10.22633/rpge.v29iesp2.20659

Revista on line de Política e Gestão Educacional
Online Journal of Policy and Educational Management

[1] Department of Management in Construction, Kyiv National University of Construction and Architecture, Kyiv, Ukraine.

[2] SESE "The Academy of Financial Management", Kyiv, Ukraine.

[3] Kyiv National Economic University named after Vadym Hetman, Kyiv, Ukraine.

EDITORA IBERO-AMERICANA

INSTITUTIONAL AND NATIONAL DIMENSIONS OF GRANT FUNDING FOR THE EDUCATIONAL AND SCIENTIFIC SECTOR IN TIMES OF WAR

DIMENSÕES INSTITUCIONAIS E NACIONAIS DO FINANCIAMENTO DE SUBVENÇÕES PARA O SETOR EDUCACIONAL E CIENTÍFICO EM TEMPOS DE GUERRA

DIMENSIONES INSTITUCIONALES Y NACIONALES DE LA FINANCIACIÓN MEDIANTE SUBVENCIONES PARA EL SECTOR EDUCATIVO Y CIENTÍFICO EN TIEMPOS DE GUERRA

Serhii PETRUKHA[1]
psv03051984@gmail.com
Nina PETRUKHA[1]
nninna1983@gmail.com
Sergii GASANOV[2]
gasanov@afu.kiev.ua
Volodymyr SHUMAN[2]
madidol04@gmail.com
Viacheslav KARASHCHENKO[3]
karashchenko27@gmail.com

How to reference this paper:

Petrukha, S., Petrukha, N., Gasanov, S., Shuman, V., & Karashchenko, V. (2025). Institutional and national dimensions of grant funding for the educational and scientific sector in times of war. *Revista on line de Política e Gestão Educacional, 29*(esp2), e025055. https:doi.org/10.22633/rpge.v29iesp2.20659

Submitted: 13/08/2025
Revisions required: 05/09/2025
Approved: 17/11/2025
Published: 25/11/2025

ABSTRACT: The study analyses the transformation of education and science funding in Ukraine, which shifted from a Soviet maintenance model to a competitive subsidy system, addressing the challenges of war. The aim is to examine the formation and development of these mechanisms during conflict and propose directions for their adaptation to the post-war economy. Methodologically, it is based on a systematic and comparative analysis of official reports, international documents, and statistical data, complemented by economic calculations and institutional analysis. The results indicate that the creation of the National Research Foundation of Ukraine marked a decisive transition to the competitive model. Even during the war, programs such as Science for the Reconstruction of Ukraine and Science for Security and Sustainable Development maintained scientific support. International initiatives offset financial losses and strengthen global integration, making subsidies a strategic instrument of modernization and reconstruction.

KEYWORDS: Grants. Financial mechanisms. Grant financing. Educational and scientific sphere. Budget expenditures.

RESUMO: *O estudo analisa a transformação do financiamento da educação e da ciência na Ucrânia, que passou de um modelo soviético de manutenção para um sistema competitivo de subsídios, enfrentando os desafios da guerra. O objetivo é examinar a formação e o desenvolvimento desses mecanismos em tempos de conflito e propor direções para sua adaptação à economia pós-guerra. Metodologicamente, baseia-se em análise sistemática e comparativa de relatórios oficiais, documentos internacionais e dados estatísticos, complementada por cálculos econômicos e análise institucional. Os resultados indicam que a criação da Fundação Nacional de Pesquisa da Ucrânia marcou uma transição decisiva para o modelo competitivo. Mesmo durante a guerra, programas como Ciência para a Reconstrução da Ucrânia e Ciência para a Segurança e o Desenvolvimento Sustentável mantêm o apoio científico. Iniciativas internacionais compensam perdas financeiras e fortalecem a integração global, tornando os subsídios instrumento estratégico de modernização e reconstrução.*

PALAVRAS-CHAVE: *Subsídios. Mecanismos financeiros. Financiamento por subsídios. Esfera educacional e científica. Despesas orçamentárias.*

RESUMEN: *El estudio analiza la transformación de la financiación de la educación y la ciencia en Ucrania, que pasó de un modelo de mantenimiento soviético a un sistema de subvenciones competitivo, abordando los desafíos de la guerra. El objetivo es examinar la formación y el desarrollo de estos mecanismos durante el conflicto y proponer directrices para su adaptación a la economía de posguerra. Metodológicamente, se basa en un análisis sistemático y comparativo de informes oficiales, documentos internacionales y datos estadísticos, complementado con cálculos económicos y análisis institucional. Los resultados indican que la creación de la Fundación Nacional de Investigación de Ucrania marcó una transición decisiva hacia el modelo competitivo. Incluso durante la guerra, programas como Ciencia para la Reconstrucción de Ucrania y Ciencia para la Seguridad y el Desarrollo Sostenible mantuvieron el apoyo científico. Las iniciativas internacionales compensaron las pérdidas financieras y fortalecieron la integración global, convirtiendo las subvenciones en un instrumento estratégico de modernización y reconstrucción.*

PALABRAS CLAVE: *Subvenciones. Mecanismos financieros. Financiación mediante Subvenciones. Esfera educativa y científica. Gastos presupuestarios.*

Article submitted to the similarity system

iThenticate

Editor: Prof. Dr. Sebastião de Souza Lemes
Deputy Executive Editor: Prof. Dr. José Anderson Santos Cruz

10.22633/rpge.v29iesp2.20659

INTRODUCTION

Ukraine's modern education and research sector is facing unprecedented challenges caused by both long-term institutional transformations and military turbulence. The departure from the Soviet funding model, which for decades was based on a retentionist logic and inertial distribution of budgetary resources, is accompanied by a gradual transition to grant mechanisms based on competition, performance, and international standards of transparency. At the same time, the full-scale war has revealed the critical vulnerability of the educational and research infrastructure, while confirming the viability of the grant model, which has helped to ensure the sector's adaptation in the crisis. In international practice, the role of grants as a basis for the development of science and education is obvious, as they are a tool for improving the quality of research, mobility of scientists, and integration into global networks (National Academies of Sciences, Engineering, and Medicine [NASEM], 2022; Science Europe, 2023).

For Ukraine, the issue of grant funding is of double relevance: first, as a means of overcoming the consequences of the war and supporting scientific schools, and second, as a mechanism for modernizing management and financial processes in the field of education and science. Research by leading Ukrainian and foreign authors confirms that the grant approach allows not only to expand access to funding, but also to form new standards of academic integrity, accountability, and performance (Mishchuk & Ovcharova, 2024; Piven et al., 2024).

At the same time, there are still so-called "white spots" in the scientific discourse. In particular, there is a lack of comprehensive studies that would combine the analysis of institutional changes in funding with the evaluation of the effectiveness of grant programs in crisis conditions. The impact of the grant model on the long-term sustainability of the education and research sector, the integration of human capital into recovery processes, and the balance between internal and external sources of funding remain insufficiently studied. The problem of building a professional infrastructure for grant management and creating common evaluation standards also remains relevant.

In view of the above, the purpose of this study is to identify the peculiarities of the formation and development of grant mechanisms for financing the educational and scientific sphere of Ukraine in the context of military challenges, to characterize their institutional transformations and to identify key areas for adapting this model to the post-war development needs of the state.

LITERATURE REVIEW

Studies of grant mechanisms for financing the educational and scientific sphere of Ukraine cover a wide range of topics, from the institutional breakdown of the Soviet model

to the practical testing of new instruments in the wartime period. Scholars emphasize that the creation of the National Research Foundation of Ukraine (NRFU) was a key step in the transition to a competitive model of resource allocation based on transparency, peer review, and result orientation (NASEM, 2022; Yermolychev, 2022; Science Europe, 2023; Mishchuk & Ovcharova, 2024). A number of works focus on the transformation of budget policy, which shifts the emphasis from maintenance expenditures to investments in the development of science and education (Petrukha et al., 2024; Petrukha et al., 2025; Petrukha et al., 2024; Petrukha et al., 2023).

The war conditions have radically affected the research sector, causing the loss of infrastructure, relocation of scientists, and a drop in funding, but at the same time have strengthened international cooperation and mobilization of donor programs (de Rassenfosse et al., 2023; Mierau et al., 2024; Hladchenko, 2025; Obrizan, 2022). In these circumstances, the resilience of academic communities is evident, particularly in the fields of biomedicine and engineering, where grant mechanisms have been most effective (Hondermarck et al., 2024; Piven et al., 2024; Tsybuliak et al., 2024; Babich, 2024).

Particular attention is paid to the problems of education during the war: ensuring the safety of students and teachers, maintaining the quality and flexibility of curricula, and developing an ethic of care in interaction (Ivanenko, 2024; Zayachuk, 2024; Kenworthy & U'Ren, 2025; Lukianova, 2023). Researchers emphasize that local support systems and managerial innovations allow universities to maintain the quality of education even in crisis conditions (Gurevych et al., 2025; Błaszczyk et al., 2025; Marchenko, 2023; Walters, 2025).

The financial architecture of modern science in Ukraine demonstrates a diversification of sources – domestic and international grants, humanitarian funds, and open science instruments. In this context, works on the design of grant competitions, the policy of APC exemptions, and comparisons with international practices are becoming relevant (Carnehl et al., 2024; Nazarovets, 2017; Nazarovets, 2025; Walters, 2025). An important component is also official data from government agencies and international organizations that record the scale of grant funding, the role of the NGSS, and the effectiveness of tuition voucher instruments (Accounting Chamber of Ukraine, 2024; Ministry of Finance of Ukraine, 2023; Cabinet of Ministers of Ukraine, 2024; Ministry of Economy of Ukraine, 2025a).

Finally, a significant number of studies emphasize human capital as the most vulnerable component of the education and research system. Issues of mental health, motivation, and career prospects of researchers are becoming crucial to productivity and sustainability, and grant programs play a role in mitigating the negative effects of war (Gurevych et al., 2025; Piven et al., 2024; Piven et al., 2024; Tsybuliak et al., 2025). It is also confirmed that integration into international programs such as Erasmus+ and MSCA4Ukraine is an important channel of support for Ukrainian scientists and students (European Commission,

2025a; European Commission, 2025b; National Erasmus+ Office in Ukraine, 2025; European Commission, 2025c).

A separate body of research addresses the broader social and educational context. In particular, Hladchenko (2025) analyzes the international cooperation of Ukrainian scientists during the period of full-scale war, emphasizing both new opportunities for integration into global networks and the risks of losing national human resources. Lukianova (2023) examines the functioning of Ukrainian higher education institutions under martial law, focusing on the challenges of governance, quality assurance, and the role of universities in maintaining public hope. At the same time, Obrizan (2022) examines the socio-economic dimension of the war—the growth of poverty, unemployment and the scale of internal displacement, which directly affect the stability of the educational and scientific sphere and the ability to attract human capital.

An important area of research has been the assessment of financial indicators of support for science and education through the analysis of budget reports, statistics, and international audits, which confirm the gradual increase in the role of the grant component in government spending (Ministry of Finance of Ukraine, 2024a; Ministry of Finance of Ukraine, 2024b; Ministry of Finance of Ukraine, 2024c; National Institute for Strategic Studies, 2025). The works of emphasize the importance of international initiatives such as Horizon Europe, MSCA4Ukraine and other EU programs that create institutional “bridges” for Ukraine’s integration into the global research space (European Commission, 2025a; European Commission, 2025b; European Commission, 2025c; National Research Foundation of Ukraine, 2025).

Government data confirms the systematic use of education vouchers as a tool for targeted support of the population in times of war (Cabinet of Ministers of Ukraine, 2025; Ministry of Economy of Ukraine, 2025b; Ministry of Economy of Ukraine, 2024; Cabinet of Ministers of Ukraine, 2024). Studies also show that national and international support creates conditions for a gradual increase in investment in science even in wartime (National Research Foundation of Ukraine, 2022; Ministry of Education and Science of Ukraine, 2024; Babich, 2024; Accounting Chamber of Ukraine, 2024).

Thus, the generalized review confirms that Ukraine’s scientific community is adapting to the challenges of war through diversified grant mechanisms and international cooperation. However, the problems of institutional maturity of grant management and full integration of human capital support measures into the financial policy of science and education remain unresolved.

METHODS

The study was conducted by the author’s team on the basis of the analysis of legal acts, official reports of government institutions (Ministry of Finance of Ukraine, Ministry

of Education and Science of Ukraine, Cabinet of Ministers of Ukraine, National Research Foundation of Ukraine), as well as materials of international organizations, including the European Commission, Science Europe, and NASEM. To achieve the results, the authors used methods of comparative analysis of financial indicators in different periods (pre-war, war and projected post-war), economic and statistical methods to assess the dynamics of grant funding, as well as institutional and structural-functional analysis to interpret changes in the financial architecture of the educational and scientific sphere of Ukraine.

RESULTS AND DISCUSSION

The current state of Ukraine's education and research sector is determined by the overlap of two large-scale processes: military turbulence and institutional restructuring of public finances. In recent years, there has been a shift from a maintenance logic of financing (consumption expenditures) to a project-competitive, grant-based logic (development expenditures), which brings the institutional and functional structure of expenditures closer to the models of developed economies. A turning point in this trajectory was the launch of the National Research Foundation of Ukraine, which institutionally broke the Soviet model of budgetary maintenance and reoriented the system to competition for quality and results (NASEM, 2022; Petrukha et al., 2025; Petrukha et al., 2023; Petrukha et al., 2024).

The war has radically changed the initial conditions for the sector's functioning: interrupted research chains, relocation of institutions and research groups, loss of infrastructure, uneven access to equipment, and long-term strain on human capital. At the same time, the academic community has shown high adaptability: active international cooperation, mobilization of donor programs, and reformatting research topics to meet the needs of security, recovery, and resilience. At the level of empirical evidence, both significant losses and unexpectedly high performance in "bottlenecks"—from biomedicine to engineering—are recorded, precisely where grant tracks and partnerships were organized most rationally (Hondermarck et al., 2024; de Rassenfosse et al., 2023; Mierau et al., 2024; Piven et al, 2024).

At the level of education and learning quality management, the sector simultaneously addresses the challenges of student safety, teacher support, and maintaining academic standards. Teaching formats are being rethought, curriculum flexibility is being enhanced, an ethic of care is being introduced in interaction with students, and offline/online components are being combined, taking into account risks and unequal access to resources. It is these managerial innovations that fuel sustainability and explain why, even under constraints, universities demonstrate growth in niche areas and maintain quality where local support and safety nets are built (Ivanenko, 2024; Zayachuk, 2024; Kenworthy & U'Ren, 2025; Gurevych et al., 2025).

The financial architecture of the sector is now based on diversification of sources: domestic grants (NRFU, budget programs of the Ministry of Education and Science with a competitive component), international grant tracks, humanitarian and institutional funds, as well as open science tools (in particular, APC exemption policies) that reduce barriers to publication and accelerate knowledge circulation. The focus is on the design of competitions and evaluation mechanisms that should minimize transaction costs for teams and shift the priority towards scientific novelty, applied value, and multidisciplinarity; this brings the Ukrainian grant field closer to international best practices without neglecting national peculiarities and post-war recovery needs (Błaszczyk et al., 2025; Carnehl et al., 2024; Marchenko, 2023; Nazarovets, 2025; Walters, 2025).

The most vulnerable variable remains human capital—mental health, motivation, workload, and academic trajectories of researchers and students. Supporting the sustainability of university communities, institutional umbrellas of care and career bridges for young scientists, as well as targeted grant funding for integration into international networks are measures that directly affect the productivity and sustainability of scientific schools. Evidence from Ukrainian and international studies consistently shows that without systematic interventions in researcher and student well-being, the effects of war fatigue accumulate and undermine results, while thoughtful grant instruments and institutional practices dramatically increase resilience (Tsybuliak et al., 2025; Piven et al., 2024; de Rassenfosse et al., 2023).

As a result, Ukraine's education and research sector is entering a phase of managed institutional transformation, where grant funding is becoming not only a way to attract resources, but also a mechanism for modernizing management, quality assurance, and integration into global research ecosystems. The success of this transformation depends on aligning budgetary policy with recovery priorities, strengthening the transparency of competitive procedures, supporting human capital, and maintaining the openness of science with an emphasis on safety, results, and international cooperation.

Institutional shifts in the financing of higher education and science in Ukraine are taking place in two interrelated areas: changing the organizational and legal status of educational and research service providers (transition from budgetary institutions to state non-profit enterprises) and reorienting budget policy from maintenance funding (consumption expenditures) to project-based competitive grant funding (development expenditures). Such a transformation minimizes «inertial» costs, enhances efficiency through competition for quality, and allows for integration into international practices of transparent project selection and evaluation, including through the National Research Foundation of Ukraine and other competitive instruments. In wartime and post-war conditions, it also serves as a mechanism for rapid reorientation of resources to the priorities of reconstruction, security, and innovation, which is consistent with the recommendations of international expert institutions and updated approaches to

10.22633/rpge.v29iesp2.20659

public finance in Ukrainian research (NASEM, 2022; Petrukha et al., 2025; Petrukha et al., 2024; Petrukha et al., 2023; Petrukha et al., 2024).

The key differences, management implications, and expected effects of the two funding models are summarized below (see Table 1)

Table 1

Institutional shifts in the financing of higher education and science: from budgetary institutions to state non-profit enterprises and from consumption expenditures to development grants

Dimension/ parameter	**Old model: budgetary institution + consumption expenditures**	**New model: state non-profit enterprise + development grants**
Legal status and economic competence	*Limited economic autonomy; budget financing; emphasis on compliance*	*Expanded operational autonomy within a public mission; contractual relations; emphasis on results*
Sources of funding	Mainly general budget fund (staff, utilities, current expenses)	Combination of targeted grants (NRFU, international donors), special fund, co-financing, partner contributions
Mechanism of funds allocation	Incremental planning based on historical principle; low competition	Competitive selection, peer review, policy priorities; competition and results-based
Budget classification/ logic	Consumption expenditures (maintenance)	Development expenditures (investments in research, infrastructure, innovation)
Tools.	Estimates, staffing, limits	Grant programs, project roadmaps, grant agreements, KPIs
Assessment and audit	Formal compliance with norms and procedures	Peer review, interim/final reports, external audits, performance metrics (publications, patents, implementations)
Risk management	Focus on process risks; little flexibility	Project risks and their management; ability to quickly reallocate within the agreement
Motivation and HR	Stable rates, weak incentives for productivity	Grant allowances, competition for talent, individual and team incentives
Infrastructure	Maintaining existing facilities	Investment in modernization/sharing of research infrastructure
International integration	Occasional participation in programs	Systematic participation in international consortia, open science, open access policies
Publicity and openness	Document flow aimed at internal control	Open competitions, publication of conditions/ results, open data on funding
Expected effects	Preservation of the status quo, low innovation	Accelerated innovation, higher quality of research and training, better relevance to the needs of reconstruction

Note. Created by the author on the basis of (Carnehl et al., 2024; Mierau et al., 2024; NASEM, 2022; de Rassenfosse et al., 2023; Petrukha et al., 2025; Petrukha et al., 2024; Petrukha et al., 2023; Petrukha et al., 2024).

10.22633/rpge.v29iesp2.20659

The transition to the model of state non-profit enterprises, combined with the expansion of the grant component, changes the very logic of public funding: from «maintenance» to «investing in results» Through competition, open procedures, and a clear system of metrics, this model accelerates infrastructure renewal, strengthens human resources incentives, and increases the international integration of Ukrainian science and higher education. It better meets the challenges of wartime and post-war reconstruction, as it allows for the allocation of resources to priority areas and the rapid scaling of effective practices; However, it also requires a mature system of peer review, professional grant management, and fine-tuned safeguards against formalism to maintain a balance between flexibility and accountability (Carnehl et al., 2024; Mierau et al., 2024; de Rassenfosse et al., 2023).

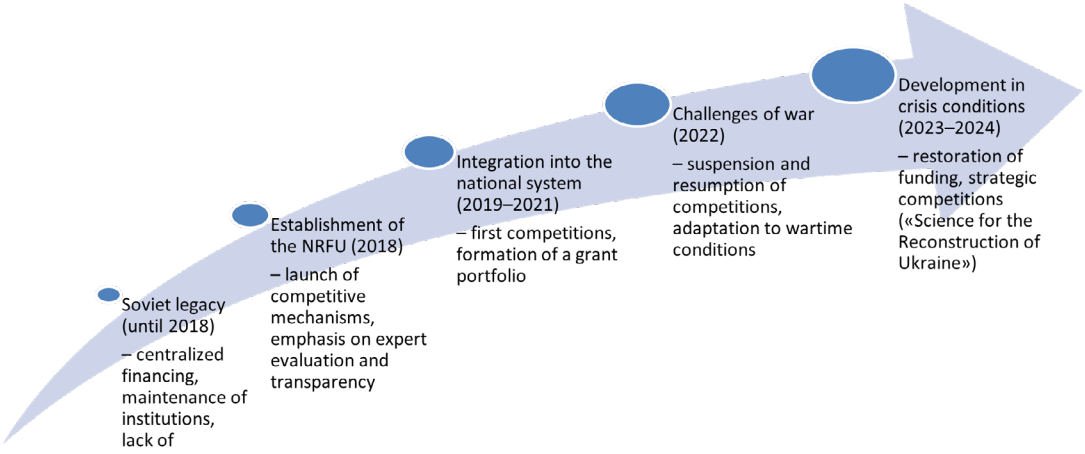
One of the key institutional factors in breaking the Soviet model of funding education and research was the creation of the National Research Foundation of Ukraine (further – NRFU) in 2018. This step initiated the transition from an administrative and budgetary system of maintenance to a competitive system of grant funding based on the principles of transparency, peer review, and result orientation. According to the data, in 2022 the government explicitly emphasized that the main mission of the NRFU was to form a qualitatively new model of research funding through independent competitive project support (Yermolychev, 2022).

The grant approach allowed to shift the emphasis from financing consumption expenditures to development expenditures aimed at research, infrastructure, and innovative solutions. Already in the first quarter of 2024, the NRFU financed research worth UAH 148 million, which was 26% of the UAH 567 million planned for this year (Ministry of Finance of Ukraine, 2024c). This demonstrates the systematic nature of the mechanism, which, even in wartime, has not only not stopped but is actively implementing priority areas, including the competitions “Science for the Reconstruction of Ukraine” and “Science for Security and Sustainable Development of Ukraine” It is noteworthy that during the full-scale war, the NRFU quickly adapted, resuming its competition activities after a forced pause in 2022. As noted by the international organization Science Europe, the foundation has proven its ability to maintain the stability of procedures and continue to support researchers in extraordinary circumstances, which has signalled the maturity of the institution (Science Europe, 2023). The changes are also confirmed in the statistics of funding of the National Academy of Sciences of Ukraine. The share of expenditures from the general fund for research decreased from 85.4% in 2022 to 76% in 2023, while competitive allocation and grants already covered 20.3% of all topics (Mishchuk & Ovcharova, 2024). This demonstrates the actual transition to a new logic of resource allocation—from inertial budgetary maintenance to a result-oriented funding model.

Let us visualize the main stages of the institutional breakdown in the financing of the education and research sector to show how the formation of the National Research Foundation

of Ukraine consolidated the shift from the Soviet model to the modern grant system. The logic of changes is shown in Figure 1.

Figure 1
Stages of institutional breakdown of the system of financing the educational and scientific sphere of Ukraine



Note. Created by the author based on (Ministry of Finance of Ukraine, 2024; Mishchuk & Ovcharova, 2024; Science Europe, 2023; Yermolychev, 2022).

The visualization demonstrates that the creation of the NRFU was a «turning point»: from funding by inertia to a competitive model with flexible grant instruments. This institutional breakthrough laid the foundation for the restoration and further integration of Ukrainian science into the European and global scientific space.

Below is a structured assessment of the dynamics and share of grant funding of scientific and scientific and technical activities (S&T) in Ukraine in three sections: before the full-scale invasion,«in wartime, and in the conditions of future post-war recovery. For the sake of correctness, I separate the “narrow” understanding of grant funding—competitive funds from the National Research Foundation of Ukraine (NRFU) from the state budget—from the broader context of international grants (Horizon Europe, MSCA4Ukraine, EIC, etc.), which are not always fully reflected in the internal statistics of GERD implementation. It is the share of the NRFU in public R&D expenditures and the (minimal) share of the NRFU in total R&D expenditures that I use as a measurable indicator of the “share of grant funding”. In addition, I present related wartime and postwar factors that shape the trajectory of this share.

1) Before the full-scale invasion (base year: 2021). In 2021, the program of the State Program of the State Budget of Ukraine 2201300 “Support of the NRFU, grant support...” provided UAH 666.78 million for the general fund (the third largest program in the field of science), and the share of grant funding for the NRFU in the general fund expenditures for R&D was 8.04%. This means that almost every twelfth hryvnia of public funds for R&D in 2021

was distributed on a competitive basis through the NRFU—a qualitative gap with the pre--competitive model (data from the official budget review of the MES-NRFU). According to the total expenditures on R&D (all sources), which in 2021 amounted to UAH 20,973.8 million, the "minimum" grant share of the NRFU was about 3.10% (≈ UAH 649.7 million in grants funded by the NRFU according to the Fund's report; author's calculation). For comparison, the Ministry of Finance separately reported that in total, "almost UAH 733 million" was allocated to the NRFU in 2021 (including all items, which is consistent with the amounts of the general and special funds). The cumulative context—GDP research intensity of 0.29-0.33% in 2021-2023—emphasizes that even at the pre-war peak, the grant component has only begun to «overload» institutional maintenance, but has not yet reached the levels of developed systems (Ministry of Education and Science of Ukraine, 2024, National Research Foundation of Ukraine, 2022, (Ministry of Finance of Ukraine, 2023).

2) Wartime (2022-2024). In 2022, there was a "collapse" in the dynamics: 100% of the grant budget allocated for the NRFU was reallocated to defense needs; no competitive projects were funded. Under these conditions, total R&D expenditures fell to UAH 17,117.8 million (-18.4% by 2021). That is, the share of grant funding from the NRFU in 2022 was, by definition, 0% (domestic segment), although international support instruments (MSCA4Ukraine—€35 million; EIC4Ukraine—€20 million) were partially "picked up" by scientists—mostly outside the country, so they are not fully reflected in domestic R&D expenditures. Already in 2023, the system demonstrates recovery: total R&D expenditures increased to UAH 21,348.1 million (≈ +1.8% by 2021), and the state budget provided UAH 505 million for the NRFU. This yields two useful proportions: (i) ≈ 6.16%—the share of the NRFU in the general fund expenditures on science (UAH 8.2 billion of the general fund; author's calculation), and (ii) ≈ 2.37%—the minimum share of the NRFU in total R&D expenditures (GERD). In 2024, the recovery continued: in the first quarter of 2024, the NRFU has already funded UAH 148 million, which is 26% of the annual plan of UAH 567 million (a pace compatible with a return to the pre-war trajectory of competitive funding) (Accounting Chamber of Ukraine, 2024; National Research Foundation of Ukraine, 2025; Ministry of Finance of Ukraine, 2024a; European Commission, 2025c).

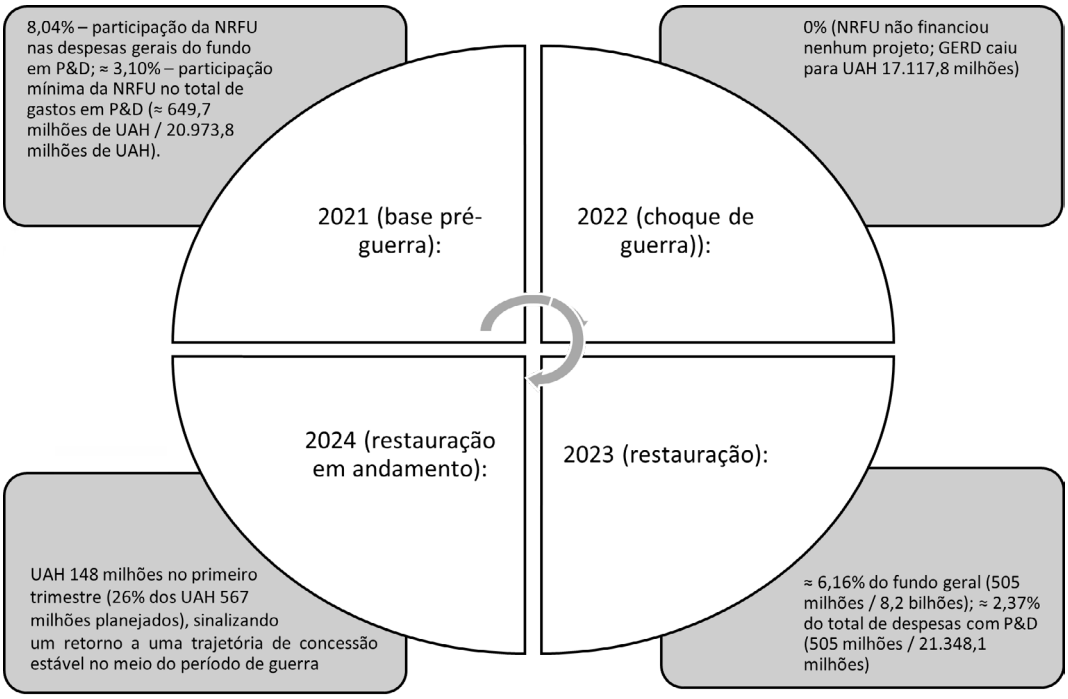
3) Future post-war recovery (framework and reference points). An institutional «window of opportunity» is being formed, potentially increasing the share of the grant component in STI funding. First, Ukraine is fully associated with Horizon Europe (from January 1, 2021), and in 2025 the European Commission launched the International Coalition for Science, Research and Innovation in Ukraine; the 2025 work programs include mandatory participation of Ukrainian organizations in a number of topics, including security, autonomous systems and humanitarian demining. These instruments—along with Horizon Europe's office in Kyiv—directly strengthen the grant channel in post-war reconstruction (including in the "hard" clusters, where grants are objectively large). Secondly, the internal budgeting policy already reflects

a return to the capital component (the share of capital expenditures increased in 2024), and the review of the Ministry of Finance shows a significant role of grants in the overall macro-financing of the budget—this creates fiscal space for the NRFU to restore its role as a systemic distributor of competitive research funds. Taking into account the pre-war proportions (8.04% of the general fund in 2021) and the restored volumes of 2023-2024, in the «baseline» scenario of post-war recovery, it is realistic to expect the return and gradual exceeding of this share in the medium term through a combination of internal and external (Horizon Europe, MSCA, EIC) grant flows—with the correction that international grants are partially implemented outside Ukraine and are not always fully included in the internal GERD statistics (National Institute for Strategic Studies, 2025; Ministry of Finance of Ukraine, 2024b).

To evaluate the effectiveness of the testing of grant-based training mechanisms during the war, it is advisable to show the "hard" volumes (how many people were actually covered and for how much) and unit costs (average check). According to official statistics, the scale of educational vouchers in 2023-2024 shows positive dynamics both in terms of the number of certificates issued and their financial parameters.

Let's present the key findings in Figure 2.

Figure 2
Key findings in figures (generalization)



Note. Created by the author.

In 2024, the number of vouchers issued increased by almost 4.9 thousand compared to 2023, an increase of 27.6%. The total amount of financing increased from UAH 252 million to

UAH 327 million, i.e. by 29.8%. At the same time, the average check remained relatively stable, rising only by UAH 237 (1.7%), which indicates that the costs per applicant are controlled and the program is scaled up in a balanced way.

In 2023, vouchers became a mass tool, and in 2024 they scaled in number and funding, while maintaining a manageable cost per case; in 2025, the dynamics continue (operational data are outside the main table). For the purpose of graphing, the authors summarize the indicators in Table 2. The authors have collected official administrative data from government releases (number of vouchers issued; amount of financed training) and calculated: (1) the average voucher check as "funding/number," (2) the year-on-year growth of indicators (2024 vs. 2023). All fractional values are presented with a decimal point; amounts are rounded to the hundredth of a hryvnia, percentages—to the hundredth of a point. The year of comparison is 2023.

Table 2
Vouchers for education during the war: scale, average check and growth

Period	Number of vouchers issued, units	Funding, UAH million	Average voucher check, UAH	Increase in vouchers by 2023, %	Increase in financing by 2023, %.	Increase in the average check by 2023, %
2023	18 025	252,00	13 980,58	0,00	0,00	0,00
2024	23 000	327,00	14 217,39	27,60	29,76	1,69

Note. Created by the author on the basis of (Cabinet of Ministers of Ukraine, 2024; Ministry of Economy of Ukraine, 2024; Ministry of Economy of Ukraine, 2025a).

In 2023-2024, the voucher mechanism demonstrated scalability (number +27.60%) and growth in financed volumes (+29.76%) while maintaining a stable unit cost (+1.69% to the average check). This means that the tool expands coverage without "overheating" the cost per participant, an important sign of operational efficiency in a military economy. Additionally, as of August 2025, the government reports 10,000 vouchers issued since the beginning of the year (YTD), which confirms the continuation of a positive trajectory in the current period (Ministry of Economy of Ukraine, 2025a, 2025b).

Let us consider the implementation of support for science and researchers through Erasmus+ and MSCA4Ukraine.

1. Erasmus+ is an education and mobility program as a "pillar of European solidarity". Erasmus+ continues to play a key role in supporting Ukraine: the program covers not only scholarships, but also textbook exchanges, virtual exchanges and partnership strategies, allowing learning to continue even in times of crisis (European Commission, 2025a). In addition, Capacity Building in Higher Education (CBHE) in 2025 supported 22 new projects involving 107 Ukrainian organizations, which means systematic capacity building of Ukrainian universities (National Erasmus+ Office in Ukraine, 2025).

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2. MSCA4Ukraine - scholarships for researchers in exile. The MSCA4Ukraine scheme under the Marie Skłodowska-Curie Actions program has already supported 174 researchers: 125 initially, plus an additional 49 in March 2025 (European Commission, 2025b). The recipients are doctoral students and postdocs conducting research in 15 EU countries or associated with Horizon Europe, while maintaining links with the research communities in Ukraine (European Commission, 2025b). The program is coordinated by Scholars at Risk Europe, the Alexander von Humboldt Foundation, and the European University Association, and has budgets of up to €35 million.

For a correct benchmarking of the national peculiarities of grant support in Ukraine, explicit benchmarks are needed for the groups "EU/EEA," "Anglo-Saxon systems," and "Asian innovative economies." The following table uses specific countries and their specialized foundations/agencies representing established practices of competition, peer-review, open science, and human capital support (see Table 3).

Table 3
Ukrainian peculiarities of grant support and comparison with the practices of specific developed countries

Dimension/ parameter	Ukraine (2022-2025): peculiarities	Example countries and institutions (typical practices)	Conclusion for adaptation
Architecture of granting institutions	Internal NRFU competitions + external EU tracks; fast special competitions for security/ reconstruction	Germany – DFG; France – ANR; Netherlands – NWO; Sweden – VR; Finland – A KA; Norway – RCN; United Kingdom – UKRI; United States – N SF/NIH; Canada – NSERC/SSHRC; Japan – JSPS/ JST; South Korea – NRF; Israel – I SF	Enshrine the peer-review standard and the program cycle (call → evaluation → grant agreement) at the level of top foundations.
Funding priorities	«Safety-Recovery-Resilience», shorter time to decision	EU/Horizon Europe (EU + associated countries), Germany, France, Poland, Sweden, Finland - long program cycles; USA - stable three-year/five-year grants	Combine the emergency track with long basic programs.
Staff mobility and retention	Large-scale external programs, risk of «leakage»	EU (Erasmus+, MSCA), UK (UKRI), Canada (Banting/Vanier), Japan (JSPS), Korea (NRF) - mobility with «bridges» of return	Build in mechanisms for dual affiliation/ reintegration.
Open science / APC waivers	Active use of APC waivers for authors from Ukraine	EU/UK/ND/Sweden – developed open access policies, agreements with publishers	Expand agreements and institutional funds for APCs/ repositories.
Evaluation of results and accountability	Shift to results; unify metrics in the process	USA (NSF/NIH), UK (REF/UKRI), Germany (DFG) – mature KPIs and audits	Unify KPIs and risk-framework (adjusting estimates in crises).

10.22633/rpge.v29iesp2.20659

Dimension/ parameter	Ukraine (2022-2025): peculiarities	Example countries and institutions (typical practices)	Conclusion for adaptation
Infrastructure / sharing	Fragmentation of access due to relocation/risks	Germany (national centers), UK (national research infrastructures), Sweden (shared facilities)	Prioritize «shared facilities» in development grants.
Support for well-being	High demand for mental support and campus safety	EU countries, the US, Canada – standard well-being services in project budgets	Include these costs as eligible in competitions.

Note. Created by the author on the basis of (NASEM, 2022; de Rassenfosse et al., 2023; Piven et al., 2024; Carnehl et al., 2024; Nazarovets, 2025; Gurevych et al., 2025).

In the table, the authors have explicitly indicated the reference countries and institutions so that «developed practices» do not remain an abstraction. The key idea is that the Ukrainian model is fast and crisis-oriented, while Germany/France/Netherlands/Sweden/Finland, the UK, the US, Canada, Japan, South Korea, and Israel have long program cycles and formalized standards for selection, accountability, and open science. Adaptation for Ukraine: institutionalize peer-review standards and KPIs, build “bridges” for the reintegration of mobile researchers, and scale up open access and infrastructure sharing policies.

The authors will suggest ways to adapt grant funding mechanisms to the needs of post-war recovery and long-term modernization of Ukraine’s economy.

1. Mission programs “from research to implementation.” Launch long-term (3-5 years) mission competitions with clear results for reconstruction: energy independence, renewable infrastructure, demining, digital services of the state. The conditions are co-financing with regions/businesses, intermediate milestones, payments for achieved KPIs (TRL, commissioned facilities, local procurement multiplier). A separate capital track for joint laboratories and shared use centres.

2. Human capital and “return bridges.” Introduce return fellowships and double affiliation for scientists from abroad, industrial PhDs and grants for retraining for scarce reconstruction professions (construction, energy, medical technology). Allow grants to cover mental health, care, and mobility costs as elements of talent retention. Create fast microgrants for young teams to launch prototypes and startup schools at universities.

3. Demand-driven instruments (SBIR/PCP/PPI). Introduce small innovation grants for SMEs with a government customer: research → prototype → first implementation phasing, preliminary commercial procurement (PCP) and public procurement of innovations (PPI). Simplified IP law (model licenses, “buy-dollar-like”), open data/code as a standard where it does not compromise security. Integrate such competitions into e-procurement to reduce the “time to market”.

4. Standards of governance and financing. Establish independent peer review, a single risk framework for projects during/after the war, and a digital grantee account (single register of agreements, reporting, anti-fraud). Switch to program-targeted budgeting for 3 years with guaranteed overheads and a co-financing corridor. Align national KPIs with European ones (science, implementation, exports, green and security indicators) and link payments to them.

The results obtained show that grant funding mechanisms in the educational and scientific sphere of Ukraine not only consolidated the institutional breakdown of the Soviet model, but also became one of the few tools capable of ensuring sustainability in wartime. On the one hand, a number of authors emphasize the stabilizing function of grants in the science system, especially through the activities of the National Research Foundation of Ukraine (Mishchuk & Ovcharova, 2024; Science Europe, 2023). On the other hand, there are positions that point to Ukraine's overdependence on external donor programs, which creates a risk of losing autonomy in science policy making (Nazarovets, 2017, 2025).

It is worth noting that international authors (de Rassenfosse et al., 2023; Mierau et al., 2024) focus on the negative effects of the war on human capital, while others (Piven et al., 2024; Tsybuliak et al., 2025) emphasize the high ability of Ukrainian scientists to mobilize and maintain professional activity even in crisis conditions. This contradiction can be explained by differences in time and thematic sections: some studies record overall losses, while others demonstrate niche performance in the areas that received targeted grant support.

Similarly, in the higher education sector, there is a divergence in the interpretation of the effectiveness of managerial innovations. Some researchers view military transformations as a critical challenge to quality preservation (Ivanenko, 2024; Lukianova, 2023), while others show that curriculum flexibility, development of an ethic of care, and introduction of local support systems have allowed to maintain academic standards even in crisis conditions (Gurevych et al., 2025; Błaszczyk et al., 2025; Zayachuk, 2024). Thus, our results are more in line with the second group of authors, as they confirm the importance of local institutional decisions in supporting education sustainability.

In interpreting the data on financial architecture, the authors agree with Carnehl et al. (2024) that the design of grant competitions is key to reducing transaction costs and increasing efficiency, but the authors also see a risk of excessive formalism, as pointed out by Walters (2025) and others. This indicates the need for a balance between transparency and flexibility, which has not yet been achieved in the Ukrainian context.

Thus, the results of our study are consistent with the main conclusions about the role of grant funding as a mechanism for modernizing science and education. At the same time, significant limitations remain, ranging from the institutional maturity of the peer review system to the weak integration of human capital support measures into financial policy. Most of the authors agree on the recognition of grants as a systemic factor, but their optimal use requires

further research, in particular in the area of building long-term programs adapted to the conditions of reconstruction and sustainable development.

CONCLUSION

This study suggests that grant funding mechanisms are becoming not only an alternative to traditional budgetary approaches, but also a key tool for institutional transformation of the educational and scientific sphere of Ukraine. The novelty of the paper lies in the identification of the combination of institutional reforms with the impact of wartime conditions, which creates a unique trajectory for Ukrainian science and education. On a practical level, the results show that grant programs are able to ensure sustainability even in times of crisis, but their effectiveness is limited by fragmented management, lack of professional staff in grant administration, and overdependence on external donors.

Compared to the expected results, which included confirmation of the role of grants as an additional source of funding, a much deeper effect was found — grants have become a systemic factor in the management of the educational and scientific space. This opens up prospects for integration into international research networks and the formation of national mission programs, but at the same time poses the challenge of building a mature institutional infrastructure.

Further research should focus on exploring mechanisms for combining short-term crisis instruments with long-term development programs, developing models for integrating grant funding with budget strategies, and finding the optimal balance between transparency, efficiency, and flexibility. In the end, grants should be viewed not as an auxiliary tool, but as a strategic resource for restoration and modernization, capable of determining the contours of the future of Ukrainian science and education.

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CRediT Author Statement

Acknowledgements: We thank the Yuri Kondratyuk National University, Poltava Polytechnic University (Ukraine).
Funding: None.
Conflicts of interest: None.
Ethical approval: No ethical approval required.
Availability of data and materials: The data and materials used in the work are available at corresponding author's request.
Authors' contributions: Serhii Petrukha: Conceptualization, Methodology, Supervision, Writing – Original Draft. Nina Petrukha: Data Curation, Investigation, Validation, Writing – Review and Editing. Sergii Gasanov: Software, Visualization, Formal Analysis, Resources. Volodymyr Shuman: Project Administration, Writing – Review and Editing. Viacheslav Karashchenko: Methodology, Data Curation, Writing – Review and Editing.

Processing and editing: Editora Ibero-Americana de Educação
Proofreading, formatting, standardization and translation