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The Mechanism of Ensuring the Sustainability of The Development of The Higher Education System During the Formation of a New Technological Order

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ABSTRACTS

The subject of the article is the study of the mechanism of ensuring the sustainable development of the higher education system in the process of formation of a new technological order. The object of the article is the higher education system. The purpose of the work is to ensure the sustainable development of the higher education system during the formation of a new technological order. To achieve this goal, the following tasks of this study are solved: research and clarification of the concept of sustainable development of the system of higher education, description of the sources of the risk of loss of stability in the process of development of the higher education system associated with the transition to a new technological order, and study of the elements of the mechanism for ensuring sustainable development of the higher education system. The scientific novelty of this article is to determine the description of the mechanism for ensuring the sustainable development of the higher education system and its constituent elements.

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1. INTRODUCTION

The relevance of this article is determined by the process of forming a new technological order in the economy and society. During the formation of a new technological order, additional risks appear, which may cause a decrease in the sustainability of the development of the higher education system.

The hypothesis of this article may be the assumption that by forming a mechanism to ensure the sustainability of the development of the higher education system, risks to the sustainable development of this system can be reduced.

The work aims to ensure the sustainable development of the higher education system during the formation of a new technological order. To achieve this goal, the following tasks of this study are solved:

(i) research and clarification of the concept of sustainable development of the higher education system.
(ii) descriptions of sources of risk of loss of stability in the process of development of the higher education system in the process of transition to a new technological order.
(iii) studying the elements of the mechanism for ensuring the sustainable development of the higher education system.

The object of the article is the system of higher education. The subject of the article is the study of the mechanism of ensuring the sustainable development of the higher education system in the process of formation of a new technological order.

A study of scientific publications on the topic of this article showed the following.

Scientists consider it important to ensure the sustainable development of the higher education system (Trofimenko, 2022). Universities play an important role in ensuring the sustainability of the higher education system (Sharashkina, 2021). At the same time, analysts believe that it is necessary to ensure the stability of the university in the situation of modernization of the higher education system (Kurdova, 2017). The researchers note that the degree of stability of the regional higher education system is influenced by the interests of the subjects of the regional economy. Teachers claim that master's degree training at universities should contribute to their sustainable development. The researchers note that the level of sustainability of the higher education system was influenced by the pandemic (Perederiy & Litvinova 2021). At the same time, foreign authors note that the problem of introducing the paradigm of sustainable development of the higher education system is also important for other countries (Azizov, 2020). In Kazakhstan, one of the tools for the sustainable development of the higher education system is considered to be the introduction of technologies for crediting training. Scientists are investigating the problems of sustainable development of the higher education system of the regions (Safonov, 2022). Analysts note that, in turn, the higher education system of the region can be considered a factor in the sustainable development of this region (Chudinovskikh, 2019). Experts analyze the higher education system of the region in terms of its impact on the sustainable development of the entire region. Experts note that changes in the higher education system are taking place against the background of the formation of a new technological order in the economy and society. In connection with the formation of a new technological way, conceptual transformations in the work of universities are necessary (Glushchenko, 2020). Scientists predict that the development of the higher education system in a new technological way will be accompanied by the formation of an educational ecosystem, and the role of mentoring will increase (Glushchenko, 2022). At the same time, it is possible to develop student ecosystems at universities (Glushchenko, 2023). All these publications confirm the relevance

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of the formation of a mechanism for ensuring the sustainability of the development of the higher education system, which indicates the relevance of this article.

2. METHODS

This is a literature survey, in which data were obtained from internet sources, specifically, from articles in international journals. Data were collected, explained, and summarized to get some information.

3. RESULTS AND DISCUSSION

Under the mechanism of ensuring the sustainability of the development of the higher education system during the formation of a new technological order, we will understand a system of methods and tools for maintaining the state of sustainability of the development of this system.

Additional risks for the sustainability of the development of the higher education system are created by the process of a new technological basis of the economy and society. The new technological order will be characterized by the intensive development of the following types of technologies: nanotechnologies; neurotechnologies; digitalization technologies; information technologies, biotechnologies, and others (Glushchenko, 2020).

To consider the structure and components of the mechanism of sustainable development of higher education, it is necessary to clarify the very concept of sustainability in the development of this system. It is known that from an economic point of view, such development of an organization is considered sustainable, in which there is no decrease in any of the types of assets of this organization. The disadvantage of this definition can be considered in the conditions of changing the technological basis during the transition to a new technological order, a change in the ratio of various types of assets may be objectively required. In particular, during the transition to a new technological order, the role of intangible assets may increase.

In the theory of large systems, the stability of a system is understood as the ability of this system to return to its initial state after a certain external influence on this system has been carried out. This definition of system stability also has a drawback. This disadvantage is determined by the fact that the higher education system must be in the process of constant innovative changes. Such changes are necessary to ensure that the higher education system meets the requirements and promising trends in the development of society and the economy.

In 2022, the external impact on the higher education system can be recognized as the impact of factors related to the crisis and the transition of the economy to a new technological order. The global crisis is precisely the form and mechanism of the transition of society and the economy to a new technological order. In case of insufficient ability of the higher education system to adapt to new factors, there may be a loss of stability in the development of the higher education system.

When analyzing this situation, it is recommended to take into account that as part of the socio-economic development management system, the higher education system should be in a state of conjugation with the economy and public institutions. Violation of such conjugacy of the conditions of the higher education system, economy, and society can be considered as one of the signs of the loss of stability of the higher education system. In addition, the

DOI:
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violation of such a conjugacy of the conditions of the higher education system of the economy and society can cause a loss of competitiveness as well as stability of the economy and society.

This makes it possible to interpret the sustainable development of the higher education system as a continuous process of maintaining the conjugacy of the states of this system, economy, and society. This conjugacy of the states of the higher education system is most relevant during the crisis. This is because during the crisis there are rapid structural changes in the economy and society. During the crisis, the technological basis of activity, the structure of markets, management methods, forms of doing business, and more are changing rapidly.

The state of the higher education system associated with the economy and society can be characterized by the following signs:

(i) the structure of the higher education system meets the existing and future needs of the economy and society.
(ii) the quality of educational products of the higher education system meets the needs of society and the economy.
(iii) the organizational culture of the higher education system corresponds to the trends of the new technological order.
(iv) the costs of the education system of various stakeholders correspond to their financial capabilities.
(v) the higher education system has a mechanism for adapting the higher education system to the observed changes in the economy and society, and more.

The risks of reducing the sustainability of the processes of economic and social development can manifest themselves in the following:

(i) in reducing the quality of higher education to a level at which it is impossible to maintain the competitiveness of the economy and society.
(ii) a low proportion of graduates who find a job in their specialty due to the discrepancy between the request of economics and the structure of graduate specialties in the higher education system.
(iii) inaccessibility of higher education for a significant proportion of the population to financial indicators and others.

The conjugacy of the states of the higher education system, economy, and society can most effectively ensure the development of the higher education system within the framework of the ecosystem approach (Glushchenko, 2022). This statement is based on the fact that the ecosystem approach in higher education makes it possible to ensure:

(i) comprehensive provision of educational services to consumers.
(ii) to coordinate the interests of all interested parties in this process.
(iii) minimize possible damage to elements of the surrounding socio-economic environment and others (Glushchenko, 2022).

Thus, the first element of the mechanism for ensuring the sustainable development of the higher education system can be recognized as the formation of an ecosystem approach in the development of the higher education system. The second element of this mechanism can be called the further development of distance education based on information technology (smart education). This segment of higher education can increase the sustainability of the higher education system. Distance education can be effective in obtaining a second higher education; in additional professional education. However, in the process of developing this form of training, the following risk factor associated with this must be taken into account: the risk of the impossibility of transmitting implicit knowledge by verbal methods. All knowledge transmitted through the education system can be divided into explicit knowledge and implicit knowledge. Explicit knowledge is conveyed by verbal means. Implicit knowledge can only be

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transmitted by non-verbal methods in the process of personal communication between the teacher and students. The sources of implicit knowledge in an educational product can be in the following points:

(i) the processes of aggregation (merging into one system) of elements into a single whole (product, system).
(ii) the interdisciplinary nature of research; human relations within professional institutions and others

Due to the increasing complexity of the objects of the external world in the economy and society, the importance of implicit knowledge may objectively increase. At the same time, it is implicit knowledge that can be a source of synergy in the process of social production. Therefore, with the further development of “Specific”, "Measurable", "Achievable", "Relevant", and "Time-Bound" (SMART) education, it should be borne in mind that the process of transferring implicit knowledge is concentrated in the field of personal communications between teacher and student.

The third element of the mechanism for ensuring the sustainable development of the higher education system can be called the wider use of the project form of higher education. The analysis shows that during the development of a new technological order, innovations will become continuous and permanent. The main form of implementation of innovative activities is innovative projects. Such an expansion of innovative activity of organizations can lead to the transition of organizations from a process model of activity to a project model of their activities. When switching to the use of the project model of organizations, the following changes in the activities of organizations can be observed:

(i) changes in the organizational structure (transition to a matrix structure).
(ii) in working with personnel, a transition from managing functional units to forming and managing project teams is possible.
(iii) changes in organizational culture are possible due to the increasing role of innovative values of the organization (encouraging innovation activity) and others.

All this may lead to the need for an accelerated transition of the higher education system to a more active use of the project form of such education. It is necessary to pay attention to the fact that the project form of higher education has many distinctive features. Such distinctive features of higher project education include the following points:

(i) learning through the implementation of educational projects occupies an essential place in the structure of the student's academic load.
(ii) there is a comprehensive use of the knowledge acquired by the student in the project; students are being trained to work as part of project teams.
(iii) there is a more active development of students' activity skills; participatory project management is practiced in teams.
(iv) there is a development of horizontal communication between students; there is a formation of a horizontal communication style between a teacher and students, and others (Glushchenko V.V., 2022).

Presumably, in 2022, the main constraining factors (risks) for the intensive implementation of the project form of higher education may be in the following points:

(i) a small number of university teachers with practical skills in implementing projects in the economy and society.
(ii) a small proportion of teachers with a full range of competencies for quality project management (analysis shows that effective project management requires knowledge of

DOI:
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at least more than eight fields of knowledge: law, finance, investment, technical sciences, marketing, management, personnel management, and entrepreneurship.

(iii) low interest in a real business in the implementation of joint projects with the participation of students; the level of socialization of knowledge about the project model of organizations and the project form of higher education, and more.

The development of the project form of higher education can become an essential element of the mechanism of adaptation of higher education to the changes taking place. This is because the implementation of joint projects with organizations of the real economy and society can be an effective tool for adapting a university to the requirements and conditions of the external environment of the higher education system. At the same time, each joint project can be considered a separate experience of adapting the university to the demands of the external environment. Therefore, through the implementation of joint projects, the conjugacy of the conditions of the real economy and the educational process at the university will be ensured. Such joint implementation of projects will increase the sustainability of both the higher education system and the real economy. This idea must be conveyed to the leaders of the real economy in the process of socialization of knowledge about the project form of higher education.

The fourth element of the mechanism for ensuring the sustainability of the processes of development of the higher education system can be the application of lean production methodology in higher education. The inclusion of lean production methods in the mechanism of ensuring the sustainability of the development of the higher education system can be linked to the results of the analysis of the causes of the 2008 crisis. As a result of this analysis, it was found that one of the main causes of this crisis could be a violation of the principles of thrift in large corporations. On this logical basis, it can be concluded that the introduction of lean manufacturing principles in the higher education system can reduce all types of unproductive losses. At the same time, such a reduction in losses in the higher education system can reduce the risk of a crisis in this system. Consequently, the introduction of lean manufacturing principles in the higher education system can increase the sustainability of the development of the higher education system.

The fifth tool for ensuring the sustainable development of the higher education system can be the creation of student ecosystems at universities. Research shows that the creation of such student ecosystems can contribute to increasing the sustainability of the development of the higher education system for the following reasons: establishing closer contacts and communications between society and universities; increasing the level of comfort of students' everyday life; reducing unproductive waste of time and effort by students in extracurricular work; increasing the level of student involvement in the educational process; increasing the level of motivation of students in the educational process and others (Glushchenko V.V., 2023). All these factors work to increase the degree of sustainability of the development of the higher education system. For this reason, the creation of student ecosystems in universities can be considered a tool to ensure the sustainability of the development of the higher education system.

The sixth direction of increasing the sustainability of the development process of the higher education system during the formation of a new technological order can be considered the further development of innovative organizational culture at universities. The analysis shows that during the formation of a new technological order, the following types of technologies can develop most intensively: nanotechnology, neurotechnology, digitalization technologies, information technology, and biotechnology (Glushchenko V. V., 2020). The development of these technologies requires new forms of relations between people within the framework of

DOI:
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professional and public institutions. Therefore, universities can increase the level of sustainability of their development by developing such programs: programs for the modernization of university activities; programs for the transformation of the organizational culture of the university. Particular attention should be paid to the implementation of innovative values of organizational culture when developing programs for the modernization of the organizational culture of universities.

The basis for the formation of such programs for the modernization of the activities of universities may be the revision of all educational programs. Such an audit of educational programs should be carried out in the interest of integrating new types of technologies into these programs. At the same time, it should be taken into account that, as student surveys show, the teacher is no longer considered by the student as the main source of knowledge. This function is performed by the Internet.

In the 21st century, a teacher should help a student to develop: research skills; skills of working in a small group; business and interpersonal communication skills; skills in presenting their results, and more. This requires changes in the organizational culture of the university. As you know, organizational culture performs two functions.

The first function is to ensure the adaptation of the university to the changes taking place. This is a function of external adaptation. The second function of the organizational culture of the university is the internal coordination of all elements of the educational process in the interest of the external adaptation of this university. Therefore, the organizational culture of the university can be considered an important part of the mechanism for ensuring the sustainable development of the university. In such an assessment of the role of organizational culture, it should also be taken into account that in the 21st-century competition between innovatively active universities will be conducted precisely at the level of organizational cultures (and not educational products).

The seventh element of the mechanism for ensuring the sustainable development of universities can be a productive approach to their activities. The analysis shows that to improve the quality of education, it is important to form a product approach. This approach increases the efficiency of spending university resources. Therefore, to ensure the sustainability of the development of education, it is important to develop a product approach in the activities of universities. Scientists predict that the product approach may replace the competence approach at universities. Let's explain the differences between competence-based and product-based approaches in the activities of universities. With a competence-based approach in the educational process, in addition to knowledge, the student is also given skills, practical skills.

The product approach at the university is characterized by an emphasis on the formation of educational products. An educational product can be called a systematic combination of such elements: knowledge; skills; research skills; organizational and professional culture. One of the technologies for creating educational products can be project-based higher education. At the same time, the product approach can also be implemented within the framework of traditional subject education at universities.

The formation of a new technological order in the economy and society dramatically increases the urgency of the problem of ensuring the sustainability of the development process of the higher education system. During the crisis, the issue of ensuring the sustainability of the development of the higher education system should be given increased attention.

DOI:
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To ensure the sustainability of the development of universities in a period of intense changes, it is necessary to create a mechanism to maintain the sustainability of such development of universities. This is because the creation of such a mechanism will ensure the comprehensive nature of the impact of stakeholders on the sustainability of universities. At the same time, it will also be possible to coordinate the degree of influence of all stakeholders on the process of maintaining the sustainability of university development. This is important not only for universities but also for the entire economy as a whole. It should be borne in mind that the sustainable development of universities in the period of a new technological order is considered an important factor in ensuring the sustainability of the regional economy itself.

The analysis shows that the sustainability of development is influenced by such characteristics of the university's activities as the level of customer orientation of the university, the degree of customization of scientific, and the pedagogical activities of the university.

A low degree of customer orientation in the university can lead to a loss of stability in its development. Such a loss of sustainability in the university's development may be a consequence of a decrease in the quality of higher education. In turn, such a decrease in the quality of education may be the result of a misunderstanding at the university of trends in the development of economic sectors and specific enterprises. And errors in assessing trends in the development of the industry (or region) may be the result of insufficient customer orientation of the university. Therefore, increasing the degree of customer orientation of the university can be considered as a way to increase the sustainability of the university's development process in the context of its transition to a new technological order.

The level of customer orientation of universities can be increased by using the project form of higher education. At the same time, the customer orientation of the university means that the university is aware not only of the current activities of the partner organization. The customer orientation of the university also means that this university knows the forecasts for the development of partner organizations.

The customization of the university's activities should be considered as the degree of concentration of the university's efforts on certain areas of its activities. Customization in the university's activities makes it possible to increase the efficiency of resource use. Therefore, such customization of the university's activities should be considered as a way to increase the sustainability of the university's development process. This is explained by the fact that the customization of the university's activities reduces the risk of loss of sustainability of the university's development due to excessive diversification of scientific and educational activities.

The risk of excessive diversification of university activities may be associated with the conglomerate nature of the organizational structure of a significant part of universities. The transition to a new technological order opens up many alternative directions of development (nanotechnology, information technology, neurotechnology, etc.). This increases the risk of unproductive losses due to the dispersion of university resources. Customization of the university's activities reduces the risk of unproductive losses in the university's activities associated with excessive "dispersion" of its resources in many areas of its activities.

To reduce the risks of sustainable development of the university, it is necessary to choose the right direction for the development of the university. In turn, to choose the right direction for the development of the university, it is necessary to assess several points:

(i) opportunities and threats of the external environment.
(ii) the competitive advantages and disadvantages of the university.

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For such a justification of the university's development directions, the SWOT analysis methodology, the Boston Consulting Group matrix, and other strategic marketing planning tools can be used. Based on the results of the SWOT analysis of the university's activities, it is possible to form a list of measures aimed at the following points:

(i) minimizing threats to the external environment.
(ii) measures aimed at using the opportunities of the external environment by the university.
(iii) measuring at minimizing the weaknesses (competitive disadvantages) of the university.
(iv) measuring effectively using the strengths (competitive advantages) of the university.

All possible directions of the university's activities should be studied using the concept of alternative costs within the framework of the university's financial management strategy.

In general, we can say that the control and management of the level of sustainability of the university development process during its transition to a new technological order can be recognized as one of the most urgent tasks of university management in this period. To coordinate measures aimed at ensuring the sustainability of university development, a policy of ensuring the sustainability of university development in the context of transition to a new technological order can be developed and implemented. The policy of ensuring the sustainability of universities can be understood as a set of coordinated measures aimed at preventing the loss of stability by the university in the process of its development during the transition to a new technological order.

4. CONCLUSION

The paper describes the concept and defines the structure of the mechanism for ensuring the sustainability of the development of the higher education system and individual universities during their transition to a new technological order. It is emphasized that during the formation of a new technological order, the problem of ensuring the sustainability of the development of universities is becoming more acute. The analysis carried out in this work suggests that customer orientation and customization of work by the university can ensure the sustainability of university development during the formation of a new technological order. At the same time, the tools for ensuring the sustainability of the development of universities can be in the following points:

(i) an ecosystem approach in the development of the higher education system; the development of “Specific”, "Measurable", "Achievable", "Relevant", and "Time-Bound" (SMART) education.
(ii) the transition to a project form of higher education; the introduction of lean production methodology.
(iii) a product approach in the activities of universities; the development of innovative organizational culture and more.

The materials of this article allow us to recognize ensuring the sustainability of the university's development as one of the most important tasks of university management and the higher education system.

5. AUTHORS’ NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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