



MECHANISMS AND MODELS OF RISK MANAGEMENT PROCESS OF EDUCATIONAL ACTIVITY OF HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

An approach to the risk management process based on the traditional principles of risk management is used in this article as the basis for constructing a risk management model for the educational activities of higher education institutions.

The mechanisms that ensure the effective functioning of the system that ensures the reduction or compensation of the risks of educational activities proposed in this material can be adapted and used to create an integrated risk management system for any educational institution.

The approach to the system of risks of the educational activity has a number of features and nuances, some of which this article tries to cover. The key principles proposed in it are of practical application and tested in the course of the experiment.

Keywords: Educational Activity, Higher Education Institutions, Risk Management

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1. INTRODUCTION

An educational institution played an important role in the development and functioning of any society. The process of accumulation of knowledge by mankind, the formation and formation of scientific approaches, has led higher education institutions to play a key role in the storage and processing of knowledge accumulated by previous generations, as well as the approaches and traditions of their transfer to a new generation of people [1-2].

The effectiveness of the economic development of any state largely depends on the personnel potential of its citizens, namely, on the professional, technical, economic and scientific training of specialists. Therefore, it is worth considering the system of higher education both as a fundamental institution of the country and as one of the elements of the system of market relations [3-4]. The consequence of this will be the adoption of the fact that institutions of higher education are part of the economy, providing educational services to individuals and business entities.

The transformation of the educational services market in the current conditions of socio-economic development actualizes issues related to risk management in higher education institutions, as their increasing independence and independence entails an increase in managerial and financial risks for incorrect decisions. That is why the search for adequate and effective risk management mechanisms does not lose relevance over time.

2. METHODOLOGY

The very essence of the activity of any institution of higher education presupposes its perception as an integral unity, which is associated with specific relations with consumers of educational services: society, the state, enterprises, individuals, and at the same time as a social institution with a complex structure, goals and tasks, with various internal relationships and connections.

As an element of the higher education system, an educational institution itself can be considered as a system with specific properties and characteristics necessary for solving the tasks of providing services for obtaining a high-quality education, which is schematically presented in Fig. 1.



Figure 1 Quality factors in higher education

2.1. Nuances and Characteristics of Risk Management Mechanisms in Educational Institutions

The risk management system is a complex multi-stage process, the purpose of which is to reduce or compensate for possible damage to the facility in case of potential adverse events [5-7].

The education system itself, and higher education, in particular, is a rather specific area, which is characterized by its own special risks, which often have significant distinguishing features from those traditionally considered in the classical theory of risk management.

Therefore, it is important not only to identify the risks of educational activity but also to systematize them, to analyze them, their interdependence and the degree of influence on the achievement of the main goal of an educational institution - the provision of quality educational services.

It is important to consider that one of the main systemic properties of any institution of higher education is openness in relation to the external environment. This is expressed in three fundamental processes: the receipt of a social resource from the external environment, the transformation of this resource as a result of the main activities of the university and the transfer of an educational product - a specialist with a specific level of qualification, with professional and social mobility in the external environment. The consumer of this product is society, and in terms of professional mobility – the labour market.

That is why the necessity of studying the external environment is determined, which is a set of factors that actively influence and influence the educational market conditions and the effectiveness of the university. The heterogeneity of the external environment allows us to distinguish two levels of interaction between universities and the external environment, presented in Fig. 2.

The scheme makes it clear that the functioning of any institution of higher education does not occur in a vacuum, its activity is closely dependent on the influence of factors of the external macro and meso-environment, and largely determines the development trends of the institution itself. Environmental factors and risks cause not only quantitative but also structural shifts in higher education, their study and analysis is a prerequisite for the formation of mechanisms to effectively adapt to conditions of high dynamics and low predictability of the external environment.

In the conditions of market relations, such a mechanism may be the use of risk management methods, the application of which will allow educational institutions to improve their activities in an unstable environment and limited resources.

Among theoretical and practical risk management models, it should be noted the mechanism of corporate risk management throughout the organization, which considers risk as to the likelihood of losses arising from the adoption of incorrect or non-adoption of the necessary management decisions.

The use of this mechanism allows us to state that, along with the types of risks common to all areas of activity, there are specific risks that are peculiar only to one or another type of human activity. In the field of higher education, the risk will lie in the possibility (danger) of obtaining an unplanned result due to changes in the educational environment of the institution under the influence of external and internal factors [8-10].

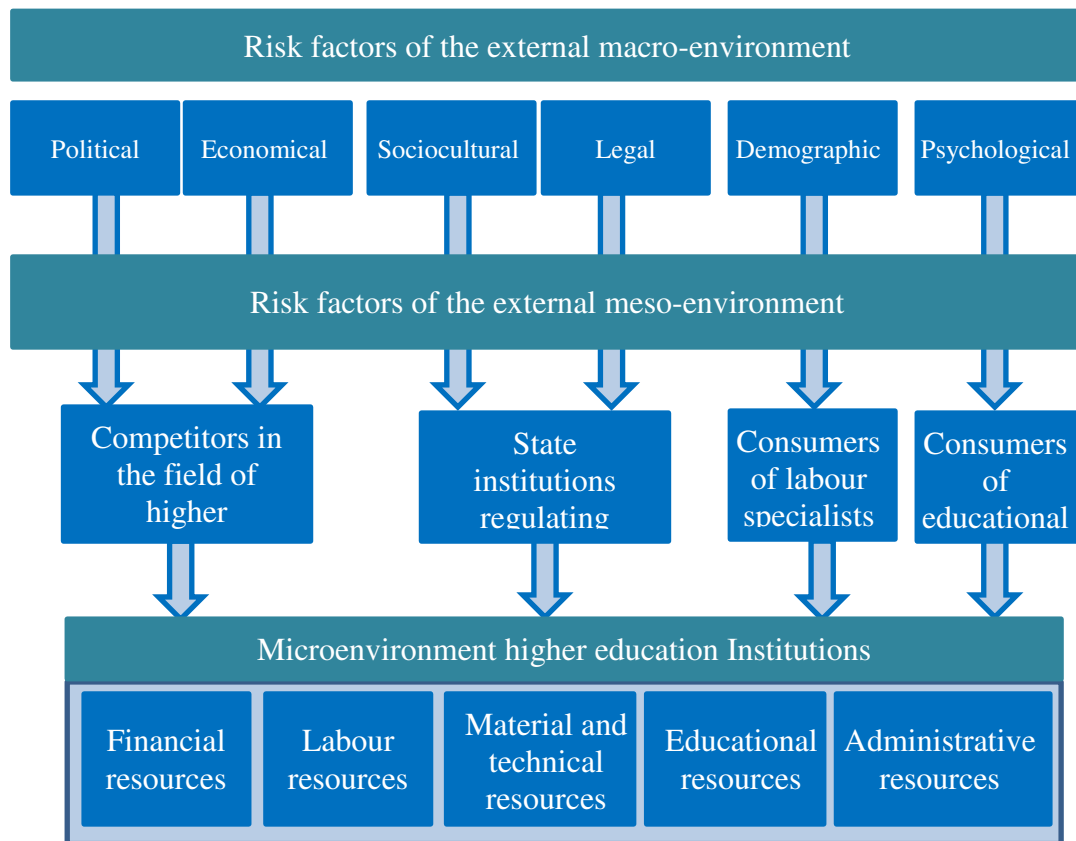


Figure 2 Scheme of the impact of environmental risks on the activities of higher education institutions

For example, due to insufficient financing of educational activities, institutions of higher education will not be able to provide the necessary level of quality for theoretical and practical training of graduates, which will significantly reduce their adaptability in the labour market and lead to a deterioration of the institution's position in society and the state. However, it is possible that through the use of an institution of higher education of an effective, constantly improving quality management system, as well as a system for forecasting future requests of consumers of educational services and graduates, interested parties can get results beyond their expectations. So, a student (person) can receive from the institution of higher education much more useful knowledge and skills than expected at admission [11-12].

Risk management involves their comprehensive accounting, which in turn requires a risk classification of higher education institutions; they are presented in Fig. 3.

Most of these risks are typical for various organizations, but higher education institutions have their own set of unique risks that can be accepted as risks directly related to the educational activities of higher education institutions:

- insufficient number of highly qualified and talented teachers;
- the inability to provide the necessary funding for educational activities;
- the inability to provide students with modern literature and access to information resources;
- the inability to provide a modern material and technical base of sufficient volume;
- the insufficiently high initial level of applicants;
- the inability to create favourable conditions for active scientific, practical, social, cultural and sports activities;

- failures in establishing relations with enterprises for the organization of practical training of students and the lack of practical training programs in the institution itself;
- inconsistency of the educational and methodological support of the educational process used by the educational institution with modern requirements.

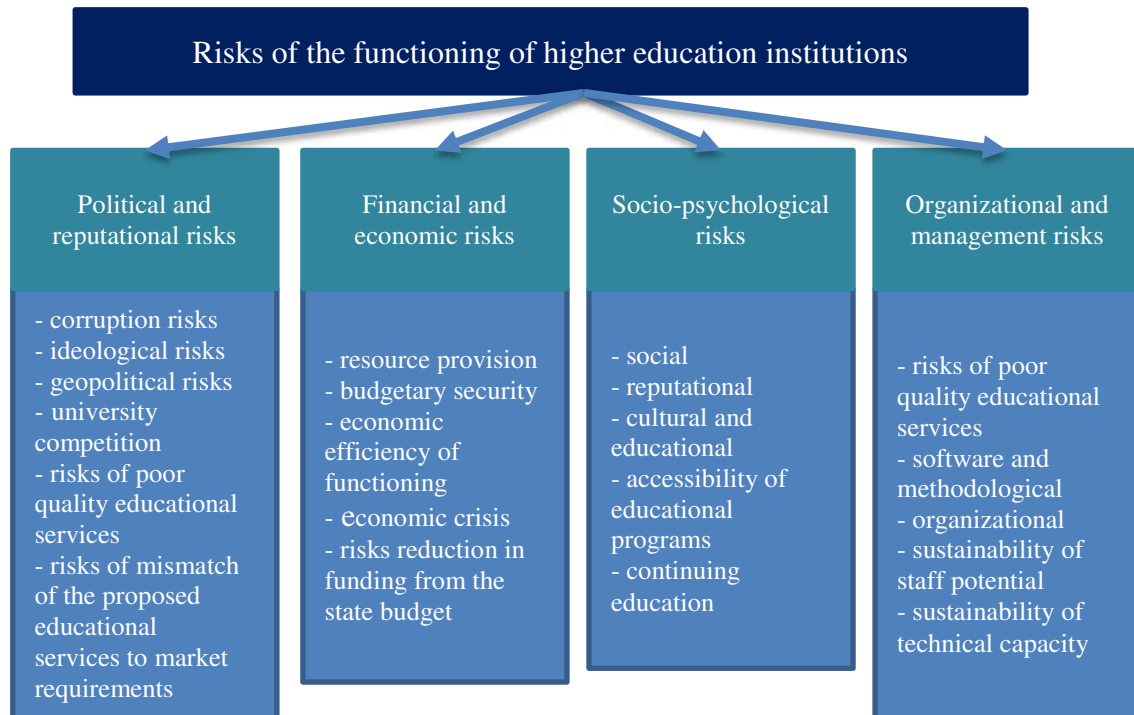


Figure 3 Risk classification of higher education institutions

All these risks (including the risks of the sphere of educational activity) are typical for educational institutions of various organizational and legal forms. It should be borne in mind that the severity of losses due to the onset of a risky situation can be different for different organizational and legal forms of educational institutions.

So, in the activities of institutions of higher education of state ownership, there are acceptable risks, critical and catastrophic are extremely rare, this is due to the fact that the state, based on the principle of subsidiary liability, limits the volume and content of the independent economic activity of state universities, thereby reducing the risk of default and incurring losses. In addition, state institutions of higher education are subject to strict regulation of educational activities, compulsory licensing and accreditation of educational programs.

For non-governmental institutions, the likelihood of critical risk situations associated with a lack of financial resources, primarily for the development and achievement of strategic and tactical goals, is significantly increased. Non-governmental institutions of higher education assume serious financial obligations for rent and utility bills, the use of means of communication, remuneration of professors and teaching staff, and bear independent property responsibility for the funds at his disposal.

2.2. Building a Model of the Process of Risk Management of the Educational Activities of Higher Education Institutions

As mentioned above in the conditions of market relations, the process of implementing risk management strategies should become part of the management work of a higher education institution along with the management of the educational process, research, finance, etc.

That is why, in this article, risk management in the activities of institutions of higher education is considered as a set of methods for analyzing and neutralizing risk factors, combined into a planning, monitoring and corrective action system, which can be represented in the form of a diagram-algorithm Fig. 4.

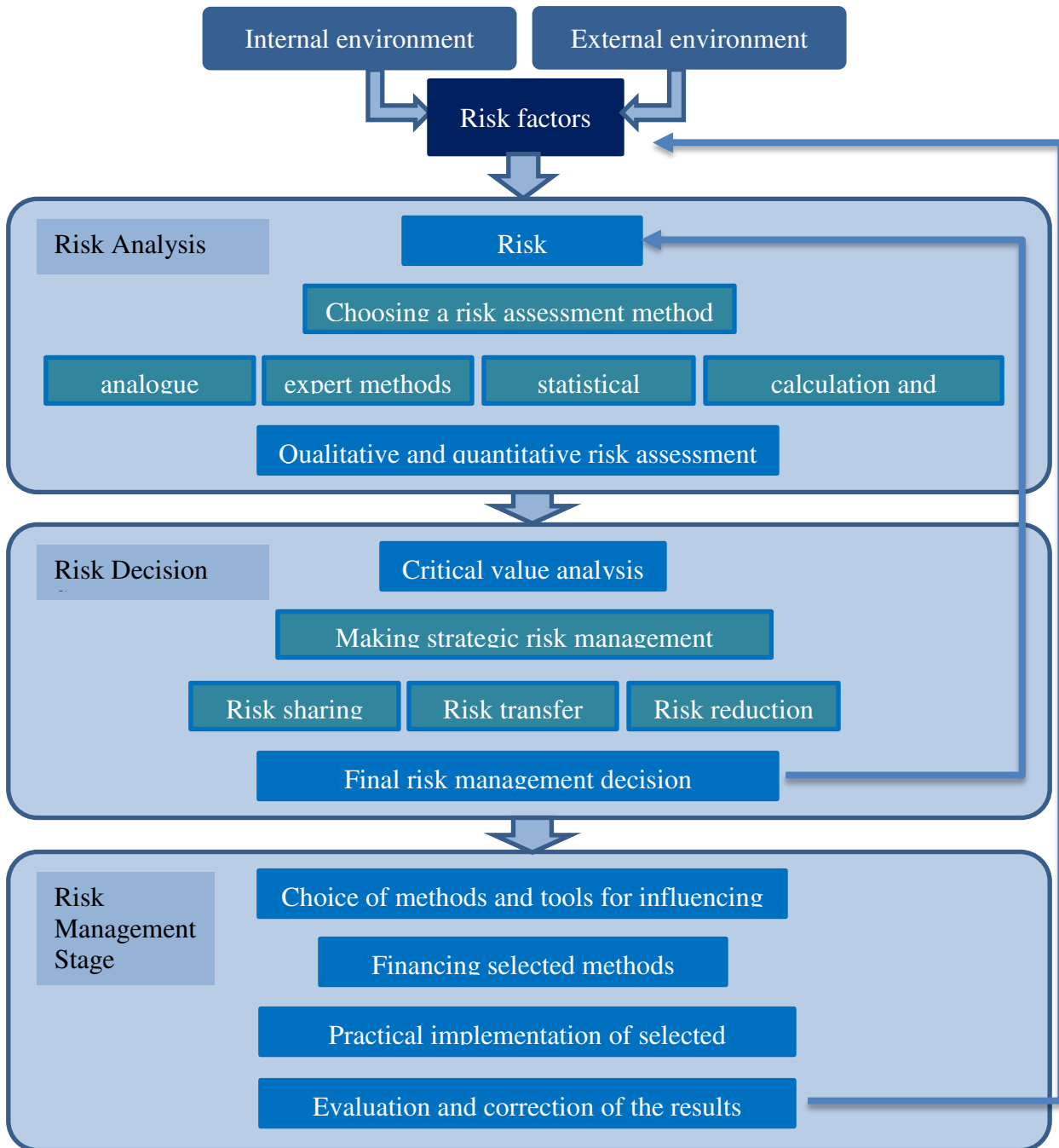


Figure 4 The risk management algorithm of educational activities of higher education institutions

The proposed algorithm allows for flexibility and adaptability of the risk management system in the activities of higher education institutions due to the fact that the results of each stage become data for subsequent stages, forming a decision-making system with feedback. Such a system ensures the most efficient achievement of risk management goals since the information obtained at each stage allows you to adjust not only the methods of influencing the risk but also the risk management goals themselves.

The multifaceted nature of the risks that accompany any activity is primarily due to a variety of factors characterizing both the features of a particular type of activity and the specific features of the uncertainty under which this activity is carried out. Risk-forming factors characteristic of the educational activities of higher education institutions may manifest themselves in different ways; the role of the same factors in different situations may not be the same.

In conditions of uncertainty and the lack of reliable information about risk situations in the form of frequencies of their manifestation, the most effective method for assessing risk factors is mainly the method of expert assessments. In this case, conducted through a survey, implemented by obtaining individual opinions of members of the expert group with subsequent processing of the data. The correctness of the implementation of the survey program is confirmed by the involvement of experts with the highest degree of competence in the field of higher education as experts. The assessment of experts will be based on the analysis of a number of key indicators that determine the risks inherent in the educational process.

It should be noted that these indicators can be calculated as risk factors for a single discipline, per student, or for the whole educational institution, depending on the needs of risk analysis.

Risk of insufficient funding for educational activities

$$rnf = A * rnbf + B * rndf \quad (1)$$

$$rnbf = \frac{nbs}{pbs} \quad (2)$$

where A and B are weights; $rnbf$ – the risk of lack of budget funding; $rndf$ – the risk of lack of other sources of financing; nbs – the lack of funds; pbs – the need for funds

Risk of lack of qualified teaching staff

$$rnpk = \frac{npq}{tpq} \quad (3)$$

where npq is the number of teachers with insufficient qualifications; tpq – total number of teachers in higher education institutions

The risk of insufficient information support of the scientific and educational process

$$rnio = \frac{nkd}{tkd} + \sum_{i=1}^N Ai * \frac{nli}{tli} \quad (4)$$

where nkd is the lack of high-speed access channels to information resources; tkd – the required number of high-speed access channels to information resources; nli – lack of literature of the i -th type or in the i -th discipline; tli – the required amount of literature of the i -th type or on the i -th discipline; Ai – the weight coefficient; N – the number of disciplines or types of literature.

The risk of the imperfection of the material and technical base

$$rno = \sum_{i=1}^N Ai * \frac{uoi}{tnoi} + \sum_{i=1}^N Bi * \frac{noi}{toi} \quad (5)$$

where uoi – obsolete equipment of the i -th type; $tnoi$ – all available equipment of i -type, noi – lack of equipment of i -type; toi – all the necessary equipment of the i -th type.

The risk of non-compliance of educational and methodological support with modern requirements

$$rnp = \sum_{i=1}^N Ai * \frac{nqi}{tqi} \quad (6)$$

where nqi – the number of discrepancies of the i -th assessment object; tqi – the number of requirements for the i -th assessment object

Risk of low level of training for applicants

$$rnua = \frac{qn}{qpk} \quad (7)$$

where qn – the number of failed students by the end of the 1st semester; qpk – the total number of students admitted to the first year

This criterion can also take into account *the risk of non-fulfilment of the enrollment plan.*

$$rnua = \frac{qnk}{tqa} \quad (8)$$

where qnk – the number of the failed contest; tqa – total number of applicants

As well as a variant of the general lack of the number of applicants for study places, formed by state order

$$rnua = \frac{nqa}{pnb} \quad (9)$$

where nqa – the lack of applicants for a budget set; pnb – budget recruitment plan

The risk of poor-quality educational services

$$rnko = A(A_1 * rnpk + A_2 * rnio + A_3 * rno) + B * rnp + C * rnua \quad (10)$$

where A, A_1, A_2, A_3 – weighting factors that determine the level of influence of risks of educational-methodological, material and technical base and qualification character, B and C – weighting factors that determine the level of influence of risks of educational-methodological support and preliminary training of applicants.

The traditional methods of risk reduction, considered by the classical risk management system, as applied to the educational process of an educational institution, acquire a number of features in their interpretation (presented in detail in Fig. 5).

Diversification of risks – involves the expansion of the geography and scope of activities, as well as the possibility of integration with other market participants, also includes mechanisms to expand the sources of financing of educational activities and the used methods of educational processes.

Risk transfer – this group of methods involves the transfer of a number of risks to subcontractors, both by concluding service contracts and supporting non-core (non-core) activities, as well as transferring a number of functions to outsourcing.

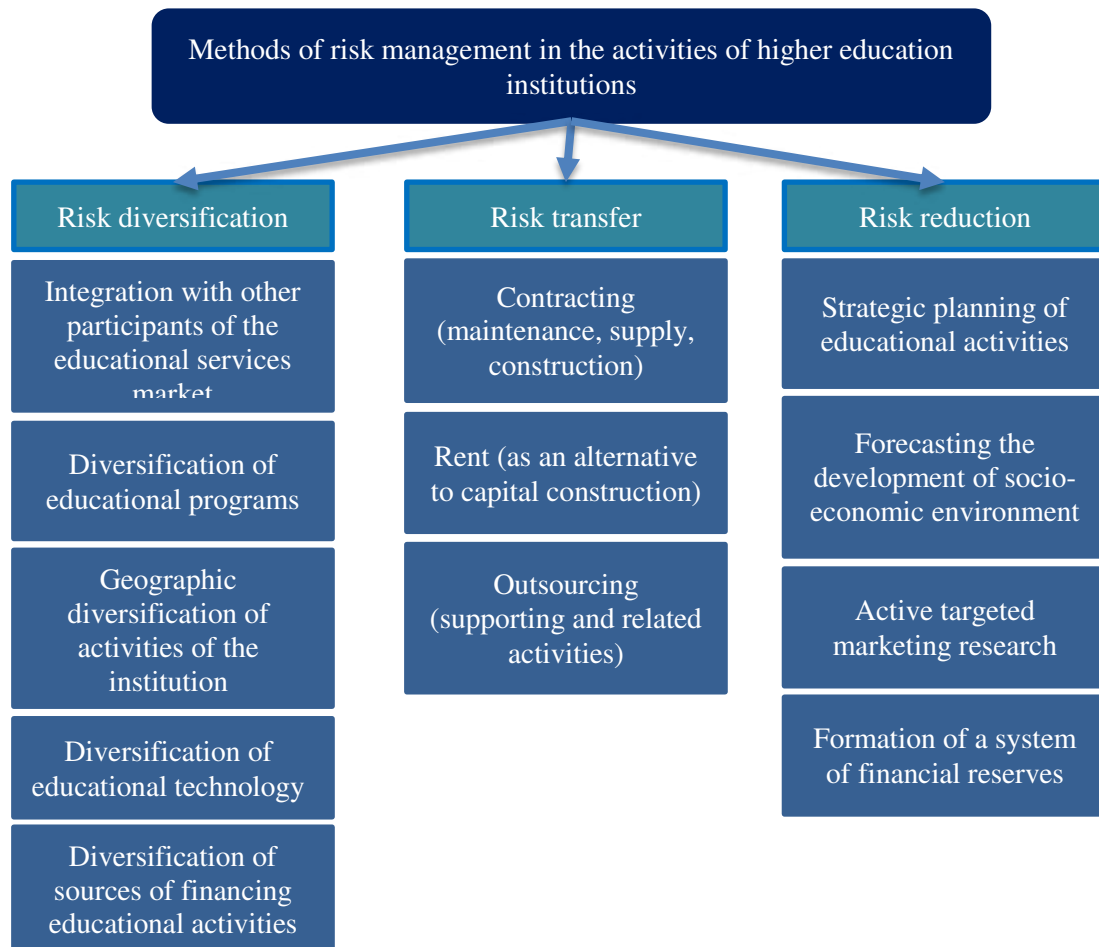


Figure 5 Adaptation of risk management methods to the educational activities of higher education institutions

Risk reduction – includes mechanisms to prevent the occurrence of the risk, or reduce the impact of its occurrence on the educational process, involves the use of strategic planning techniques, marketing and socio-economic analysis, as well as reserving funds to compensate for losses.

3. EXPERIMENT AND ANALYSIS OF THE RESULTS

The experiment will be based on a higher education institution specializing in the preparation of bachelors and masters in computer technology, in the following specialities:

- Computer science;
- Systems Engineering;
- Software Engineering;
- Computer engineering;
- Applied Mathematics;
- Security of information and communication systems;
- System analysis.

The study of the level of professional training of students can be started by considering the dynamics of changes in the performance scores of applicants, students and graduates over 8 years, presented in the diagram Fig. 6.

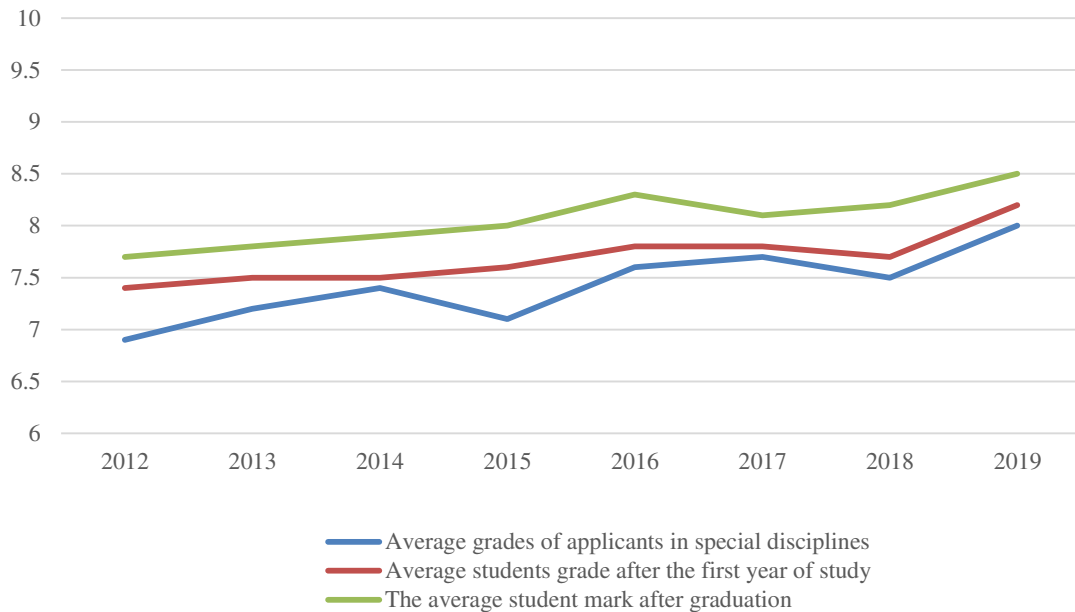


Figure 6 Graph of the dynamics of changes in student achievement scores

The trend in university policy to increase both the average score of applicants and the average level of academic performance of graduates is clearly monitored. This indicates the directional policy of the teaching staff to improve the educational process.

As for testing the risk management methodology, it is worth noting that the proposed methodology was used exclusively as a complementary risk management system for this university. In practice, this meant that a systematic analysis was carried out and expert assessments were prepared, the risks of reducing the quality of training were worked out, and recommendations were given by the administration of the educational institution, but control over the choice of risk management methods, financing of risk control mechanisms, as well as adjustment of management results remained the sole prerogative of the administration of the university.

Risk analysis of educational activities was carried out in the context of the main areas of training; preliminary data for each speciality are presented in Table 1.

Table 1 The indicators of higher education institutions in the context of the main specialities

Internal code	Name of speciality	Number of students enrolled in studies	Total number of students studying	Number of teaching staff	Percentage of students studying for a fee	Amount of financing, thousand dollars	Sufficiency of financing
501.1	Computer science	45	240	17	82%	350	96%
502.3	System engineering	52	232	18	85%	320	93%
703.2	Software engineering	67	318	25	78%	420	92%
704.5	Computer engineering	63	349	23	77%	435	87%
404.6	Applied	28	158	12	74%	227	86%

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	Mathematics						
405.7	Security of information and communication systems	47	247	14	91%	342	96%
802.5	System analysis	25	117	9	84%	157	96%
	Total	327	1661	118		2251	

Next, an expert assessment of the weights corresponding to the coefficient is carried out, and risk indicators are calculated, for example, we give calculations of the risk of insufficient financing of educational activities, for speciality 501.1 Computer Science, the amount of funding for this specialization is 350 thousand dollars, with underfunding, that is, a budget deficit of this speciality is 4%, respectively, the risk factor $r_{mbf} = 13/350 = 0,0371$

The results of the expert evaluation of specialists are presented in Table 2.

Table 2 Expert risk assessment of educational activities of higher education institutions

Risks	501.1	502.3	703.2	704.5	404.6	405.7	802.5
Risk of insufficient funding for educational activities	0,0371	0,0719	0,0905	0,1540	0,1630	0,0439	0,0446
Risk of lack of qualified teaching staff	0,0678	0,0339	0,0169	0,1017	0,0085	0,0254	0,0085
Risk of insufficient information support of the scientific and educational process	0,0052	0,0002	0,0029	0,0034	0,0002	0,0008	0,0004
Risk of imperfection of the material and technical base	0,0740	0,1051	0,0196	0,0343	0,0036	0,0165	0,0076
Risk of non-compliance of educational and methodological support with modern requirements	0,0002	0,0001	0,0002	0,0001	0,0001	0,0002	0,0001
Risk of low level of training for applicants	0,0444	0,0385	0,0597	0,0794	0,0714	0,1064	0,0400
Risk of poor-quality educational services	0,0958	0,0889	0,0496	0,1095	0,0419	0,0746	0,0283

An analysis of the data shows that in three specialities: "Software Engineering", "Computer Engineering" and "Applied Mathematics" there is an increased risk of insufficient funding, and it is precisely in these specialities that the majority of students involved in paying for tuition through the state budget (22%, 23 % and 26% respectively), which allows us to conclude that there may be insufficient subsidized financing of these specialities at the expense of state funds.

In the two specialities "Computer Science" and "Computer Engineering", the increased risks associated with the lack of teaching staff with the necessary qualifications, primarily the lack of teachers in the departments of these two specialities, is explained by the presence of partially overlapping related disciplines, which causes an additional burden on the teaching staff structure.

It is also worth noting the special attention areas in the category "Risk of the imperfection of the material and technical base" in the speciality "System Engineering", the reason for which was the untimely updating of the educational equipment park, and "Risk of the low level of training of applicants" in the specialities "Security of information and communication systems" and "Computer Engineering" - this was caused by a decline in student performance in these specialities after the first year of study.

In general, the increased level of risk in the three categories naturally influenced the increase in the total level of "Risk of poor quality of educational services" for the speciality "Computer Engineering". The data of the analysis carried out according to the proposed scheme, in general, coincided with the conclusions of the university administration, which drew attention to the presence of potential risk situations at the department engaged in the preparation of this category of specialists, which once again confirmed the viability of the proposed methodology.

4. CONCLUSION

At the present stage of development of society, higher education institutions are increasingly becoming subjects of the economic market, providing a wide range of educational services. Their activities are now largely determined by the level of supply and demand for educational services and evaluated in terms of economic performance criteria. The application of the risk management concept will provide the educational institution with the most efficient use of its existing potential in accordance with the requirements of the market and will allow timely response to changes in the external environment.

When constructing the organizational structure of risk management in higher education institutions, it is advisable to use and test various models that combine both centralization of risk management in the institution as a whole and the possibility of delegating risk management between separate functional units.

The risk management technique proposed in the article can be used as an additional mechanism for monitoring and analyzing risk situations and can serve as the basis for a complete independent risk management system for higher education institutions.

REFERENCES

- [1] Prokopenko O., Kudrina O., Omelyanenko V. ICT support of higher education institutions participation in innovation networks, CEUR Workshop Proceedings, 2387, 2019, P. 466-471.
- [2] Kuzior, A., Kwilinski, A., Tkachenko, V. Sustainable development of organizations based on the combinatorial model of artificial intelligence, *Entrepreneurship and Sustainability*, 7(2), 2019, 1353-1376.
- [3] Prokopenko O., Kudrina O., Omelyanenko V. Analysis of ICT Application in Technology Transfer Management within Industry 4.0 Conditions (Education Based Approach), CEUR Workshop Proceedings, 2105, 2018, P. 258-273.
- [4] Tkachenko, V., Kuzior, A., Kwilinski, A. Introduction of artificial intelligence tools into the training methods of entrepreneurship activities, *Journal of Entrepreneurship Education*, 22(6), 2019, P. 1-10.
- [5] Bondarenko, S., Liliya, B., Oksana, K., Inna, G. Modelling instruments in risk management, *International Journal of Civil Engineering and Technology*, 10(1), 2019, P. 1561-1568.
- [6] Tkach Ivan M., Loishyn Anatolii A., Uhrynovych Oleh I., Okipniak Dmitry A., Potetiueva Maryna V. Risk management in defense program: Evidence from Ukrainian arm forces, *Management Science Letter*, №9(7), 2019, P. 1071-1082.
- [7] Tkach Ivan M., Loishyn Anatolii A., Liashenko Ihor O., Zinchenko Andrii, Lobanov Anatolii A. Research of main international approaches for risk management process's standardization in the context of internal control standardization in the Armed Forces of Ukraine and providing national security, *Revista Espacios*, Vol. 40 (Number 20), 2019, P. 14

- [8] Pliashko O. S., Lybak I. A. Influence of Environment Factors on the Activities of Higher Education Institutions, June 2019, DOI: 10.32983/2222-4459-2019-6-108-114
- [9] Svitlana Semenyu, Video marketing in the activities of higher education institutions, March 2019, DOI: 10.15276/mdt.3.1.2019.5
- [10] Arnesh Telukdarie, Megashnee Munsamy. Digitization of Higher Education Institutions, *2019 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)*, December 2019, DOI: 10.1109/IEEM44572.2019.8978701
- [11] Agnė Vaiciukevičiūtė, Jelena Stankeviciene, Nomeda Bratcikoviene. Higher education institutions' impact on the economy, *Journal of Business Economics and Management*, 20(3), April 2019, P.507-525 DOI: 10.3846/jbem.2019.10156
- [12] Samuel King Opoku, Samuel Appiah, Automating Students' Activities in Higher Educational Institutions, October 2016, DOI: 10.7753/IJCATR0511.1003
- [13] Ibrahim Waheed, Prof. Dr. Andy Seddon, Utilisation and Challenges of the Learning Management Systems in the Higher Education Institutions in Maldives: The Lecturers' and Students' Perspectives, *International Journal of Information Technology & Management Information System*, 10(1), 2018, pp. 01–10.
- [14] Senthil Kumar J, Venkataraman V, Meganathan S and Meena V, A Data Mining approach to classify Higher Education Sector data using Bayesian Classifier, *International Journal of Mechanical Engineering and Technology*, 8(9), 2017, pp. 95–103.
- [15] Hamad Balhareth, Cloud Computing Strategy and Adoption in Higher Education: The Case of Saudi Arabia. *International Journal of Information Technology & Management Information System*, 9(1), 2018, pp. 30–38.
- [16] Natalie V. Kamenez, Elena A. Aleshugina, Olgai. Vaganova, Zhannav. Smirnova and Anna V. Chanchina, Competency-Oriented Improvement of an Additional Language Educational Program in Technical Higher Education, *International Journal of Mechanical Engineering and Technology*, 9(11), 2018, pp. 1137–1145.