, which, ultimately, will ensure the development of science in Ukraine in the context of economic recovery.

Failure to realize the priority of financing the development of science in Ukraine will lead to the impossibility of implementing a strategy to modernize the national economy. We believe that the financing of scientific research should become one of the priority areas of science development in Ukraine.

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Failure to realize the priority of financing the development of science in Ukraine will lead to the impossibility of implementing a strategy to modernize the national economy. We believe that the financing of scientific research should become one of the priority areas of science development in Ukraine's strategic development, along with the need to strengthen its defense capabilities. Science, acting as a key structural element of the economic system, is designed to lay the foundation for the formation of national security, strengthening innovation and technological independence, which is especially relevant and urgent for Ukraine in the postwar recovery.

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