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THE RISK MANAGEMENT IN HIGHER EDUCATION SYSTEM

Abstract

The purpose of the article is to study the system for assessing the quality of education in the context of risk management in the activities of higher educational institutions. The definition of the concept of «risk in the higher education system» is given. The methodological basis of the study is the provisions of the theory of system analysis, the concept of process management and management by results; provisions on the social, activity, creative essence of the individual and the multifactorial nature of the development of the effectiveness of his management process and the justification of its criteria and indicators; system-structural approach, its application in the theory and practice of pedagogical science; approach to action, quality management of education, methodology of pedagogical research. The article covers the analysis of the research of domestic and foreign scientists in the field of strategic management and quality assurance in higher education institutions, the use of risk management, the analysis of the processes of activity of higher educational institutions. The authors propose a methodology for identifying and managing risks at the university. To prevent risks, it is recommended to develop a risk management map, which is determined by the

importance of risks and the likelihood of their occurrence. The authors studied risk categories, as well as assessing the degree of risk. Risk assessment provides constructive information and analysis to consider specific risks and make informed decisions about the choice between options. The authors also outlined recommendations to reduce the occurrence of risks in the process of activity of the Kazakh agrotechnical research university named after Saken Seifullin. The use of the above elements allows us to develop not only the organization of the educational process in higher educational institutions, but also its quality management system.

Keywords: risk, higher education, risk management system, risk management card, risk identification.

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ЖОҒАРЫ БІЛІМ БЕРУ ЖҮЙЕСІНДЕГІ ТӘУЕКЕЛДЕРДІ БАСҚАРУ

Аңдатпа

Мақаланың мақсаты - жоғары оқу орындарының қызметіндегі тәуекелдерді басқару жағдайында білім сапасын бағалау жүйесін зерттеу. «Жоғары білім беру жүйесіндегі тәуекел» ұғымына анықтама берілген. Зерттеудің әдіснамалық негізі жүйелік талдау теориясының ережелері, процестерді басқару және нәтижелер бойынша басқару тұжырымдамасы болып табылады; жеке тұлғаның әлеуметтік, іс-әрекеті, шығармашылық мәні және оның басқару процесінің тиімділігін дамытудың көп факторлы сипаты және оның критерийлері мен көрсеткіштерін негіздеу туралы ережелер; жүйелік-құрылымдық тәсіл, оны педагогика ғылымының теориясы мен практикасында қолдану; іс-әрекетке көзқарас, білім беру сапасын басқару, педагогикалық зерттеу әдістемесі. Мақалада жоғары оқу орындарында стратегиялық басқару және сапаны қамтамасыз ету саласындағы отандық және шетелдік ғалымдардың зерттеулерін талдау, тәуекел-менеджментті пайдалану, жоғары оқу орындары қызметінің процестерін талдау қамтылған. Авторлар университеттегі тәуекелдерді анықтау мен басқарудың әдістемесін ұсынады. Тәуекелдердің алдын алу үшін тәуекелдердің маңыздылығымен және олардың туындау ықтималдылығымен анықталатын тәуекелдерді басқару картасын әзірлеу ұсынылады. Авторлар тәуекел категорияларын, сонымен қатар тәуекел дәрежесін бағалауды зерттеді. Тәуекелді бағалау нақты тәуекелдерді қарастыру және нұсқалар арасында таңдау туралы негізделген шешімдер қабылдау үшін конструктивті ақпарат пен талдауды қамтамасыз етеді. Зерттеу барысында тәуекелді бағалауды жүргізудің негізгі артықшылықтары анықталды. Сондай-ақ, авторлар Сәкен Сейфуллин атындағы Қазақ агротехникалық зерттеу университетінің қызмет процесінде тәуекелдердің пайда болуын азайту бойынша ұсыныстар көрсетілген. Жоғарыда аталған элементтерді пайдалану бізге жоғары оқу орындарында білім беру процесін ұйымдастыруды ғана емес, сонымен қатар оның сапасын басқару жүйесін жасауға мүмкіндік береді.

Түйін сөздер: тәуекел, жоғары білім, тәуекелдерді басқару жүйесі, тәуекелдерді басқару картасы, тәуекелдерді анықтау.

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УПРАВЛЕНИЕ РИСКАМИ В СИСТЕМЕ ВЫСШЕГО ОБРАЗОВАНИЯ

Аннотация

Целью данной работы является изучение системы оценки качества образования в условиях управления рисками в деятельности высших учебных заведений. В работе определено понятие «риск в системе высшего образования». Методологической основой исследования являются положения теории системного анализа, концепции процессного управления и управления по результатам; положения о социальной, деятельностной, творческой сущности личности и ее многофакторном характере развития эффективности процесса управления и обоснование его критериев и показателей; системно-структурный подход, его применение в теории и практике педагогической науки; деятельностный подход, управление качеством образования, методология педагогических исследований. Также приводится подробный анализ исследований отечественных и зарубежных ученых в области стратегического управления и обеспечения качества в высших учебных заведениях, использования управления рисками и процессами в высших учебных заведениях. Авторы предлагают методологию выявления и управления рисками в высших учебных заведениях, которая предполагает обнаружение, идентификацию и устранение рисков. Для предотвращения рисков рекомендуется разработать карту управления рисками, которая определяет значимость и вероятность их возникновения. Авторы рассмотрели оценку рисков, а также их категории. Оценка рисков позволяет получить конструктивную информацию и анализ, рассмотреть конкретные риски и принять обоснованное решение о выборе вариантов. В исследовании определены основные выгоды и ключевые преимущества проведения оценки рисков. Также были даны рекомендации по снижению возникновения рисков в процессе деятельности Казахского агротехнического исследовательского университета им. Сакена Сейфуллина. Приведенные выше элементы могут быть использованы не только для организации учебного процесса в университете, но и для развития его системы менеджмента качества.

Ключевые слова: риск, высшее образование, система управления рисками, карта управления рисками, идентификация риска.

Introduction. At this juncture in time, the Republic of Kazakhstan is equipped with a robust and comprehensive national framework that is meticulously designed to evaluate the quality of educational practices and outcomes, which intricately includes a multitude of components such as the terminal assessments administered to students, the rigorous processes surrounding the accreditation and certification of various educational institutions, as well as the thorough evaluation of teaching personnel, among a plethora of other critical elements that contribute to the overarching educational landscape.

However, it is imperative to note that this evaluative framework, while extensive, does not adequately address or mitigate the potential risks that are inherently present within the higher education sector, thereby leaving certain vulnerabilities unexamined and unaddressed.

From a theoretical standpoint, risk is delineated as the probability or likelihood of encountering various forms of loss, which may stem from a myriad of human actions, specific contextual circumstances, or even natural phenomena, and this includes but is not limited to instances of mismanagement, unforeseen occurrences, and a diverse array of additional factors that could compromise the stability and integrity of the educational system [1, 2].

The methodological underpinnings of this inquiry are firmly rooted in the principles of systems analysis theory, encapsulating the framework of process management and emphasizing results-oriented management; this encompasses a wide array of notions pertaining to the social, functional, and creative dimensions of the individual, while simultaneously considering the multifaceted aspects of enhancing the efficacy of management processes and justifying the criteria and metrics

employed within this context; the systemic-structural perspective is also included, highlighting its application in both theoretical and practical domains of pedagogical science, alongside an activity-oriented approach to educational quality management and the methodologies relevant to pedagogical research. Nevertheless, despite the extensive body of research that has been conducted within the field of economic science, a unified and cohesive conceptualization of its fundamental nature remains frustratingly elusive and difficult to pin down.

Within the realm of higher education, the existence of risks is particularly pronounced due to the fact that these risks are inherently interconnected with educational, scientific, social, and economic dimensions, and arise for a multitude of reasons that are intimately linked to their complex and multifaceted nature, which necessitates a thorough examination and understanding of these interrelations in order to effectively address them. These aspects, interacting with each other, create unique challenges that can affect various aspects of the University's activities. There are several main factors that indicate why risks are common in higher education. Internal factors include the quality of teaching and research at a high level to maintain academic prestige. Effective financial and corporate governance, including resource allocation and strategic planning, plays a key role in the sustainability of the University. The cultural environment and social dynamics in universities, such as internal disagreements and issues of academic freedom, can create tension. In addition, attracting and supporting students, including providing attractive educational programs and development opportunities, are also important aspects for the successful functioning of higher education institutions.

Historically, risk was associated with the probability of adverse outcomes, in contrast to the notion of «chance», which denoted the potential for favorable results; however, contemporary understanding integrates both the negative and positive dimensions of risk. In this context, negative risk is viewed as a peril or threat, whereas positive risk is regarded as an opportunity. The perception of risk as an opportunity is predicated upon the relationship between risk and return, indicating that an elevation in risk correlates with an increase in potential returns, but also entails a greater likelihood of loss. Conversely, the conceptualization of risk as a threat is rooted in the examination of adverse occurrences such as financial detriment, theft, reputational harm, damages, or insolvency, among others.

The notion of integrating both positive and negative risks is highly scholarly in nature. It references a theoretical framework known as the probability distribution of potential outcomes (both favorable and unfavorable). For example, in GOST R ISO 31000-2010 «Risk management. Principles and Guidelines», risk is defined as the influence of uncertainty on goals. Furthermore, the effect is characterized as a positive or negative divergence from anticipated results [3].

Through an extensive and meticulous examination, as well as a comprehensive evaluation, of a diverse array of literature that is specifically focused on the multifaceted aspects of higher education alongside the principles and practices of quality assurance embedded within various educational frameworks, the following nuanced definition was articulated and elucidated: Risk, in this context, refers to a conceivable and potential scenario that may emerge during the intricate execution of a particular activity, which may in turn result in a significant deviation from the intended outcomes or, alternatively, a failure to successfully accomplish an established and predetermined objective that has been set forth within the educational paradigm.

The scientific approach to managing risks in the educational activities of higher education institutions begins with their classification. Russian scholars have identified three key methods for classifying risks: 1) based on distinguishing between primary and secondary characteristics; 2) based on separating external and internal factors; and 3) by focusing on subjects (individuals, society, and the state). Each of these methods offers distinct advantages. For instance, classifying risks based on primary and secondary characteristics facilitates grouping them in a way that is most practical for applying management tools and strategies. The classification of risks into external and internal categories helps in quickly pinpointing risk sources and selecting appropriate management techniques. Meanwhile, classifying risks by subjects provides a comprehensive understanding of the

risks and their interconnections. It is also important to recognize that higher education is a critical component of a nation's economic security. As its primary objective is to produce highly qualified professionals who meet labor market demands, the education sector plays a vital role in the "individual – enterprise – state" relationship. This role arises from the overlapping needs of these stakeholders: individuals seek professional knowledge and skills, businesses need skilled workers to maintain competitiveness, and the state aims to boost GDP and earn returns from investments in education.

Risk identification is the process of discovering, recognizing, and documenting potential risks. In our view, the aim of identifying risks is to understand what events or situations could occur and potentially hinder the achievement of an organization's or system's objectives. After recognizing a risk, the organization should assess any existing safeguards in place, such as design elements, personnel, processes, and systems.

The risk identification process involves pinpointing the root causes and sources of risk (such as dangers associated with physical harm), as well as the events, conditions, or circumstances that could significantly impact the organization's goals and how they may influence those objectives.

To effectively identify risks, the following methods can be employed:

- evidence-based methods such as checklists and historical data analysis;
- systematic group methods, where the expert group follows a systematic process to identify risks through a structured set of instructions or questions;
-methods of automatic inductive reasoning.

Basic provisions. The main purpose of the article is to manage the risks of higher education institutions, as well as to identify the likelihood of their occurrence. To do this, the article uses a risk map, with which we have divided the risks into hazard groups and probability of occurrence. Thus, three categories were identified: critical risk, acceptable risk and insignificant risk. The time of occurrence was identified for each degree of danger. In general, the purpose of the study is to minimize the risks of higher education institutions in order to improve the quality of the education system.

Materials and methods. Various supportive techniques can be used to improve the accuracy and completeness of risk identification, including brainstorming and the Delphic method.

One of the important problems in the risk management system is their systematization, identification and development of a common classification system. Each institution of higher education, based on an analysis of the external and internal environment, conducts an analysis in order to develop a methodology for their management [6].

In order to effectively manage risks within the academic institution, specifically at «S Seifullin Kazakh Agrotechnical Research University» NC JSC, ten principal categories of risks have been delineated pertinent to the university's operational processes, which are prioritized based on their significance in the provision of educational services. To facilitate subsequent management efforts, classifications of risks have been formulated, correlating with the identified types of risks.

The subsequent categories have been established:
1) Based on the nature of the interactions involved;
2) In accordance with the scale of the activities undertaken;
3) By virtue of the interplay of internal factors;
4) Relative to the classification of the educational services market.

The risks that have been identified through a systematic analytical process have been meticulously classified into the previously mentioned categories, and in order to facilitate the effective management and subsequent development of a holistic risk management framework, unique codes have been designated to each risk category, thereby enhancing clarity and operational efficiency in addressing these risks.

The next critical step within the intricate field of risk management, particularly in the context of an academic institution such as a university, involves the implementation of a thorough risk assessment, which is fundamentally a vital element of the risk management paradigm and represents

a structured methodology aimed at thoroughly appraising the potential impacts associated with the diverse objectives set forth by the institution. This crucial phase necessitates a detailed examination of the identified risks through a methodical and sequential analytical approach, which includes assessing the probabilities associated with these risks, and it precedes the formulation of strategic considerations that will guide future actions and decisions within the university framework. The primary aim of engaging in a comprehensive risk assessment is to provide essential data and critical analytical perspectives that will empower institutional stakeholders to make well-informed decisions regarding the appraisal of specific risks, as well as to navigate the selection process among the various alternative strategies available for managing those risks effectively. During the course of the research initiative, a variety of significant benefits associated with the effective implementation of a thorough risk assessment were identified and documented, which include, but are not limited to, an enhanced understanding of the myriad risks and their potential impacts on the operational facets of university life; the provision of indispensable information to individuals occupying decision-making roles within the institution; an augmentation of knowledge pertaining to the identified risks that is instrumental in establishing relevant evaluative criteria; the identification of principal stakeholders who play a pivotal role in relation to risk management and the vulnerabilities present within various systems and organizational structures; and the comprehensive evaluation of risks as they pertain to an array of systems, technologies, or methodologies deployed within the academic environment.

Additionally, risk assessments offer substantial assistance in prioritizing risks, which is essential for effective resource allocation; contribute to the prevention of incidents by leveraging insights gained from analyses conducted after incidents have occurred; facilitate the selection of appropriate risk treatment strategies; ensure compliance with pertinent legal and regulatory requirements that govern risk management practices; and provide valuable information that aids in determining the acceptability of various risks in comparison to the established criteria set forth by the institution.

The foundational tenets of risk management encompass a range of policies, procedures, and organizational frameworks designed to implement an effective risk management system that operates at all levels within the institution, ensuring that risk considerations are integrated into the organizational culture and decision-making processes.

In the context of higher education, where the primary mission revolves around delivering high-quality educational services and engaging in robust research activities, it is imperative that the assessment of risk levels pertaining to educational programs be conducted at least once every academic year in order to maintain a proactive stance toward risk management and to safeguard the institution's objectives.

Results and Discussion. When identifying risks, each process manager establishes the likelihood of risk occurrence by determining the percentage of high and unlikely risks for each process, based on this, the risk framework is determined. A risk map is drawn up based on the likelihood and significance of the risks. Risk assessment is a combination of the probability of risk and its materiality. Risk assessment is carried out with a forecast horizon equal to 1 year. The probability of risk is an expert metric and is determined on a 5-point scale (Table 1).

Table 1 Scale for determining the likelihood of risk

Point score	Value in %	Interpretation
1 (Very low)	1-7%	The event will most likely occur no more than once every 15 years
2 (Low)	7-20%	The event will most likely occur once every 5-15 years
3 (Medium)	20-50%	The event will most likely occur once every 2-5 years
4 (High)	50-70%	The event is likely to occur in the next 1-2 years
5 (Very high)	>70%	The event is likely to occur in the coming year

Process managers on the above scale, based on the analysis of their processes, determine the likelihood of risks. The likelihood of risk occurrence is determined for 1 calendar year.

The final Z value is determined by: the number of probable risks from 30% (30 inclusive) -A, we divide by the total number of probable risks in this process - B, multiplying by 100%.

$$Z = \frac{A}{B} * 100\%$$

Risk analysis is primarily concerned with the cultivation of a comprehensive understanding of various risks that may impact an organization or institution. This analytical process provides essential data that is crucial for the thorough assessment of these risks and for making informed decisions regarding the necessity of taking risks into account, as well as determining the most suitable strategies and methodologies for their evaluation and consideration. In the realm of risk analysis, there exists a critical examination of the underlying causes and sources of risks, in addition to a detailed analysis of their potential consequences and the probability of these consequences actually materializing in a real-world context. It is imperative to identify the various factors that may influence both the nature of the consequences and the likelihood of their occurrence, as these factors play a significant role in the overall risk landscape. Furthermore, it is important to recognize that a single event can yield a multitude of consequences, which in turn can have far-reaching effects on numerous organizational goals and objectives, as illustrated in previous academic studies [7].

To effectively mitigate potential risks, it is strongly recommended that a comprehensive risk management map be developed, which is strategically determined by evaluating the significance of identified risks in conjunction with the likelihood of their occurrence within the operational framework. In light of this, three primary parameters have been meticulously identified, which are critical in understanding the degree of influence these risks have on the functioning and activities of a higher educational institution, as depicted in the accompanying Figure 1. The identification and analysis of these parameters are essential for formulating a robust risk management strategy that is tailored to the unique challenges faced by educational institutions in today's complex environment. By integrating these insights into the risk management framework, institutions can enhance their resilience and adaptability in the face of uncertainty. Ultimately, the development of such a map not only aids in the prioritization of risks but also provides a structured approach for decision-makers to navigate the intricacies of risk management in an academic setting.

-    -   Critical risk
-    -   Acceptable risk
-    -   Minor risk

Figure 1. Three main parameters according to the degree of influence

Risk monitoring is about controlling the level of risk. This is achieved by updating on a regular basis (once a year) information on risks, risk management measures, the status of measures implementation, as well as by monitoring the degree of influence and likelihood of risks that were developed earlier at the stage of risk identification and assessment.

The identified clusters of critical risks facilitate the identification of key problem areas within the educational process, allowing for the designation of responsible departments for further detailed analysis, aimed at devising specific methods for risk minimization. Undoubtedly, the spectrum of risks associated with the educational domain is extensive, varied, and continues to expand over time. Consequently, a qualitative resolution to this issue cannot be achieved through isolated procedures aimed at reducing losses stemming from realized risks; rather, it necessitates the development and implementation of a comprehensive risk management system within higher education institutions.

Thus, the top five most critical risks can be attributed to:
1) Strategic
2) Educational
3) On scientific activity
4) Educational work
5) On International Relations
6) Financial
7) Personnel
8) Legal
9) Information
10) Life support

Financial risks are dependence on external funding: universities are heavily dependent on external funding, including government grants, private donations, and income from tuition fees. Changes in economic conditions, such as recessions or cuts in the state budget, can lead to a decrease in these sources of income. For example, cuts in funding from private donors can especially affect universities with large endowments, such as Harvard or Stanford. * Endowment management risks: universities with large funds, such as Harvard and Stanford, face risks associated with fluctuations in financial markets. Mismanagement of these funds can lead to significant losses, which will negatively affect the long-term financial stability of universities. [3]

When it comes to ethical risks in research, universities that conduct advanced research, such as Harvard and Oxford, face ethics dilemmas. This includes areas such as artificial intelligence, biotechnology and genetics, where abuse and ethical violations can occur. Conflicts over ethical violations can damage the reputation of universities and lead to legal consequences.

Cyber threats include forms of cyberattacks due to the large amount of stored data, including personal data of university students, research and the results of innovative projects. Attacks can lead to data corruption, theft of intellectual property, and malfunctioning of universities.

Political risks include ongoing changes in legislation by universities that limit their academic freedom or affect funding. For example, new immigration laws can make it difficult to attract foreign students and teachers, which is important for universities like Cambridge.

Modern universities seek to create an inclusive environment that respects cultural, ethnic and gender differences. However, the growth of social polarization and discrimination can cause difficulties in maintaining this environment. Universities may face pressure from students, staff, and society as a whole that demands greater justice and equality. Campus culture and safety issues related to the safety of students and staff are becoming increasingly relevant. This includes preventing violence, combating harassment, and ensuring the mental health of students.

In the realm of risk theory, the concept of risk is fundamentally understood as the potential for incurring losses that may emerge from the intrinsic attributes associated with certain natural phenomena, as well as various forms of human activity; this includes the probability of making erroneous or suboptimal management decisions that could lead to unfavorable outcomes; furthermore, it encompasses the likelihood of confronting unforeseen circumstances that may arise during the implementation of specific activities or operations. The manifestation of a risky event can produce a wide array of outcomes, which may be classified as negative, positive, or neutral (where everything transpires as originally intended) [8].

In the particular scenario being analyzed, the risk primarily pertains to the potential failure of stakeholders to realize their objectives, which are intricately linked to the quality of the educational services provided. For example, a business enterprise may find itself unable to enhance labor productivity in a timely manner due to the inadequate qualifications and competencies of its workforce, which highlights the critical importance of education. Moreover, it is pertinent to acknowledge the possibility that through the implementation of a highly effective and continuously evolving quality management system [9, 10], coupled with an adept forecasting system that anticipates the future demands of consumers of educational services and the expectations of

graduates from universities, stakeholders may indeed achieve outcomes that exceed their initial expectations.

Conclusion based on the discussions and analyses presented above, it is reasonable to assert that the risk management methodology proposed for the higher education system has the potential to facilitate the development of a robust and effective framework within universities, which will significantly enhance the quality of training provided to specialists entering the workforce. To reduce the occurrence of risks in the processes of the «S.Seifullin Kazakh Agrotechnical Research University» NC JSC activities, heads of departments are advised:

- taking into account the pandemic, to conduct a risk analysis for distance learning and the work of employees;

- when determining risks, to analyze current activities, and the last 3 years;

- to analyze the possibility of preventing risks, their causes and measures to eliminate them;

- to monitor and analyze the causes of critical risks;

- to analyze the impact of risks on the implementation of the process and the activities of «S. Seifullin Kazakh Agrotechnical Research University» NC JSC;

- in the reports on the occurrence and risk management, to reflect all activities in full in order to ensure the transparency of risk management in the process;

- to manage and prevent risks at current meetings, analyze their occurrence with the results reflected in the reports or minutes of the meeting;

- to ensure the timely collection of information to identify risks, plans for their management and prevention, reports on their occurrence;

- to improve the form of the report on risk management and prevention with full reflection of measures for risk management processes of «S. Seifullin Kazakh Agrotechnical Research University» NC JSC.

Academic risks in higher education institutions around the world cover a wide range of issues that can affect the quality of Education, reputation, research and innovation. In the context of mass access to higher education and an increase in the number of universities, there is a risk of devaluation of diplomas even in higher educational institutions. If diplomas are not so important in the labor market, this can affect the attractiveness of universities for students and employers. These risks require higher education institutions to have flexibility, strategic management and continuous monitoring to maintain a high level of education and research and maintain an international reputation.

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ОПТИМИЗАЦИЯ ПРОЦЕССОВ ПОВЫШЕНИЯ КВАЛИФИКАЦИИ ПЕДАГОГОВ КАЗАХСТАНА С ИСПОЛЬЗОВАНИЕМ ОБРАЗОВАТЕЛЬНОЙ БЛОКЧЕЙН ПЛАТФОРМЫ

Аннотация

В современном образовательном контексте, где важным становится непрерывное обучение и повышение квалификации сотрудников в учебной среде, применение инновационных технологий представляет значимый интерес, поэтому актуальность данного исследования обусловлена необходимостью оценки эффективности использования платформы с элементами блокчейн технологии для повышения квалификации педагогов. Целью статьи является проведение комплексного исследования эффективности платформы для повышения квалификации педагогов с использованием блокчейн-технологий в Казахстане. Для достижения указанной цели был применён комбинированный исследовательский подход, включающий качественные и количественные методы анализа. В результате сравнения производительности, энергопотребления и стойкости к атакам был предложен рекомендуемый алгоритм консенсуса для внедрения в систему блокчейн с целью повышения эффективности образовательного процесса. Проведение симуляций на платформах с использованием многоагентных моделей позволили оценить производительность системы, задержки транзакций и пропускную способность при различных нагрузках и объёмах данных. Результаты исследования устойчивости блокчейн платформы к различным атакам позволили определить меры по обеспечению безопасности и целостности сети блокчейн. Проведение симуляций различных сценариев исполнения смарт-контрактов позволили оценить их производительность, стабильность и безопасность, а моделирование механизмов принятия решений и голосования в блокчейн платформе позволило оценить эффективность, прозрачность и справедливость системы управления. Полученные результаты позволяют сделать вывод о высокой эффективности использования платформы с элементами блокчейн технологии для повышения квалификации педагогов в Казахстане. Само исследование вносит вклад в развитие образования и педагогической практики, предоставляя новые возможности для повышения качества образования и профессиональной подготовки преподавателей.

Ключевые слова: образовательные технологии, повышение квалификации, блокчейн технология, многоагентное моделирование, система управления.