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Adaptive-Selective Type of Financing of Higher Education Institutions in Overcoming Sustainable Development Disparities

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ABSTRACT

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Modern socio-economic transformations in Ukraine have led to radical changes in higher education, serving as a basis for generating new knowledge and training highly qualified personnel. At the same time, market economic conditions significantly affect the processes of formation and use of financial resources of higher education institutions. The purpose of this study is to deepen the theoretical foundations and develop practical recommendations regarding the adaptive-selective type of financing of higher education institutions in overcoming sustainable development disparities. It is argued that financing is the process of providing the subjects of all institutional sectors of the economy, including types of economic activity (in particular education) and their institutions, with the necessary monetary resources. The work systematizes the sources of formation of financial resources of higher education institutions in overcoming sustainable development disparities, and also defines external (economic and political state of the country; scientific, technical and informational environment; external economic environment; natural and ecological environment) and internal influencing factors (material and the technical base of institutions of higher education; the volume of state orders for the training of specialists; fees for educational and other services) for the formation of financial resources in institutions of higher education. Conceptual approaches to improving the financing mechanism of higher education in Ukraine to overcome sustainable development disparities are justified, which will take into account the need to rethink the theoretical and methodological foundations of the influence of higher education on the development of the national economy. The implementation of the proposed recommendations will contribute to strengthening the influence of the adaptive-selective type of financing of higher education institutions in overcoming disparities in development on the activation of educational activities in Ukraine.

KEYWORDS

education, educational services, financing, higher education institutions, state budget, sources of financing, public-private partnership, sustainable development.



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Адаптивно-селективний тип фінансування вищих навчальних закладів у подоланні диспропорцій у сфері сталого розвитку

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СТАТТЯ

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Сучасні соціально-економічні перетворення в Україні спричинили радикальні зміни у сфері вищої освіти як основи для генерування нових знань та підготовки висококваліфікованих кадрів. Водночас ринкові економічні умови суттєво впливають на процеси формування та використання фінансових ресурсів вищих навчальних закладів. Метою даного дослідження є поглиблення теоретичних засад та розробка практичних рекомендацій щодо адаптивно-селективного типу фінансування вищих навчальних закладів у подоланні диспропорцій сталого розвитку. Стверджується, що фінансування являє собою процес забезпечення суб'єктів усіх інституційних секторів економіки, видів господарської діяльності, зокрема освіти та їхніх установ, необхідними грошовими ресурсами. У роботі систематизовано джерела формування фінансових ресурсів вищих навчальних закладів у подоланні диспропорцій сталого розвитку, а також визначено зовнішні (економічний і політичний стан країни; науково-технічне та інформаційне середовище; зовнішнє економічне середовище; природне та екологічне середовище) та внутрішні чинники впливу (матеріально-технічна база вищих навчальних закладів; обсяг державних замовлень на підготовку фахівців; плата за освітні та інші послуги) на формування фінансових ресурсів у вищих навчальних закладах. Обґрунтовано концептуальні підходи до вдосконалення механізму фінансування вищої освіти в Україні з метою подолання диспропорцій сталого розвитку, які враховуватимуть необхідність переосмислення теоретичних і методологічних засад впливу вищої освіти на розвиток національної економіки. Реалізація запропонованих рекомендацій сприятиме посиленню впливу адаптивно-селективного типу фінансування вищих навчальних закладів на подолання диспропорцій розвитку, активізацію освітньої діяльності в Україні.

КЛЮЧОВІ СЛОВА

освіта, освітні послуги, фінансування, вищі заклади освіти, державний бюджет, джерела фінансування, державно-приватне партнерство, сталий розвиток.

1. Introduction

Modern socio-economic transformations in Ukraine have caused radical changes in the field of higher education as a base for generating new knowledge and training highly qualified personnel. At the same time, market economic conditions significantly affect the processes of formation and use of financial resources of higher education institutions (hereinafter referred to as HEIs). There is disproportionality in the financing of various specialties and levels of education, the unreasonableness of the amounts of allocated funds in terms of higher education. Under such circumstances, the issues of carrying out reforms in this area become a priority, which requires the formation of new types of funding for higher education.

Increasing the effectiveness of the adaptive-selective type of financing of higher education in overcoming sustainable development disparities can be achieved by mobilizing new sources of financial resources for the implementation of competitive educational activities and the production of quality educational services. The urgent need to solve problems related to the improvement of the adaptive-selective type of financing of HEIs requires the search for new methods and approaches for diversification and rational use of their financial resources.

The purpose of this study is to deepen the theoretical foundations and develop practical recommendations regarding the adaptive-selective type of financing of higher education institutions in overcoming sustainable development disparities.

The research hypothesis is as follows: One of the most effective means of successful implementation of educational transformation is the proper use of modern tools of adaptive-selective type of financing of all components of the educational system. Expenditures on education should ensure the development of the education system, its transition to a new qualitative level, which would provide the future socio-economic development of the country as a whole. However, in the face of today, effective funding for higher education in Ukraine is complicated by a serious crisis in the national economy, related not only to internal but also primarily to external factors, such as war, resolved by the Russian Federation and a large-scale pandemic of COVID-19. This causes additional challenges to the educational field, forcing additional sources of financing to overcome development disproportions.

In addition to the above problems, according to the results of the analysis of the peculiarities of financing HEIs in Ukraine, the following problems should be distinguished: (1) low level of internationalization of domestic institutions of higher education; (2) inconsistency of the positions of scientists and politicians on the development of education; (3) moral and physical depreciation of fixed assets and intangible assets in HEIs; (4) relative slowness of the development of education compared to the rapid modernization of modern society; (5) lag in the quality of education compared to the educational systems of developed countries of the world; (6) low level of training of graduates of HEIs; (7) imbalance of sources of higher education funding (significant transfer of the state share); (8) oversaturation of the labor market by graduates of HEIs; detachment of training from practice; (9) insufficient financing of innovative needs of HEIs and development of scientific and pedagogical potential; (10) lack of a clear strategy for financing HEIs; (11) inconsistency of the status of HEIs "Budget Institution" as subjects of economic activity, the principles of a market economy; (12) competition of domestic institutions of higher education with foreign educational institutions.

In view of the isolated groups of threats, it is necessary to develop appropriate mechanisms and tools for their neutralization, in particular: the transition from the principle of maintenance at the expense of the state budget to state support of higher educational institutions in the amounts actually possible; ensuring effective distribution of financial resources from the state and local budgets with appropriate control; development of financing regulations taking into account minimum social standards; increasing the prestige of intellectual work; development of the educational lending system; stimulation of solvent demand for quality educational services; formation of educational and scientific clusters, creation of attractive conditions for the receipt of sponsorship funds; assistance in attracting funds under investment programs in the form of grants; provision of tax benefits for HEIs on income from independent profitable activities, etc.

2. Literature Review

An analytical review of scientific literature gives reasons to claim that there is no single universal financing mechanism for HEIs. Therefore, in order to comprehensively evaluate the effectiveness of financing of HEIs, it is necessary to measure it by various methods and methods. This issue is extremely significant for both scientists and practitioners. Economic science, especially foreign science, is rich in theoretical paradigms and methodological and practical approaches to the adaptive-selective type of financing of HEIs. But we believe that due to various reasons, most of them cannot be used in our country. In academic research models, it is proposed to use the public-private partnership mechanism in the field of financing HEIs [25].

The study of higher education in the context of its financing is based on research: the concept of human capital; methods of organizing economic cooperation; analysis of the conceptual model of financing HEIs; models of financing higher education in Ukraine, its lending mechanisms; effectiveness of the system of education financing and management; strategies and formation of the basis for investing in higher education and science and effective economic policy in this field [14]; determinants of management efficiency in the system of higher education, which involves an increase in budget funding, expansion of state lending for higher education, formation and support of research universities [23; 24]; formula distribution, which contributes to the formation of a competitive environment among HEIs [27]; inflows of private investments into the higher education system [1]; modern world rankings (The Global Competitiveness Index); the process of forming an educational cluster as a mechanism of interaction between HEIs and business structures within the framework of public-private partnership with appropriate financial support [9–11; 25].

The issue of ensuring the higher education competitiveness in the current conditions of educational area globalization and the development of digital economy was revealed in the articles of H. Futao [3], O. Hart [4]; H. Horta [5], V. Kovtunets, S. Londar [12], M. Krupka, O. Hrynkevych, S. Sas [14], Yu. Petrova [17], N. Ugur [22], Z. Varnalii [23; 24], O. Krasilnik, L. Khmelevskaya [24], Yu. Vitrenko [26], D. Zagirniak, O. Kratt, M. Zagirnyak [28], T. Zatonatska, O. Rozhko, I. Lyutyy, N. Tkachenko, O. Anisimova [29]. These researchers analyzed the essence and prospects of using modern information and communication technologies as an effective strategy tool to ensure the adaptability of the higher education system to the challenges of the digital economy.

3. Problem Statement

One of the central ideas of modern financing is the implementation of public-private partnership (hereinafter referred to as PPP) in the financing of HEIs in Ukraine, where ministries, including the Ministry of Education and Science of Ukraine, state services, central executive authorities will act as a state partner (Fig. 1).

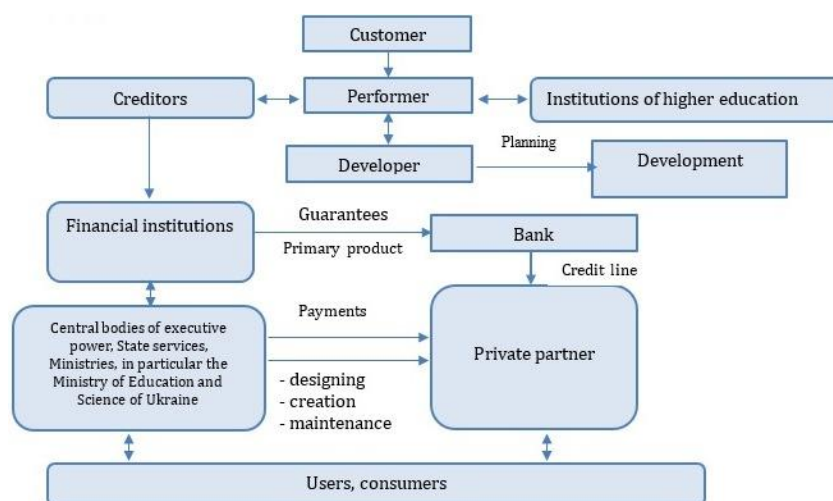


Figure 1. Algorithm for PPP implementation in the financing of higher education institutions in Ukraine

Source: Developed by the authors.

Within the framework of public-private partnership, it is considered necessary to form educational-scientific clusters with appropriate funding, which will contribute to the activation of educational-scientific activities, diversification of funding sources for educational programs and scientific research.

The advantages of PPP implementation in the financing of HEIs in Ukraine can be considered: stimulating the development of entrepreneurial thinking and promoting the implementation of advanced management methods; promoting the development of innovative forms of project financing; improving the quality of public services to consumers (higher education students); increasing the efficiency and effectiveness of financing, taking into account the interests of various groups of stakeholders.

Some authors continuing this theme, claim that the development of partnership relations between the state, science and the private sector will enable HEIs to increase the efficiency of property management, contribute to the attraction of extrabudgetary funds for the implementation of projects, increase the level of teaching and conducting scientific research, and in will generally contribute to the active development of the higher education system of Ukraine.

The beginning of an active increase in the attention of scientists to PPP problems dates back to 2005. The tendency to increase the attention of scientists is determined by the approval in 2004 of the "Green Book" of the European Commission on PPP and the Communication on PPP and Community legislation on public procurement and concessions.

Therefore, the use of the PPP mechanism will allow HEIs to overcome the sustainable development disparities that have persisted in recent years and activate partnership relations between HEIs, business and the state, thereby restoring the link "science – education – business". In addition, the application of the PPP mechanism will allow HEIs to effectively manage their own property, attract additional financial resources for conducting scientific activities, improve the quality of teaching and generally increase the level of competitiveness of HEIs of Ukraine in the world educational and scientific space.

4. Methods and Materials

The financing mechanism of higher education institutions and its components

The formation of new approaches to the financing of HEIs continues throughout the years of Ukraine's independence. This process was carried out in parallel with reforms and structural shifts in the country's political, social, and economic systems. Among the most important, it should be noted the spread of the market mechanism in the field of education, the emergence of private property, the creation of private educational institutions, fundamental changes in the budget and tax legislation, the transition to the use of the toolkit of the program-targeted method of financing, the formation of a formulaic approach to the distribution of budget funds, etc. It should be noted that these transformations were carried out against the background of the development of general globalization processes, which at the current stage of development cover the entire European educational space, they led to the appearance of many new financing tools in the field of education. In this context, we propose to ensure an adaptive and selective type of financing of HEIs in overcoming sustainable development disparities, to establish cooperation with foreign subjects of educational activity. We believe that the adaptive-selective type of higher education financing is the choice of the best financing mechanism that can be adapted to HEIs in overcoming the disproportions of development in today's conditions. That is, Ukraine needs to develop a financing mechanism for higher education, where clear procedures will be specified, how and from which sources will receive funding. Unlike the foreign experience, the domestic one does not correspond to the desired. The country is already trying to implement an investment policy regarding the financing of HEIs, and is looking for investment methods, since the budget does not effectively plan the financing of this area. However, this is only the initial stage of reforming the financing of higher education, it is necessary to continue to study foreign experience and adapt it to Ukrainian realities.

Thus, financing is the process of providing the subjects of all institutional sectors of the economy, types of economic activity, in particular education and their institutions, with the necessary monetary resources. The theoretical generalization of the existing views on the essence of the financing mechanism of higher educational institutions made it possible to define it as a financial relationship

with an appropriate set of elements (mission, goals, principles, subjects, methods, forms, sources, factors of provision and analytical tools), on the basis of which the appropriate level of funding is achieved, functioning and development of these institutions (Fig. 2).

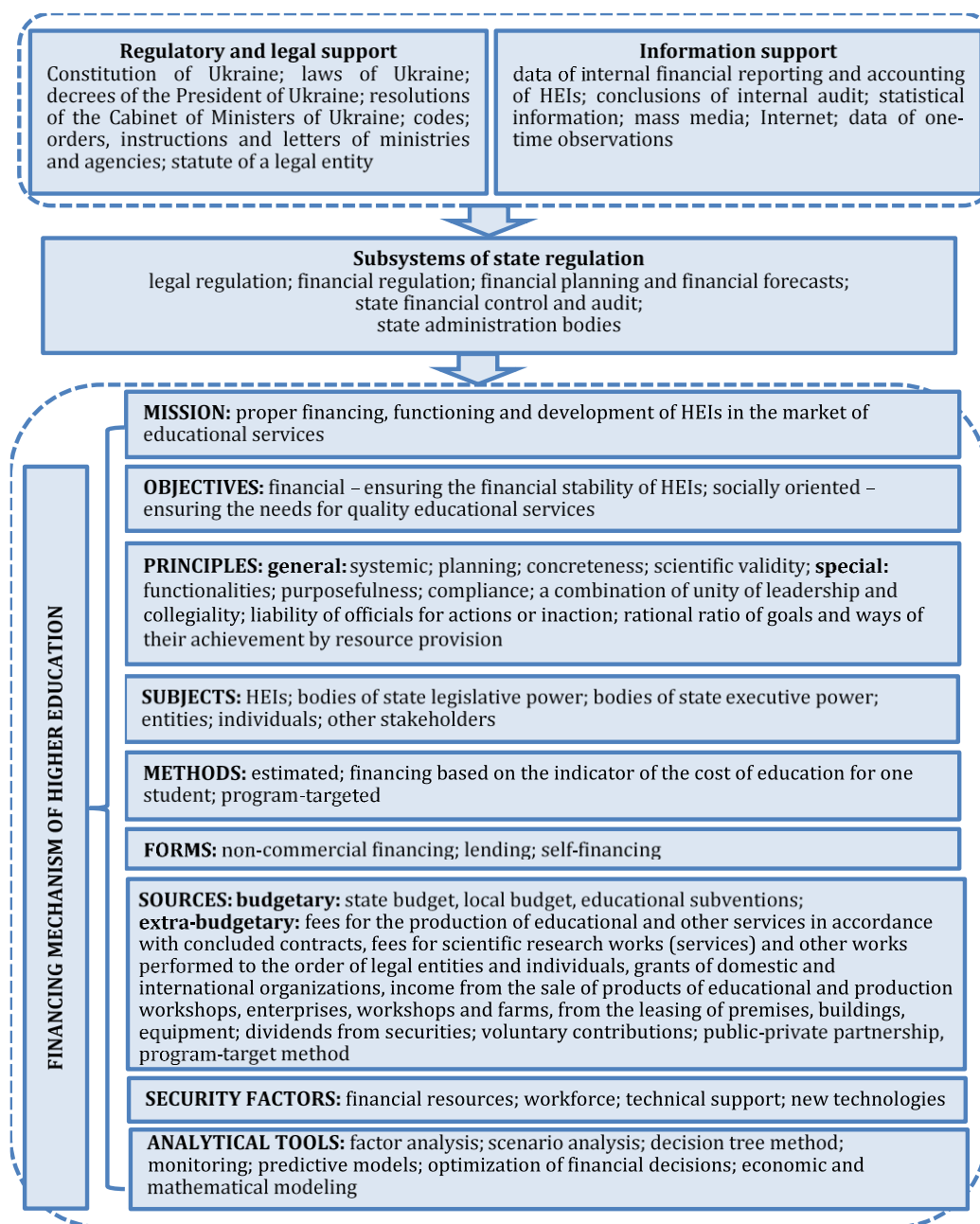


Figure 2. The financing mechanism of higher education institutions and its components

Source: Developed by the authors.

In Ukraine, HEIs are financed mainly from the state budget. Also in paragraph 61 of the Federal Law “About Education” dated September 5, 2017 No. 2145-VIII, it is determined that additional sources of funding for educational institutions are allowed in Ukraine, in particular the following: funds received for training, training, advanced training and retraining of personnel in accordance with concluded contracts; fee for providing additional educational services; funds received for research works (services) and other works performed by the educational institution on the order of enterprises, institutions, organizations and citizens; income from the sale of products of educational and production workshops, enterprises, workshops and farms, from the leasing of premises, buildings, equipment; subsidies from local budgets; dividends from securities; currency receipts; voluntary monetary contributions, material values, received from enterprises, institutions, organizations, individual citizens; other funds.

Identification of threats to the effective financing of higher education institutions

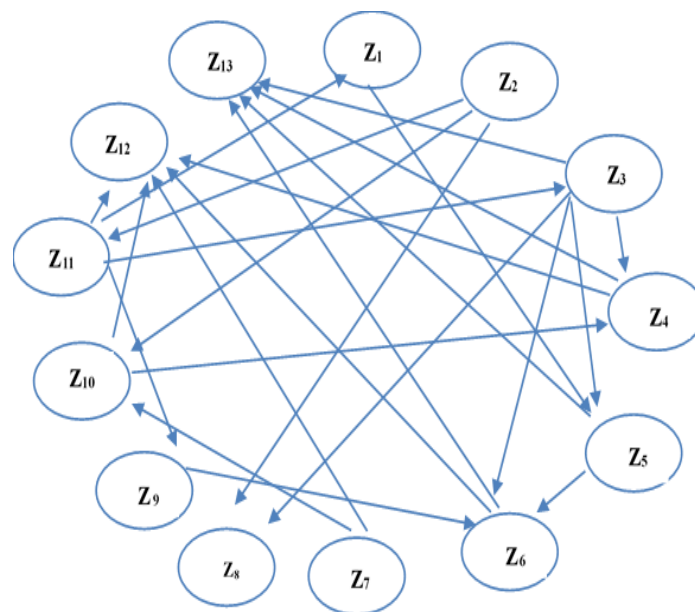
We believe that it is important to carry out threat modeling and to build an economic and mathematical model that will cover different parameters and identify the problematic aspects of educational institutions' financing. Timely identified threats that can have a negative impact on the functioning of educational institutions, as well as prompt measures taken to eliminate or minimize the negative impact, contribute to the effective and stable development not only of individual higher education institutions, but also in the whole educational field. Using the method of analyzing the hierarchy of threats to the effective functioning of these establishments, they can be ordered by the importance of influencing the process, and the Saati method will identify the components to strengthen or weaken the effect of the causative factor.

Suppose that the set $Z = \{z_1, z_2, \dots, z_m\}$ contains threats to the functioning of higher education institutions in today's economic, social and political realities. Therefore, it is necessary to identify the key threats by which the set $Z_1 = \{z_1, z_2, \dots, z_n\}$ of the set Z ($Z_1 \subset Z$) is given. We form a table showing the list of factors (threats) and their mathematical designation (Table 1).

Table 1. List of factors and their mathematical notation

Mathematical notation	Factor name	Mnemonic name
Z_1	low level of internationalization of domestic higher education institutions	LLI
Z_2	inconsistency of the positions of scientists and politicians on the development of education	IPSP
Z_3	moral and physical deterioration of fixed assets and intangible assets in higher education institutions	MPDFA
Z_4	the relative slowdown of the rates of development of education in comparison with the rapid modernization of modern society	RSRDE
Z_5	the gap in the quality of education in comparison with the educational systems of the developed countries of the world	GQE
Z_6	low level of training of graduates of higher education institutions	LLTG
Z_7	imbalance of higher education funding sources (significant over-balancing of the state share)	IHE
Z_8	oversaturation of the labor market by graduates of higher education institutions	OLMG
Z_9	separation of training from practice	ST
Z_{10}	insufficient financing of innovative needs of higher education institutions and the development of scientific and pedagogical potential	IFIN
Z_{11}	lack of clear strategy of financing higher education institutions	LCSF
Z_{12}	Status inconsistency of higher education institutions "budgetary institution" as subjects of economic activity to the principles of market economy	SI
Z_{13}	competition of domestic higher education institutions with foreign educational institutions	CDI

Source: Developed by the authors.

**Figure 3. Graph the causal link between the major threats of effective HEIs financing**

Source: Developed by the authors.

We show a subset of factors Z_1 and possible causal relationships between them by means of an oriented graph (Fig. 3) consisting of 13 points where the edges connect adjacent pairs of vertices (z_i, z_j) . The arrow is pointing from factor z_i that depends on the factor z_j (end of arrow). For example, the low level of training of graduates of the HEI is caused by insufficient financing of innovative needs of these institutions and the development of scientific and pedagogical potential.

Using the data of Fig. 3, it is possible to construct a binary dependence matrix $B = (b_{ij}, i, j = \overline{1, 13})$, where each of the elements of the matrix

$$b_{ij} = \begin{cases} 1, & \text{if vertex } i \text{ depends on the vertex } j \\ 0, & \text{if vertex } i \text{ doesn't depend on vertex } j \end{cases} \quad (1)$$

According to the results of the binary relation “depends on,” all the elements in the matrix can take two values of 0 and 1.

Table 2 shows a binary dependency matrix, where the first column and the first row of the table indicate the threat number and the second row and the second column indicate its name. The created matrix satisfies the condition of transitivity.

We construct a reach matrix $I + B$, where I is a single matrix of order 13. The obtained matrix corresponds to the condition:

$$(I + B)^{k-1} \leq (I + B)^k = (I + B)^{k+1}, \quad (2)$$

where k is an integer.

From the set Z_1 we have previously defined, for each of the thirteen factors, there are two subsets: $R(z_i)$ is the reach set, and $A(z_i)$ is the previous set (the set of previous vertices). The achievable vertex can be considered provided that the vertex z_j can be reached from the vertex z_i in the graph (Fig. 3), there will be a path leading from the vertex z_i to the vertex z_j . The vertex z_i is the vertex z_j the precursor if it can reach its vertex.

Formed sets $R(z_i)$, $A(z_i)$, as well as their cross-section, are presented in Table 2. From those vertices of the graph for which the condition is satisfied

$$A(z_i) = R(z_i) \cap A(z_i), \quad (3)$$

the first (lower) level of the hierarchy is formed. These vertices can be considered as out of reach of all other vertices of the graph.

Table 2. A binary matrix of the relationship of causal relationships between the major threats to the effective functioning of higher education institutions

Mnemonic Factor name	1	2	3	4	5	6	7	8	9	10	11	12	13
	LLI	IPSP	MPDFA	RSRDE	GQE	LLTG	IHE	OLMG	ST	IFIN	LCSF	SI	CDI
1. LLI	0	0	0	0	1	0	0	0	0	0	0	0	0
2. IPSP	0	0	0	0	0	0	0	1	0	1	1	0	0
3. MPDFA	0	0	0	1	1	1	0	1	0	0	0	0	1
4. RSRDE	0	0	0	0	0	0	0	0	0	0	0	1	1
5. GQE	0	0	0	0	0	1	0	0	0	1	0	0	1
6. LLTG	0	0	0	0	0	0	0	0	0	0	0	1	1
7. IHE	0	0	0	0	0	0	0	0	0	1	0	1	0
8. OLMG	0	0	0	0	0	0	0	0	0	0	0	0	0
9. ST	0	0	0	0	0	1	0	0	0	0	0	0	0
10. IFIN	0	0	0	1	0	0	0	0	0	0	0	1	0
11. LCSF	1	0	1	0	0	0	0	0	1	0	0	1	0
12. SI	0	0	0	0	0	0	0	0	0	0	0	0	0
13. CDI	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Developed by the authors.

It is necessary to determine the first level in the threat hierarchy (the lowest in terms of the greatest impact on the object under study). For this, we construct the table (Table 3) according to the above algorithm.

Table 3. The first iteration of the causal link between the major threats to the effective functioning of higher education institutions

Z_i	$R(z_i)$	$A(z_i)$	$R(z_i) \cap A(z_i)$
Z_1	Z_1, Z_5	Z_1, Z_{11}	Z_1
Z_2	Z_2, Z_8, Z_{10}, Z_{11}	Z_2	Z_2
Z_3	$Z_3, Z_4, Z_5, Z_6, Z_8, Z_{13}$	Z_3, Z_{11}	Z_3
Z_4	Z_4, Z_{12}, Z_{13}	Z_3, Z_4, Z_{10}	Z_4
Z_5	Z_5, Z_6, Z_{10}, Z_{13}	Z_1, Z_3, Z_5	Z_5
Z_6	Z_6, Z_{12}, Z_{13}	Z_3, Z_5, Z_6, Z_9	Z_6
Z_7	Z_7, Z_{10}, Z_{12}	Z_7	Z_7
Z_8	Z_8	Z_2, Z_3, Z_8	Z_8
Z_9	Z_6, Z_9	Z_9, Z_{11}	Z_9
Z_{10}	Z_4, Z_{10}, Z_{12}	Z_2, Z_5, Z_7, Z_{10}	Z_{10}
Z_{11}	$Z_1, Z_3, Z_9, Z_{11}, Z_{12}$	Z_2, Z_{11}	Z_{11}
Z_{12}	Z_{12}	$Z_4, Z_6, Z_7, Z_{10}, Z_{11}, Z_{12}$	Z_{12}
Z_{13}	Z_{13}	$Z_3, Z_4, Z_5, Z_6, Z_{13}$	Z_{13}

Source: Developed by the authors.

The fulfillment of condition (3) is clearly presented for the threats: Z_2 – inconsistency of the positions of scientists and politicians in the development of education; Z_7 – imbalance of higher education funding sources (significant over-governmental share). The next step is to remove from the table the rows that correspond to the selected vertices (Z_2, Z_7), as well as to remove the numbers 2, 7 from the entire table. According to the Oriented column, all vertices that meet the identified threats are removed.

We have got results in seven levels of hierarchy (from smallest to largest) thanks to computer-aided modeling: (1) imbalance of financing sources (significant prevalence of government share); the inconsistency of the positions of scientists and politicians on the further development of higher education; (2) lack of a clear financing strategy of HEIs; (3) separation of training from practice; moral and physical deterioration of fixed assets and intangible assets; low level of internationalization and academic mobility; (4) oversaturation of the labor market by graduates of HEIs; the gap between the quality of education and the educational systems of developed countries; (5) insufficient financing of innovative needs and development of scientific and pedagogical potential; low level of preparation of graduates of HEIs; (6) the relative slowdown in the development rate of education in comparison with rapid modernization of society; (7) inconsistency of the status of “budgetary institution” as a subject of economic activity with the principles of market economy; competition with foreign HEIs in attracting entrants. HEIs are constantly forced to seek additional sources of financing for their own needs for sustainable development, which is a decisive factor in ensuring their competitiveness.

5. Results and Discussion

Priority Tasks of the Modernization of Financing of Higher Education Institutions

The current state of development of the world community creates conditions under which the adaptive-selective type of funding of higher education becomes important in overcoming sustainable development disparities in Ukraine. HEIs are forced to constantly search for additional sources of funding for their own needs for sustainable development, which is a defining element of a high level of competitiveness.

Striving to increase the level of competitiveness of Ukrainian institutions of higher education, it is necessary to pay attention to solving the following priority tasks:

- to abandon financing of HEIs mainly from the state budget, instead increase the share of attracting financial resources from the corporate sector, and provide state support in the actually necessary amounts.
- to improve and deepen the autonomy of educational institutions, primarily in the field of

financing. It should be noted that there are a large number of private institutions of higher education abroad and their financing mainly depends on tuition fees and other fees.

- to include research institutions in the composition of leading universities. Completion of this task will improve the state of the material and technical base of educational institutions and post-graduate education institutions, raise the professional level of teachers, allow more effective use of the complex of material, financial and labor resources of HEIs;

- to expand the independence of HEIs in the field of resource management, including funds from the budget;

- to allow educational institutions to independently distribute budget revenues in accordance with the articles of the budget classification. Accordingly, institutions of higher education must submit reports on the spending of funds received from the budget, which can be the starting point for calculating statistical indicators in the field of education;

- to stimulate the implementation of various types of income-generating activities. Today, there is a natural need to optimize the distribution of the available resources of HEIs, which will make it possible to allocate funds for investment costs. In view of this, when self-financing, educational institutions should direct their activities to gain profit. In addition to the receipt of funds from tuition fees, the main sources of extrabudgetary funds should include income from independent activities, in particular sponsorship funds, donations, endowments, cooperation with business structures and lending. Another source of additional funds is the production of non-educational services that generate income. These include: rental of premises for holding conferences, rental of dormitories, provision of food, provision of information and consulting services, commercial use of the results of scientific research, use of the Internet; putting vehicles into operation; organization of paid museum and exhibition activities; opening of exhibitions and sales of scientific and creative products; sale of training materials; organization of paid webinars; theater performances and concerts; establishment of a subscription fee for the use of library assets;

- to conduct preparatory courses; income from the activities of scientific research units and scientific publishing activities, etc.;

- to motivate institutions of higher education to participate in the formation of the national innovation system by granting institutions of higher education the status of research. A “national HEIs that has significant scientific achievements, conducts research and innovation activities, ensures the integration of education and science with production, participates in the implementation of international projects and programs” can apply for this responsible status. The status is granted to the specified institution for the purpose of increasing the role of the university as a center of education and science, training highly qualified scientific and scientific-pedagogical personnel, putting into practice scientific achievements, technical and technological developments, implementing joint programs in priority areas together with other higher educational institutions and scientific institutions fundamental and applied scientific research to solve important socio-economic problems in various fields and regions;

- to ensure the effective distribution of financial resources for the expenditure of educational services from the state and local budgets in amounts sufficient for the development of educational institutions, taking into account the state of the material and technical and laboratory base, the possibility of reproducing the potential of scientific and pedagogical personnel and the development of science;

- to improve the methods of determining the amount of education funding and develop funding standards taking into account minimum social standards, which will allow establishing the lower limit of mandatory financial support for the development of education;

- to improve the mechanism of financing education in Ukraine, taking into account international experience, transition to multi-channel financing, take decisive measures to increase and diversify sources of financing higher education and optimize their structure;

- to create conditions for the use of intellectual work, increasing its prestige and demand for it, bringing the volume of training of specialists with higher education to the needs of the modern labor market;

- to develop the system of educational lending, which will contribute to: increasing the interest of citizens in using credit resources to pay for educational services;

- to create a new model of financing HEIs, which is based on the joint participation of the state,

business circles and citizens.

By implementing the proposed measures, educational institutions will have the opportunity to take the initiative and expand their independence in the economic sphere of HEIs.

One of the most important tasks for improving the financing of HEIs is the growth of the role of extra-budgetary funds, including obtaining funds for providing educational services, performing other non-educational services, receiving sponsorship, donations, loans, income from cooperation with business structures, etc. As Panych emphasizes, investment in higher education is a matter of social responsibility and security. However, the problem of financing covers not only the issue of the amount of funds, but also financing mechanisms, as well as the accompanying regulation that affects the distribution of these funds. Incentives for the development of HEIs depend on the general economic policy of the state.

Thus, a sufficient level of provision of HEIs with financial resources exerts its influence on the sustainable development of higher education, as well as on the quality of training of competitive highly qualified specialists. In this context, we believe that the government of Ukraine should develop not only a program of effective investment of funds in the development of national education and science, but also take priority measures to reorganize this sphere of life and society's attitude towards it. Possible measures to correct the situation in this area are: a significant increase in the status of a scientist and the role of science in society through the normalization of wages; increase in financing of the scientific sphere from the state budget in order to update the material and technical base of science; strengthening of the institutional and financial foundations of competitive (grant) funding of scientific research; creation of conditions for the return of highly qualified scientists who gained experience in universities and scientific institutions of the world; strengthening the ties of the scientific sphere with business, industrial and entrepreneurial structures; expansion of international cooperation and integration of the scientific sphere of Ukraine into the world system, in particular into the European scientific space.

In Fig. 4, we will highlight the main areas of further improvement of the financing mechanism of HEIs.

World experience in financing higher education allows us to conclude that in the practice of the leading countries of the world, state funding is reduced to a minimum and occupies a meager share, HEIs have greater autonomy, and also have the rights and broad opportunities to attract and use various forms of funding. In Ukraine, the funding of HEIs is predominantly provided by budgetary resources; their number does not give opportunities to fully develop, to implement innovative projects, which is why the Ukrainian HEIs need to develop new, more effective funding systems for HEIs and approach the standards of advanced countries of the world.

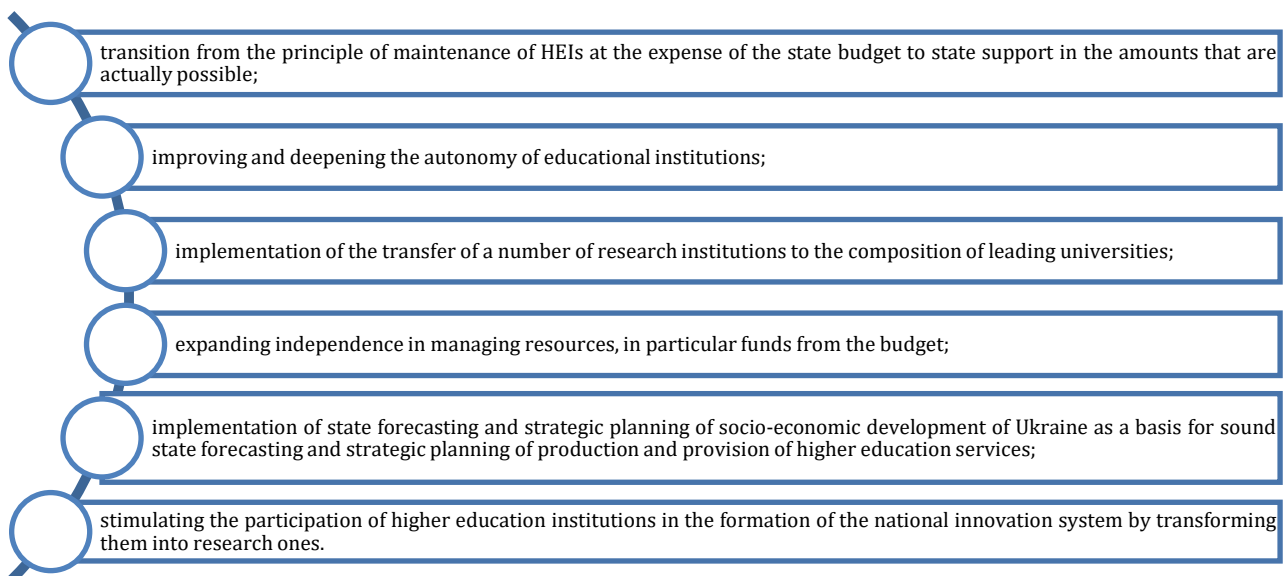


Figure 4. The main areas of improvement of the financing mechanism of higher education institutions

Source: Developed by the authors.

Subjects and contours of the effective structure of higher education in Ukraine

In the process of functioning, Ukrainian state institutions of higher education interact with various entities (Table 4).

Table 4. Financial, economic and social relations of state institutions of higher education with stakeholders

Institutions of higher education	State	The state acts as a guarantor of the rights of every citizen to receive higher education on equal terms, and the state also creates and ensures all necessary conditions for HEIs to carry out their activities. At the same time, state institutions of higher education are an instrument of the state's social policy in providing citizens of the country with higher education.
	Employers	Employers are both customers and consumers of the HEI's product at the same time. In the case of financing state institutions of higher education, employers (both public and private sectors) place orders for the training of the necessary specialists for certain sectors of the economy and thus form their offer of certain educational services. And while receiving highly qualified specialists, they consume the same educational services.
	Subjects of economic activity	State institutions of higher education attract possible alternative sources of financing and carry out capitalization of the implementation of certain types of their own activities in order to increase the level of training of highly qualified and innovatively developed specialists.
	Society	State institutions of higher education are obliged to train modern individuals who will step confidently "in step" with modern progress, feel comfortable in society and contribute to its progressive development in the future.
	Market of educational services	State institutions of higher education interact with all segments of the educational services market, interact with other educational institutions. And the market of educational services contributes to ensuring all the rights and opportunities of students.
	Households	State institutions of higher education act as investors in personal development, thereby providing the labor market with qualified specialists.

Source: Developed by the authors.

Such relationships affect: (1) the effectiveness of the financing process of state HEIs and the results of their activities; (2) social development and development of the individual as a whole. Financial resources of the state, households, economic entities and own funds of state HEIs act as material carriers of financial relations between all participants of the educational services market. That is why there is a need to study all aspects of these relationships between state institutions of higher education and all stakeholders in order to carry out an in-depth analysis of the processes of existing financing of domestic educational institutions and to determine development prospects based on the experience of foreign countries.

In view of the global reduction of public financial resources in Ukraine and the countries of the world, the "DEFINE" project was introduced. His main tasks were:

- determination of state financing mechanisms and their development during the last decade;
- monitoring trends in state funding of universities;
- identification of key problems in the field of higher education financing;
- development of measures to increase the efficiency of financing universities, etc.

That is, the main activity of the "DEFINE" project is the study of financing in higher education, the provision of recommendations that will contribute to the development of strategies for increasing the efficiency of financing higher education.

Studies emphasize that in most cases, the state distributes the appropriate funding for higher education through so-called block grants (Table 5).

Table 5. The mechanism of distribution of state funding

Grants			
Funding based on activity results		Other financing methods	
Performance contracts	Funding based on a formula		Based on the negotiation process
	According to performance criteria "at the exit"	According to performance criteria "at the entrance"	Based on a historically determined distribution
Project financing			
Financing under programs of "excellence"			
Other methods of direct financing, including targeted			

Source: Developed by the authors.

The distribution of block grants according to the formula is the main method of distribution of state funding by state institutions of higher education and is used in the vast majority of countries included, for example, in the University Autonomy in Europe study. Negotiated block grant funding is used in some countries such as Austria, Germany and Spain. In practice, however, a country will use a combination of methods to determine the size of the grant allocation. This experience can also serve Ukrainian HEIs as an additional source of attracting financial resources, while contributing to increasing the quality of educational products.

Implementation of the reform of domestic higher education should be a “companion” of the implemented economic reforms in the country, which are aimed at increasing the volume of innovative potential and significantly raising living standards in Ukraine. The contours of the effective structure of the development of higher education in Ukraine are highlighted in Fig. 5.

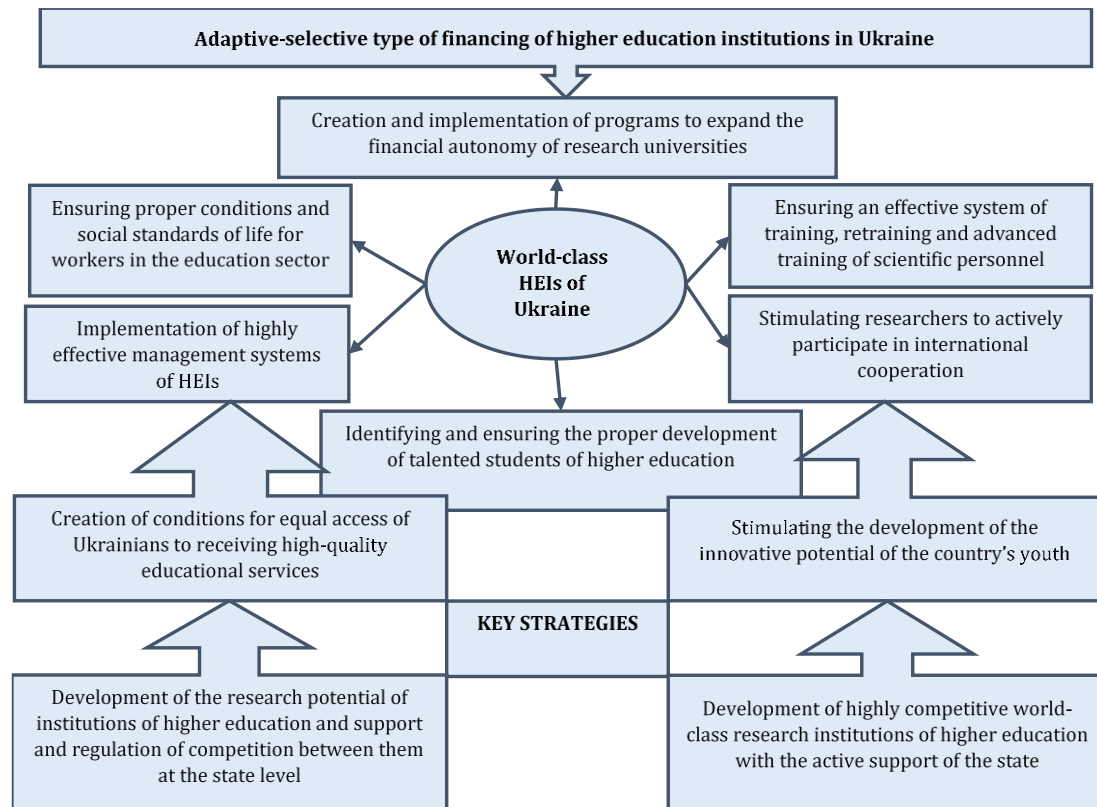


Figure 5. Contours of the effective structure of the development of higher education in Ukraine

Source: Compiled by the authors.

As already mentioned, financing of the educational sphere in Ukraine is carried out in insufficient amounts; the majority of financing is carried out by the state from the country's budgets and requires research and the attention of scientists and practitioners regarding the search for new sources and opportunities for attracting financial resources for the development of world-class educational institutions. World experience contains several strategies for the development of the educational sphere, the research of which can help domestic legislative and executive authorities to set an effective vector of development in the educational sphere:

1. The “broad” strategy (from high-quality mass higher education to the creation of world-class universities) provides for the country's achievement of the highest standards of higher education in the field of learning and teaching, expansion of general access of the population to high-quality educational services, increasing the research potential of universities, gradual evolutionary separation of university institutions capable of competing on the global market. This strategy is used mainly in the countries of Western Europe.

2. The “in-depth” strategy (from pioneering research in breakthrough fields of knowledge to the creation of world-class universities) consists of the development (with the active participation and financial support of the state) of world-class universities based on a small number of existing university institutions capable of carrying out serious and significant scientific research. This strategy was used by

the countries of East Asia during the second half of the 20th century. Currently, this model is being implemented in Saudi Arabia, Brazil, etc.

3. The combined strategy of “broad” and “deep” is a certain combination of the two previous strategies and is used today in the USA and China, and is also gaining popularity in the countries of Western Europe.

In world practice, endowment funds (trust funds) are widely used, which are trust funds intended for non-commercial use. The endowment differs from charitable financing by the targeted nature of the activity and the focus on obtaining income through the investment of funds. The endowment fund, as evidenced by the practice of countries that use this type of financing in the field of education, is an effective tool for the financial support of intellectual activity. As for the size of the endowment, it depends on the ability of the institution of higher education to effectively engage in fundraising, that is, to create certain projects aimed at attracting financial resources for non-commercial purposes. In the domestic practice of HEIs, there were attempts to introduce the first endowment funds. However, they develop slowly, which is caused by the unstable situation in the state. When creating and developing such a direction of financing as an endowment in Ukraine, it is necessary to study and be guided by the leading experience of the advanced countries of the world. Only in this way can success be achieved in the introduction and effective functioning of endowment funds in Ukraine, which will contribute to ensuring the necessary level of financing of domestic institutions of higher education and will contribute to the activation of the development of international programs, the participation of scientists in international programs.

In modern conditions, the use of charitable resources to finance education and science in Ukraine is not yet widely popular, but it is actively used in foreign practice. Its appearance is caused by the development of several non-profit organizations to alienate from the state some of the functions in the field of social policy. At the initial stages of the formation of such organizations, their resources were used only for social needs in the field of social protection, and now they are widely used in the field of education and science for the accumulation and development of human capital.

6. Conclusions

In Ukraine, limited financing of HEIs negatively affects the quality of educational services. Insufficient amounts of budget allocations require the search for additional sources of funding, and therefore the study of the best global experience of highly developed countries and its implementation in the activities of public HEIs of Ukraine indicates the following promising directions: co-financing of education by business and the state; creation of an appropriate legal framework for stimulating patronage and sponsorship; development and implementation of the higher education lending mechanism; search for promising areas of activation of research and innovation activities of HEIs; introduction of transfers of scientific developments into the activities of the real sector of the economy. Creating appropriate conditions for the development of the educational sphere, increasing funding for education and science, is a guarantee of effective development of the state as a whole.

It was found that financing is a process of providing necessary monetary resources to subjects of all institutional sectors of the economy, types of economic activity, in particular, education and its institutions. The main sources of higher education funding include funds from local and state budgets, the receipt of resources to higher education from educational, scientific, and industrial activities, property rental fees, proceeds from the sale of property, preferential state loans for obtaining higher education, payment of students' training at the expense of firms and enterprises, charitable contributions, grants and gifts, funds received for the fulfillment of specific assignments from legal entities and individuals.

To develop a universal approach to evaluating the effectiveness of the allocation of state budget funds, in particular to higher education, a methodology for calculating its comparative coefficient has been developed according to the proposed formula, which includes the main indicators of the educational and scientific activity of HEIs, and provides an opportunity to identify positive and negative trends in their development, avoid or react to problematic aspects promptly, as well as make balanced decisions.

It has been proven that when developing a financing mechanism for the activities of HEIs, it is necessary to take into account the impact of threats to their sustainable development. The main threats

to the effective functioning of the HEIs are the problems of general development, as well as financial problems. On the basis of the method of analysis of hierarchies, threats were constructed according to the degree of risk, which made it possible to propose appropriate mechanisms and tools for overcoming them for the sustainable financial development of HEIs.

The implementation of the reform in the sphere of financing of HEIs must be carried out based on the needs of Ukraine, but taking into account global trends, the vector of the development of the country's economy, society and competitiveness not only in the domestic but also in the world markets. It is necessary to focus on the needs of increasing modernization and innovation potential in the country, raising the living standards of the population. This can be done only with state support for the introduction and stimulation of the implementation of foreign experience in the field of higher education financing, creation of appropriate conditions for the development of higher education. Currently, in the modern world, it should be increasingly realized that without the implementation of paradigmatic changes in education, as well as sufficient funding of educational institutions, higher education will not be able to fulfill its mission of training young people in the competitive conditions of the development of the knowledge economy.

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