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SOME CHALLENGES OF SCIENTIFIC DEVELOPMENT IN ARMENIA: INTERNATIONAL PERSPECTIVES

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Հոդվածը ստացվել է՝ 10.11.25, ուղարկվել է գրախոսման՝ 13.11.25, երաշխավորվել է տպագրության՝ 24.12.25

Introduction. International experience in the development of science demonstrates that countries which have placed strong emphasis on scientific advancement and scientific-technological progress, and have invested substantially in this field, have reaped multiple long-term returns over time. This is evidenced, in particular, by the experience of developed countries such as the United States (US), Germany, the United Kingdom (UK), France, Singapore, Japan, China, and others.

In Armenia, a period of rapid scientific development occurred during the years of Soviet governance. However, following the attainment of political independence, science has remained in the position of a “neglected sector.” Funding has been provided only at a level sufficient to ensure its survival, especially in the field of social sciences.

The purpose of this study is to examine the experience of scientific development in selected developed countries and, on this basis, to propose recommendations for the development of science in Armenia.

Literature Review. As early as the initial years of independence, B. Yeghiazaryan emphasized the necessity of a long-term, targeted, and comprehensive program for the development of science and identified those sectors of the economy in which science could play a significant role. In addition to economic sectors, he underscored the importance of science in the process of improving the public administration system.

The author noted that in 1990 more than 55,000 employees were engaged in 260 scientific and science-supporting organizations operating in the Republic of Armenia, including 23.7 thousand scientific and academic staff (920 Doctors of Science and 8,180 Candidates of Science). Total expenditures of scientific and science-supporting organizations amounted to 4% of national income.

Particular emphasis was placed on preserving the accumulated scientific potential. According to Yeghiazaryan, a transition to fully market-based relations could be especially destructive for fundamental research and could significantly hinder its development over an extended period. At the same time, the further development of sectoral scientific potential was considered expedient for promoting technological progress within industries, increasing operational efficiency, improving working conditions, raising productivity and incomes, and enhancing product quality and competitiveness.

Assigning exceptional importance to the development of science, under the leadership of Academician M. Kotanyan, an extensive concept for the development of science was formulated in 1993 at the Institute of Economics of the National Academy of Sciences of the Republic of Armenia and submitted to the Government by the Academy. This concept sought to propose recommendations regarding the financing of scientific, technological, and innovation activities, the indirect regulation of systems for organizing scientific research and experimental design work, as well as state support and legal protection of science and scientific activity.

According to the author, increasing the efficiency of the utilization of Armenia's mineral resources would contribute to the development of new directions for the use of domestic resources and to the establishment of specialized production facilities. For this purpose, he proposes the establishment of a Center for the Research of Mineral Resources, which would be responsible for the development, design, pilot production testing, and industrial prototyping of technologies for the productive application of these resources. It is also proposed to establish a Research Center for Scientific and Industrial Equipment. Both centers should be equipped with modern, state-of-the-art facilities and specialized divisions. At the same time, they should perform functions related to the implementation of their developments in industry as well as monitoring and oversight activities[1].

In Yeghiazaryan's view, the financing of fundamental sciences should be carried out through the state budget. It is recommended that 20-25% of the total funds allocated to science be directed to the National Academy of Sciences and other organizations engaged in fundamental research, which would distribute these funds across scientific fields through their respective expert commissions.

Several authors have addressed issues related to the thematic and basic financing of science. The role of the National Academy of Sciences in financing scientific organizations within its system has once again been emphasized (Shahinyan, 1997).

Yu. Suvarian's group of researchers has also conducted a study dedicated to science[2]. The fourth chapter of the study is devoted to the analysis of statistical indicators of scientific and technological activity for the period 2004-2010. It presents the quantitative distribution of organizations engaged in scientific activity during these years, the volume of scientific and technological work, and employment levels by regions, ministries, and government agencies. The study further disaggregates the volume of scientific and technological activities by field, expenditures on research and development by funding sources, and the regional distribution of research personnel by branches of science.

A section devoted to scientific publications is of particular interest, as it analyzes the distribution of periodicals across various fields by language, thematic categories, and other characteristics. The authors also address patent activity, presenting data on the

[1] Kotanyan, M. The National Economy as a Fundamental Objective. Hayastani Hanrapetutyun [Republic of Armenia Newspaper], June 24–25, 1997, Nos. 117–118.

[2] Suvaryan, Y. M., Harutyunyan, V. L., Sargsyan, V. A., & Khachatryan, V. V. (2011). The system of education and science and economic development. Yerevan, Armenia: National Academy of Sciences of the Republic of Armenia, Gitutyun Publishing House.

number (3,309) and dynamics of applications filed during the period 1992-2010. A separate section examines international experience in science financing and presents one variant of a model for the cyclical co-development of science and production.

Some authors attribute the leading position of the United States in the field of science to its ability to attract and retain talented specialists from other countries (Ganguli et al., 2020). It is well known that the role of immigrants in the development of science in US has also been emphasized by other scholars (Moser et al., 2014)[3]. Other published works highlight the significance of "think tanks" operating in various countries as analytical hubs whose activities are built around the practical application of research results. The importance of US think tanks has also been discussed by Russian scholars (Kochetkov and Supyan) [4].

One researcher from the Russian Academy of Sciences addressed certain aspects of scientific policy during the first presidential term of U.S. President Donald Trump (Sudakova, 2020) [5]. In particular, the author examined issues related to the strategy approved by the US National Science and Technology Council entitled "Charting a Course for Success: America's Strategy for STEM Education."

Researchers from the Institute for the US and Canadian Studies of the Russian Academy of Sciences analyzed the development of fundamental sciences in the United States in the post-World War II period (Travkina and Vasilyev, 2021). According to their assessment, as a result of expenditures on both fundamental sciences and the applied sciences derived from them, labor productivity growth in the United States in the second half of the 20th century amounted to no less than 50%, while the increase in economic efficiency reached approximately 75%. These outcomes were largely enabled by the organized immigration of prominent "global brains" from other countries[6].

Another researcher has emphasized the role of state-funded research organizations, research associations and clusters, as well as research and development centers financed by industrial enterprises, in the advancement of science (Malikova, 2019).

Methodology. In the scope of the study, the methods of scientific abstraction, analysis, comparison, analogy, as well as historical and logical approaches were employed.

Analysis. Science has always been and remains a guarantor of technical and technological progress and, consequently, of societal development. It represents an objective requirement for development, as it leads to the creation of advanced

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[3] Bubnova, N. I. (2017). Think tanks as actors of contemporary politics. Comparative Politics, 8(3), 8–19. https://doi.org/10.18611/2221-3279-2017-8-3-8-19

[4] Kochetkov, G. B., & Supyan, V. B. (Year). Think tanks in the USA: Science as an instrument of real politics. Social and Humanitarian Sciences. Abstract Journal, Series 5: History, (2), 52–63.

[5] Sudakova, N. A. (2020). State and science in the Trump era: Preliminary outcomes. USA & Canada: Economy, Politics, Culture, 50(11), 46–59. https://doi.org/10.31857/S268667300012341-5

[6] Travkina N., Vasiliev V. Fundamental Science in the USA: The Cultural Dimension. Perspektivy. Electronic journal. No. 2–3; 2021. P. 85. DOI: 10.32726/2411-3417-2021-2-3-83-98.

technologies, which, in turn, ensure national development, security, and the enhancement of societal well-being. In the era of digital technologies, science has become, more than ever, the primary driving force of a country's development. It is not coincidental that the focus of international competition has shifted from goods and services to scientific knowledge. Likewise, both developed and developing countries strive to improve their performance in these domains (see Table 1).

Table 1

GII scores and ranks of several countries, 2025[7]

II rank	Country	Score	Rank according to the income group	Regional rank
1	Switzerland	66.0	1	1
2	Sweden	62.6	2	2
3	United States	61.7	3	1
4	Republic of Korea	30.0	4	1
5	Singapore	59.9	5	2
6	United Kingdom	59.1	6	3
7	Finland	57.7	7	4
10	China	56.6	1	3
11	Germany	55.5	10	7
14	Israel	52.3	13	1
15	Hong Kong, China	51.5	14	5
16	Estonia	51,1	15	9
42	Greece	37.2	39	28
43	Türkiye	37.1	3	4
56	Georgia	31.2	9	7
59	Armenia	30.5	11	9
60	Russian Federation	30,3	45	32
66	Ukraine	29.7	15	35
70	Iran	28.5	17	2
74	Republic of Moldova	27.4	20	37
79	Uzbekistan	26.5	7	3
81	Kazakhstan	26.3	24	4
85	Belarus	25.1	26	38
94	Azerbaijan	22.9	30	17
96	Kyrgyzstan	22.6	13	11

[7] Global Innovation Index 2025 Innovation at a Crossroads 18th Edition © WIPO, 2025 Genera, World Intellectual Property Organization, https://www.wipo.int/web-publications/global-innovation-index-2025/assets/80937/global-innovation-index-2025-en.pdf

According to the Global Innovation Index, among 139 countries, the leading positions are held by Finland (7th), China (10th), Israel, Hong Kong (China), and Estonia (14^{th}-16^{th}, respectively). Among post-Soviet countries, Georgia ranks 56^{th}, Armenia 59^{th}, Russia 60^{th}, and Ukraine 66^{th}.

Based on innovation index indicators, developed countries such as the United States and the Federal Republic of Germany have improved their positions. The United States ranks 3rd with a score of 61.7, while Germany ranks 11th with a score of 55.5. The US follows the Anglo-Saxon model of scientific development, whereas Germany adheres to the German model. We will briefly examine the history and distinctive features of scientific development in these countries.

As emphasized by American researchers I. Ganguli and colleagues, "The key factor behind the United States' leading position in science, technology, engineering, and mathematics (STEM) and its ability to maintain this position is the capacity to attract and retain talented specialists from other countries" [8].

Throughout its history, US government has sought to involve scientists and specialists as expert advisors in critical decision-making processes. To this end, scientific centers were established. One prominent example is the National Academy of Sciences (NAS), founded in 1863 by a special act of the US Congress.

The Academy served as a principal advisor to both Congress and the government. Its initial members were tasked with providing guidance to the nation's leadership on key socio-economic development issues, both individually and collectively. Subsequently, through legislative acts, the National Academy of Engineering (NAE) and the Institute of Medicine (IOM) were incorporated into the Academy, forming the National Research Council (NRC), which continues to serve as the primary advisory body to the government and Congress on all matters related to scientific and technological advancement.

In addition, "brain centers" established across US serve a similar purpose. The emergence of such organizations represents a logical continuation of the approach of integrating scientific and professional expertise into the resolution of practical policy challenges. These institutions encompass significant portions of research activities addressing social, political, and economic aspects of society. Consequently, scientific organizations in US have experienced substantial development and institutional consolidation[9].

In 1872, shortly after the American Civil War (1861-1865), the renowned inventor and entrepreneur Alexander Graham Bell (1847-1922) arrived in US from UK. His establishment of the American Telephone and Telegraph Company laid the

[8] Ganguli I., Kahn Sh., MacGarvie M. (editors). The Roles of Immigrants and Foreign Students in US Science, Innovation, and Entrepreneurship. Chicago. 2020. pp. 49.

[9] Kochetkov G.B., Supyan V.B. "Think Tanks" in the USA: Science as an Instrument of Real Politics. Social and Humanitarian Sciences. Abstract Journal. Series 5: History. No. 2. Pp. 52–53.

foundation for the further development of modern information and communication technologies within the American economy. Another prominent scientist and inventor, of Serbian origin, Nikola Tesla, referred to by Americans as "the man who invented the 20th century", arrived in the United States from Europe in 1884[10]. After World War I, the rise to power of fascist and Nazi regimes in Germany and Italy led to the emigration of the founders of modern atomic physics to the United States, primarily for political reasons. Among them were Albert Einstein (1933), Otto Stern (1933), Erwin Fermi (1938), Niels Bohr (brought to the U.S. from Denmark in 1943 during an American special operation), and Julius Wigner (1930). Almost all of these scientists participated, either directly or indirectly, in the Manhattan Project. This influx provided the "magic formula" to elevate American science to the highest global level. Quantity quickly transformed into quality. In the field of physics, between 1901 and 1959, 15 immigrant scientists in the US received the Nobel Prize, and between 1960 and 2013, 21 did so. In chemistry, one immigrant scientist received the Nobel Prize from 1901 to 1959, and 23 received it between 1960 and 2013[11].

After the end of the Second World War, a pivotal role in transforming fundamental scientific research into a direct productive force was played by Vannevar Bush, the science adviser to Presidents F. Roosevelt and H. Truman. According to Bush, fundamental research constituted the primary "engine" of technological progress and, consequently, of economic growth. He proposed the establishment of an independent federal agency, the National Science Foundation (NSF), which effectively functioned as a Ministry of Science; however, it was created with a delay, only in May 1950[12].

The development of fundamental sciences in US was significantly facilitated by large-scale immigration. During the Second World War, a substantial number of Jews fled Nazi Germany to the Western Hemisphere. In 1944 alone, more than 133,000 German Jewish immigrants found refuge in US, including approximately 900 lawyers, 2,000 physicians, 1,500 writers, 1,500 musicians, and 2,400 scientists[13]. Among them were prominent scholars such as Leo Szilard, Eugene Wigner, Edward Teller, John von Neumann, and Hans Bethe in the field of physics, all of whom contributed to the development of the atomic bomb, as well as Otto Meyerhof, the recipient of the 1922 Nobel Prize in Chemistry.

Between 1920 and 1970, a total of 1,365,689 patents were granted to inventors in the United States. Research fields are classified according to the 166 technological

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[10] Same place.

[11] Travkina N., Vasiliev V. Fundamental Science in the USA: The Cultural Dimension. Perspektivy. Electronic journal. No. 2–3; 2021. P. 85. DOI: 10.32726/2411-3417-2021-2-3-83-98.

[12] Travkina N., Vasiliev V. Fundamental Science in the USA: The Cultural Dimension. Perspektivy. Electronic journal. No. 2–3; 2021. P. 85. DOI: 10.32726/2411-3417-2021-2-3-83-98.

[13] Petra Moser, Alessandra Voena, and Fabian Waldinger, German Jewish Émigrés and US Invention, American Economic Review, 2014, 104(10), p. 3222. American Economic Review 2014, 104(10): http://dx.doi.org/10.1257/aer.104.10.3222

classes defined by the United States Patent and Trademark Office (USPTO), of which 60 classes include inventions patented by Jewish immigrants[14].

The next significant wave of immigrants to US occurred from the late 1980s to the early 1990s, driven by political transformations in Eastern European countries and the collapse of the USSR. By 1993, approximately 28% of professionals working in the fields of science, technology, engineering, and mathematics (STEM) in US were immigrant scientists holding doctoral degrees, and by 2017, their share had increased to 45%. In American universities and research centers, which primarily conduct fundamental research, the proportion of foreign-born individuals reached 49% in 2017, including 29.0% in full-time positions. As noted in the NSF statistical report: "Over the past 25 years, the share of foreign-born scientists has increased significantly. A consistent pattern has emerged in fundamental knowledge: the higher the level of expertise, as measured by academic degrees, the greater the proportion of foreign-born scientists and engineers employed"[15].

In US, strategic planning has been widely employed to advance the development of science and education. This approach became particularly prominent during President Barack Obama's administration, driven by reforms in federal education policy. Since the 1990s, the cost of higher education had risen significantly. This trend was further reinforced by the Obama administration's requirement that certain positions within the federal government be filled only by individuals holding a bachelor's or master's degree. Consequently, the average tuition for the 2011-2012 academic year increased by approximately 40% compared to 2000-2001[16]. This development primarily hindered access to higher education for economically disadvantaged groups. To address this issue, the so-called Pell Grant program was implemented, allocating approximately $150 billion annually from the federal budget to support students from low-income backgrounds[17].

This measure also pursued a long-term objective: to attract the most knowledgeable and capable segments of the population into scientific research and innovative activities. US has achieved a unique growth in investments across various fields of science, innovation, and research. Between 2007 and 2012, an average of 1.9% of nominal GDP was spent on the development of value-added technologies, rather than on total expenditures. This process began to gradually accelerate from 2013 and intensified significantly in 2017 due to the technological and economic competition with

[14] Same place.

[15] Ganguli I., Kahn Sh., MacGarvie M. (editors). The Roles of Immigrants and Foreign Students in US Science, Innovation, and Entrepreneurship. Chicago. 2020. p. 49.

[16] Vasilyev M.V. Strategic Development of American Universities. USA & Canada: Economics, Politics, Culture. 2015; p. 36.

[17] Vasilyev M.V. Strategic Development of American Universities. USA & Canada: Economics, Politics, Culture. 2015; p. 36.

China. By 2017, it became evident that US was lagging behind China in terms of innovation rates and research and development expenditures[18].

The global pandemic (2020) also had a negative impact on US science. Funding for research and experimental-development activities in 2021 was planned to decrease by 8.8% compared to the previous year (from $156 billion to $142 billion), with expenditures on fundamental research reduced by 6.5% ($2.8 billion) and applied research by 11.7% ($2.8 billion). Over the following two years, however, spending on science increased substantially.

By the first quarter of 2023, technology expenditures in the United States had reached a historic peak. Alongside technological investments, spending on software, particularly in artificial intelligence, has also grown, accounting for approximately 80% of the overall increase in expenditures[19]. The Federal Republic of Germany is a federal state composed of 16 federal states (Länder), each of which has its own constitution and substantial autonomy in certain areas. The organization of scientific activity in Germany, dating back to the Late Middle Ages, has served as a model for other countries in Central and Eastern Europe.

During the postwar half-century and beyond, German scientists remained steadfastly committed to their "traditional cultural and historical approaches." They largely rejected the new approaches adopted in Anglo-Saxon countries, whose principles often contradicted the aforementioned traditions. As a result, two distinct camps emerged, and dialogue between them largely failed, they were, in the most literal sense, speaking different languages, making little effort to understand one another[20].

Rapid scientific and technological advancement, along with the development of cutting-edge technologies, played a decisive role in Germany's industrial development. In the 1960s, total expenditures on science and engineering increased 5.2-fold, largely due to investments from US and the UK. Measures were also taken to prevent the "brain drain" by raising scientists' salaries. As a result of scientific and technological progress, labor productivity increased by 60% over the same period[21].

At present, Germany is a leading country in the fields of research and science. This position is largely the result of a consistent state policy and a well-developed system of support for research activities, including strong incentives for cooperation between business and academia. Germany has more than 1,000 publicly funded research organizations, approximately 450 research associations and clusters, as well as numerous research and development centers financed by industrial enterprises. At the federal level, the key institution responsible for shaping and implementing national science policy is

[18] Figurski O. Features of the Development of Science in the United States. Atomic Strategy. 2023;9:1.

[19] Same place.

[20] Mosionzhnik, L. A. (2000). The German experience and our prospects [Review of the book Archaeology, ideology and society: The German experience (2nd rev. ed.), edited by H. Härke]. Stratum Plus, 6, 444.

[21] Mosionzhnik, L. A. (2000). The German experience and our prospects [Review of the book Archaeology, ideology and society: The German experience (2nd rev. ed.), edited by H. Härke]. Stratum Plus, 6, 444.

the Federal Ministry of Education and Research (German: Bundesministerium für Bildung und Forschung, BMBF). According to the Federal Government's Strategy for the Internationalization of Education, Science, and Research, Germany has set an ambitious goal of increasing research and development expenditures to 3.5% of GDP by 2035 (Malikova, 1919). However, in the 2025 Global Innovation Index, China ranked 10th out of 139 countries, surpassing Germany.

As is well known, Anglo-Saxon countries operate a single academic degree system (the Doctor of Philosophy (PhD)) which corresponds to the Candidate of Sciences degree in many post-Soviet countries, including Armenia. In contrast, most continental European countries follow the German model, which consists of two academic degrees: the Doctor (equivalent to the Candidate of Sciences) and the Habilitated Doctor, corresponding to the Doctor of Sciences[22]. The German two-tier system of academic degree conferral encourages young and talented researchers to pursue further academic advancement by completing the next stage toward the highest doctoral qualification.

Conclusion. The Anglo-Saxon and German models of scientific development make it possible to draw several conclusions, many of which may be useful in formulating Armenia's future science development strategy. Those conclusions include:

1. Throughout their formation and development, the key to the advancement and achievements of science in US and Germany has been the consistent, long-term, and programmatic policies pursued by successive governments.

2. A decisive factor behind US' rise to, and sustained position in, leading roles in specific scientific fields (particularly technology, engineering, and mathematics) has been its ability to attract and retain talented specialists from other countries. For this purpose, major scientific institutions were established, most notably the National Academy of Sciences, founded in 1863 by a special resolution of the US Congress.

3. The National Academy of Sciences has served as the principal advisory body to Congress and the Government. The National Research Council (NRC), established on the Academy's foundation, has been and remains the main advisor to both the government and Congress on issues related to scientific and technological progress. A similar advisory role is also performed by the "think tanks" established in US.

4. A decisive role in the development of science in US was played by thousands of immigrant scientists during the Second World War, as well as by later waves of immigration resulting from political transformations in Eastern Europe and the collapse of the Soviet Union.

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[22] In Georgia, the traditional two-tier system of academic degrees was abolished and, following the U.S. model, replaced by a single-tier Anglo-Saxon system. Former Candidates of Sciences and Doctors of Sciences were equated and collectively awarded the title of "Doctor." At the same time, the Higher Attestation Commission was abolished, and the authority to confer doctoral degrees was delegated to higher education institutions. However, this new system of awarding academic degrees was rapidly and entirely discredited.

5. In Germany, following the Second World War, science and innovation experienced a significant upturn alongside rapid economic growth, driven by the Marshall Plan and effective economic governance, particularly the reforms associated with Ludwig Erhard.

6. To prevent "brain drain," scientists' salaries were substantially increased, based on performance-related remuneration principles.

7. At present, Germany has a wide network of publicly funded scientific research organizations, associations, and clusters, as well as research and development centers financed by industrial enterprises.

Based on the above conclusions and taking into account the security challenges facing Armenia, the following measures are proposed:

1. Given the need to address socio-economic development challenges and ensure state security and sustainability, the development of science should be a top priority for all successive governments, enshrined as a constitutional norm. First and foremost, this requires a national overarching development goal, which should underpin all programs and strategies: socio-economic, scientific, security-related, and others. All other policy objectives should derive from this overarching national goal.

2. Within the system of the National Academy of Sciences of RA, as well as in the private sector with state support, it is proposed to establish a "National Research Council" and "think tanks" in selected priority fields (including mathematics, physics, chemistry, physical chemistry, biophysics and biochemistry, information technologies, and others) to coordinate scientific activities.

3. By 2035, expenditures on research, innovation, and development should be increased to 5% of GDP, with 80% of these funds allocated to the priority fields identified above.

4. To prevent brain-drain, measures should be taken by 2035 to increase scientists' salaries by an average of up to 150%, in line with the requirements outlined in point 3 of these recommendations.

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ՀԱՅԱՍՏԱՆԻ ԳԻՏՈՒԹՅԱՆ ԶԱՐԳԱՑՄԱՆ ՈՐՈՇ ՄԱՐՏԱՀՐԱՎԵՐՆԵՐ (ՄԻՋԱԶԳԱՅԻՆ ՓՈՐՁԻ ԼՈՒՅՍԻ ՆԵՐՔՈ)

ՄԻՔԱՅԵԼ ՄԻՔԱՅԵԼՅԱՆ

Համառոտագիր

Քաղաքական անկախացում ունենալուց հետո Հայաստանի գիտությունը սկզբնական տարիներին օբյեկտիվ և սուբյեկտիվ պատճառներով բազմակի կորուստներ է ունեցել, իսկ հետագա տարիներին, լավագույն դեպքում գոյության խնդիր է լուծել: Գիտության զարգացման ԱՄՆ-ի և ԳՖՀ-ի փորձը ցույց է տալիս, որ այդ երկրների գիտության բնագավառների հաջողությունները պայմանավորված են իշխանությունների հիմնավոր ծրագրերի և հետևողական գործունեության շնորհիվ:

Հետազոտության **նպատակն** է՝ ուսումնասիրելով ԱՄՆ-ի և ԳՖՀ-ի գիտության զարգացման փորձը՝ առաջարկություններ կատարել Հայաստանի գիտության զարգացման վերաբերյալ:

Ելնելով սույն նպատակից՝ **խնդիր** է դրվել պարզել այն առաջնահերթ միջոցառումները, որոնց կիրառման շնորհիվ զարգացած երկրները մեծ հաջողություններ են արձանագրել: Դրա հետ միասին, կարևորվել է այդ երկրների առաջավոր փորձը Հայաստանում կիրառելու նպատակահարմարությունը:

Հետազոտությունը կատարելիս օգտագործվել են ուսումնասիրության գիտական վերացարկման, վերլուծության, համադրության, համանմանության, պատմական և տրամաբանական **մեթոդները**:

Ստացված հիմնական արդյունքները դրսևորվել են հետևյալում՝ պարզվել են այն գործոնները և գործիքակազմերը, որոնց շնորհիվ համաշխարհային դասակարգմամբ այդ երկրների գիտությունը առաջատար դիրքերում է:

Գիտական նորույթի տարրեր են պարունակում գիտության զարգացումը երկրի և ազգի զարգացման գերնպատակից բխեցումը (որպես սահմանադրական նորմ), Ազգային հետազոտական խորհուրդ և ուղեղային կենտրոններ ստեղծելու, գիտության զարգացման և գիտաշխատողների միջին աշխատավարձը բարձրացնելու նպատակային ցուցանիշներ սահմանելու առաջարկությունները:

Ստացված արդյունքները կարելի է կիրառել գիտահետազոտական ու գիտատեխնիկական աշխատանքների զարգացման հայեցակարգերի ու ռազմավարական ծրագրերի մշակման և այդ բնագավառները կարգավորող օրենսդրական բարեփոխումներ իրականացնելու ժամանակ:

Բանալի բառեր. գիտություն, միջազգային փորձ, «ուղեղների արտահոսք», «ուղեղային կենտրոն», զարգացման ռազմավարություն, գիտության ծախսեր, գերնպատակ, հիմնարար գիտություն, կիրառական գիտություն:

НЕКОТОРЫЕ ВЫЗОВЫ РАЗВИТИЯ НАУКИ В АРМЕНИИ (В СВЕТЕ МЕЖДУНАРОДНОГО ОПЫТА)

МИКАЕЛ МИКАЕЛЯН

Аннотация

После обретения политической независимости армянская наука в первые годы понесла многочисленные потери в силу объективных и субъективных причин, а в последующие годы, в лучшем случае, была вынуждена решать проблему существования. Опыт развития науки в США и Германии показывает, что успехи научной сферы этих стран обусловлены продуманными программами и последовательной деятельностью властей.

Целью исследования является разработка рекомендаций по развитию науки в Армении на основе изучения опыта развития науки в США и Германии.
Исходя из этой цели, была поставлена задача выявить приоритетные меры, благодаря применению которых развитые страны добились больших успехов. При этом была подчеркнута целесообразность применения передового опыта этих стран в Армении.

В исследовании использовались методы научного абстрагирования, анализа, сравнения, аналогии, исторического и логического изучения.

Полученные основные результаты заключаются в следующем: выявлены факторы и инструменты, обеспечивающие лидирующие позиции науки данных стран в мировом рейтинге.

К элементам научной новизны относятся: развития науки должно исходить из конечной цели из общего развития страны и нации (как конституционная норма), а также - предложения по созданию Национального исследовательского совета и мозговых центров, установлению целевых финансовых показателей (соотношение затраты на науку к ВВП) развития науки и повышению средней заработной платы учёных.

Полученные результаты могут быть использованы при разработке концепций и стратегических программ развития научных исследований и научно-технической деятельности, а также при проведении законодательных реформ, регулирующих эти сферы.

Ключевые слова: наука, международный опыт, «утечка мозгов», «мозговой центр», стратегия развития, расходы на науку, сверхцель, фундаментальная наука, прикладная наука.

SOME CHALLENGES OF SCIENTIFIC DEVELOPMENT IN ARMENIA: INTERNATIONAL PERSPECTIVES

MIKAYEL MIKAYELYAN

Abstract

Following the attainment of political independence, Armenian science suffered substantial losses during the initial years as a result of both objective and subjective factors. In the subsequent period, the scientific sector was largely compelled to focus on survival rather than development. In contrast, the experience of scientific development in the United States (US) and Germany demonstrates that the achievements of these countries are primarily attributable to well-designed long-term programs and consistent, systematic government policies.

The aim of this study is to formulate recommendations for the development of science in Armenia based on an analysis of the scientific development models of the US and Germany. To achieve this aim, the study identifies key priority measures that have enabled developed countries to attain significant progress in science and innovation, while also assessing the feasibility of adapting these best practices to the Armenian context.

The research employs methods of scientific abstraction, analysis, comparison, analogy, as well as historical and logical analysis.

The main findings of the study include the identification of key factors and policy instruments that ensure the leading positions of science in global rankings.

Particular emphasis is placed on elements of scientific innovation policy, including the need to align scientific development with the overarching national development goal (enshrined as a constitutional norm), the establishment of a National Research Council and specialized think tanks, the definition of target financial benchmarks for scientific development (notably the ratio of science expenditures to GDP), and a substantial increase in the average salaries of scientists.

The results of the study may be used in the formulation of strategic concepts and long-term programs for the development of scientific research and scientific-technical activities, as well as in the implementation of legislative reforms regulating these fields.

Keywords: science, international experience, brain drain, think tank, development strategy, science expenditures, supreme goal, fundamental science, applied science.