INNOVATIONS IN UNIVERSITY MANAGEMENT AS A PREREQUISITE FOR THE DEVELOPMENT OF COMPETITIVENESS OF THE UKRAINIAN ECONOMY DURING THE POST-WAR PERIOD

ABSTRACT

The purpose of the article is to determine the theoretical foundations of innovation in university management in the context of creating conditions for improving the competitiveness of Ukraine's economy during the post-war period.

The theoretical significance of the article is that the model of introduction of Open Science as possible innovation in university management is substantiated, the principles of the introduction of Open Science in universities are supplemented, and innovative models of interaction of universities with stakeholders aimed at common R&D activities are singled out. The practical significance of the article is that the authors formulated recommendations for the effective implementation of the Open Science model in universities; criteria for choosing a model of interaction between universities and stakeholders are proposed.

It is determined that the potential growth of the index of global competitiveness of Ukraine's economy lies, among other things, in the sphere of innovative university management. The necessity of introducing the concept of Open Science in universities as one of the innovations in management, which will increase the efficiency and impact of research on the development of Ukraine's competitive economy in the postwar period, is substantiated.

The model of implementation of Open Science in Ukrainian universities is substantiated, which takes into account European practices of implementing the concept of Open Science in universities, its basic principles, components, and understanding of its key advantages in the context of increasing economic competitiveness.

Recommendations for the effective implementation of the Open Science model in universities in the context of the introduction of new organizational and financial mechanisms, development of a culture of Open Science in the university environment, improvement of the research infrastructure, access of academic staff to institutional and external research infrastructures, supporting collaboration between academic and non-academic sector to strengthen the role of universities as key actors in innovation ecosystems, promoting international and multi-stakeholder cooperation in the context of Open Science, is substantiated.

The need for a broad partnership of universities with stakeholders aimed at common R&D activities is substantiated. Based on the study of international experience, three models of such cooperation have been identified - the regional consortium model, the professionalization model, and the cluster model.

Keywords: competitiveness, university, Open Science, partnership, post-war period, innovation, management

JEL Classification: I22, O43

INTRODUCTION

The large-scale aggression of the Russian Federation, causing tectonic shifts in the global system of the world order, is likely to have significant consequences in the development of the world economy and socio-demographic and technological processes.
In this regard, Ukraine's place in the new system of world order, in the system of international division of labor, capital and technology markets need to be rethought. An important factor in the country's competitiveness in regional and global markets is obviously the level of its technological development, R&D, and technological capacity of manufactured goods. The attention of scientists should be focused primarily on the incorporation of innovative tools in the management of higher education institutions (universities) (Borodiyenko, Zlenko, Malykhina, Kim, Diachkova, 2022), which through training and development of the scientific potential of universities are likely to increase the competitiveness of Ukraine's economy.

**LITERATURE REVIEW**

The issue of implementation of innovative approaches to university management was studied by a number of researchers. In particular, M. Sitnicki elaborated theoretical foundations for the strategic management of research universities. He believes that the economic nature of a research university integrates three types of economic activity - provision of educational services, provision of high-tech business services (in particular R&D), implementation of innovation through the mechanisms of commercialization of objects of intellectual property or through the development of start-ups or spin-off companies and the production of high-tech products. Morgulets O. considers university management as a subject of market relations, justifying the need for the implementation of such innovations as process-targeted entrepreneurial-based management, a system of internal quality assurance, and strategic management.

M. Azhazha offers systematic implementation of innovative models of university management at the level of strategic goals (integration into the international educational space, ensuring the development of a virtual distance learning paradigm, development of scientifically substantiated educational standards), operational tasks (diversification of funding sources) and transformational changes through its modernization and intensification, humanization of education, the transition of the education paradigm from traditional to personality-oriented human-centered paradigm).

The research team (I. Drach, S. Kalashnikova, O. Palamarchuk, V. Ryabchenko, L. Chervona), studying the problem of modern university management, substantiates the need to develop the personal potential of the university as an integral criterion of effectiveness and efficiency of governance and determining factor in ensuring its competitiveness. O. Kondur substantiated the idea that the implementation of the corporate model of university management enables its competitiveness and relevant strategic development. I. Reshetova believes that to increase the sustainability of the university it is necessary to maintain a certain specialization of its subsystems - operational subsystems must interact closely with the environment, capturing its fluctuations, developing distance education, university infrastructure, and networks; and conservative subsystems must maintain quality prospective: scientific research, continuity of scientific knowledge, fundamentality and quality of education.

Despite the meticulous attention of scientists and numerous studies on innovative university management, it is time to carry out scientific research in terms of implementing those innovations in the management of universities that, taking into account the war factor, are able in a short time, using the optimal amount of resources to create competitive advantages for universities and the economy as a whole. Thus, the purpose of the article is to determine the theoretical foundations of innovation in university management in the context of creating conditions for improving the competitiveness of Ukraine's economy during the post-war period.

**METHODOLOGY**

The validity of the obtained scientific results is determined by the methods used at the theoretical level of research. In particular, in the process of substantiation of the model of introduction of Open Science as possible innovation in university management, it was used such methods as theoretical analysis (in particular, such techniques as an analogy, interpolation, grouping, structuring), synthesis (generalization, extrapolation), abstraction. To define the principles of the introduction of Open Science in universities such methods as grouping and structuring were used. While defining innovative models of interaction of universities with stakeholders aimed at common R&D activities it was used generalization, extrapolation, and comparative analysis. The use of such methods as grouping, structuring, synthesis, and content analysis gave the possibility to formulate recommendations for the effective implementation of the Open Science model in universities and define criteria for choosing a model of interaction between universities and stakeholders.
RESULTS

The country's global competitiveness index is calculated using a number of criteria, which are integrated into four groups: economic performance, the efficiency of government, the efficiency of doing business in the country, and the quality of infrastructure (IMD, 2022). The method of calculating the global competitiveness index involves the calculation of absolute values for each criterion, followed by their adjustment to the weight of these criteria in the overall competitiveness index. The results of 2021 show that «qualities such as investment in innovation, digitalization, welfare benefits and leadership resulting in social cohesion have helped economies better weather the crisis, allowing them to rank higher in competitiveness» (IMD, 2022). According to the Global Competitiveness Index in 2021, Ukraine ranked 54th, behind post-Soviet countries such as Bulgaria, Slovakia, Romania, Poland, Hungary, and Slovenia. The main challenges that lowered Ukraine's global competitiveness rating in 2021 were: the consequences of the COVID-19 pandemic, the freeze of armed conflict in Eastern Ukraine, necessity to facilitate economic recovery and implementation of public-private partnership, launching full-scale energy and land market, invigorate the domestic stock market (IMD, 2022).

But the situation in 2022 has change dramatically all the factors that cause global competitiveness of Ukraine: «significant political factors are large-scale military aggression of the Russian federation, domestic political center-oriented processes and prevailing of populist paradigms, national policy on economic development/global leadership/competitiveness; among the economic factors are significant losses of social and economic potential of the country's regions, significant destruction of infrastructure, loss of human potential due to external migration, rising unemployment, loss of export positions, relocation of business from the occupied territories»; among social and demographic factors are «significant migration flows, declining of pace of population reproduction, accelerating the aging process, increasing the share of single-parent families, the unity of Ukrainian society in the direction of countering the enemy, a high level of patriotism, the formation of a democratic political nation and civil society, responsibility, ability to radically change the further history of Ukraine» (Borodyienko, Malykhina, Protopopova, Kim, Malykhina, 2022).

Therefore, the scientific interest of researchers and practitioners during the war and the post-war period should be in understanding the contribution of each criterion to the global competitiveness index and elaborating recommendations for improving performance in those aspects that can significantly affect the overall performance. In the area of the presented study on improving the effectiveness of university management, the following figures should be emphasized: the share of the indicator «research infrastructure» (includes total R&D personnel, scientific articles, graduates in Sciences, patent applications, medium and high-level value-added, knowledge transfer) is 6.6%, while the share of «educational infrastructure» (includes higher education achievements, students mobility (inbound and outbound), university education (which meets the needs of a competitive economy), management education, university education index (country score calculated from Times Higher Education University ranking) is 5.7% (IMD, 2022). That is, the potential growth of the global competitiveness index lies, among other things, in the sphere of innovative university governance. It was also found «relationship between the level of technology development and the economy as a whole and the specific costs of research in relation to GDP» (Dovhyi, 2022). Paying tribute to the latest scientific developments on the need to strengthen the research component of universities (in particular, encouraging students to do research using a sub-project approach with separate terms of reference and budget, non-financial involvement of students in the research projects of leading scientists as a tool to stimulate the acquisition of new skills and knowledge, the rating approach — «the best student — the best researcher» (Dovhyi, 2022) and improving the system of training scientific personnel (in particular, by introducing science-intensive education and research-oriented training to develop Competencies 4.0) (Dovhyi, 2022) we stand for the need for greater innovation in the management of universities as a necessary prerequisite for increasing the competitiveness of the national economy.

We believe that one of the necessary innovations is the introduction of the concept of Open Science in universities, the essence of which is to improve research in universities by improving the exchange, transfer, and access to scientific knowledge and open innovation through knowledge transfer. Open Science, based on high standards of transparency, cooperation, and communication, is a priority for policy development in the European Higher Education Area and the European Research Area (Lugovy, 2021). In addition to the obvious benefits of implementing this concept, the need to develop university cooperation with the European Research Area, develop materials on Open Science and Education, and exchange knowledge and resources with open licenses create the inevitability of the digital transformation of university research (European Commission, 2016).

Open Science is one of the components of Europe's vision, along with Open Innovation and an Open World. It consists of the creation of «transparent and accessible knowledge that is shared and developed through collaborative networks» (Vicente-Saez, 2018) that cause «increase trust in research results and open the access to all elements of a research project to the public» (Van Dijk, 2020) and «greater efficiency and productivity, more transparency and a better response
to interdisciplinary research needs» (LERU, 2018). During the post-war period, universities have to play a crucial role in solving society’s problems through research and innovation (R&I). In order to systematically implement the concept of Open Science in universities, we have created an appropriate model (Fig. 1).

This model was developed taking into account European practices of implementing the concept of Open Science in universities, its basic principles (equity and fairness, quality of research, diversity, inclusiveness, transparency, scrutiny, critique and verifiability, equal opportunities and access, respect, responsibility and accountability, collaboration, participation and inclusion, flexibility, sustainability (UNESCO, 2018); which we have supplemented by the principle of research integrity (the essence of which is to implement the practices of Open Science on the basis of integrity at all stages of research (development, implementation, reporting); transparency (providing complete and unbiased information on research results through open communication); respect for all participants (colleagues, other research participants, society), ensuring research in accordance with applicable norms and standards (ethical, legal and professional), components (open scientific knowledge, open science infrastructures, open engagement of societal actors and open dialogue with other knowledge systems (UNESCO, 2018), understanding its key advantages in the context of increasing the level of economic competitiveness (increase the efficiency of science by reducing duplication and costs of creating, transmitting and reusing data; increase the transparency, quality and reliability of research results; accelerating the transfer of knowledge, promoting a faster transition from research to innovation; increasing the impact of research results on the economy; a more effective response to global challenges that require coordinated international action).

Analysis of foreign experience in the implementation of Open Science shows that the open research system not only improves academic research but has great potential for industrial applications (Friesike, Widenmayer, Gassmann, Schildhauer, 2017). Every year, more and more studies are published showing the benefits of open citation; more sponsors are announcing policies that encourage, commit or specifically fund open research; more employers recognize open practices (McKiernan, Bourne, Brown, Buck, Kennal, Lin, McDougall, Nosek, Ram, 2019). The advantages of Open Science also include increasing the effectiveness of research, stimulating creative activity, the democratization of knowledge, and empowering of stakeholders (Arza, Fressoli, 2019). At the same time, the experience of using the practices of Open Science is introduced by a relatively small number of researchers in this field (Cook, Fleming, Hart, Lane, Therrien, Van Dijk, Wilson, 2019).
Given the above and in order to effectively implement the model of Open Science in universities, we have developed the following recommendations:

1. To introduce organizational and financial mechanisms for the development and use of Open Science practices. To do this, in the organizational structure of the university to provide a structural unit/position, responsible for the implementation and support of the practices of Open Science; to provide the appropriate level of investment in open scientific infrastructure and services, to provide the development of digital competence of academic staff.

2. To promote the development of a culture of Open Science in the university environment by promoting its values and principles. To adopt the principles of Open Science, it is advisable to provide training for academic staff on the use of the principles of Open Science, providing consideration of the following issues: the nature, goals, components, and benefits of Open Science; peculiarities of submitting scientific works in open access environment; open data and data management to comply with FAIR principles; open expert feedback; ethics and research integrity; intellectual property rights and personal data protection.

3. To provide support for the development of Open Science research infrastructure. It is advisable to develop a roadmap for the development of institutional infrastructures and increase the effectiveness of their use through the exchange of best practices.

4. To provide access to the academic staff of the university to both institutional and external research infrastructures (for example, private research institutes), including remote access.

5. To support and strengthen the interaction between academic and non-academic sectors to strengthen the role of universities as key actors in innovation ecosystems.

6. To promote international and multi-stakeholder cooperation in the context of Open Science.

The result of using the proposed model of implementing Open Science in universities should be to increase the efficiency and impact of research on the development of Ukraine’s competitive economy during the post-war period.

Significant comparative and regression analysis made it possible to identify key factors, sub-divided into five types, as having a strong causal relationship with economic competitiveness, one of the most meaningful is promoting interaction between universities, firms, and public laboratories (OECD, 2001) which can be defined as the innovation system. The role of higher education institutions is also vital in the development of such innovation systems as «they play a valuable role in the regional knowledge infrastructure, for example through business-university linkages to promote the transfer of knowledge and human capital» (Martin, 2010). Some studies have demonstrated that innovative and knowledge adapting capacities of a firm/organization/university are determined by its surroundings: «its partners, competitors, customers, the available human capital, the regional knowledge infrastructure, institutions, regulation and legislation, untraded interdependencies and a host of other factors that influence innovation directly or indirectly» (OECD, 1999). Thus, the development of effective linkages - especially «involving technology-based industries and businesses - has proved to be successful in promoting regional economic development» (Martin, 2010). During the post-war period in Ukraine there is a strong need to «intensify cooperation with partners, involving a wide range of stakeholders in the process of co-production and innovation (focusing on research aimed at overcoming the greatest societal challenges), building «smart specialization» of each university, widespread implementation of the so-called partnership model of university management» (Borodiyenko, Nychkalo, Malykhina, Kuz, & Korotkov, 2021).

In our opinion, in order to choose the most adequate model of such a partnership, it is necessary to analyze the relevant foreign experience. Such analysis shows that there are at least three models of university partnerships with stakeholders - the regional consortium model, the professionalization model, and the cluster model. The peculiarities of the regional consortium model are that the college (or other institution of higher education) becomes the core of cooperation between business, government, and education; there is a systematic interaction of several system-forming companies and the government in order to strengthen the economic development of the region. The main purpose of such cooperation is to create competitive educational programs in accordance with the requirements of the regional labor market and employers, their implementation using the resources of companies (Borodiyenko, 2020). An example is a consortium established in Greenville County, South Carolina, USA, based at Greenville Technical College (Moschetti, 2016).

A feature of the professionalization model is (the PTECH partnership between IBM, New York Education, and New York Municipal University (Moschetti, 2016) as an example) incorporation of educational programs of higher qualification levels in educational institutions which usually provide educational programs of lower qualification levels. The professionalization model allows to condense the educational process and to make it more practice-oriented and attractive to students (Borodiyenko, 2020). Under the cluster model, industrial clusters become networks characterized by the optimization of various types of costs (due to their redistribution between partners) and the exponential component of research and training.
(due to joint production and transfer of specialized technologies) (Borodiyenko, 2020). An example of this model is the region of Tuscany in Italy or Baden-Württemberg in Germany (Moschetti, 2016).

CONCLUSIONS

The potential growth of the index of global competitiveness of Ukraine's economy lies, among other things, in the sphere of innovative university management; introduction of the concept of Open Science in universities as one of the innovations in management will increase the efficiency and impact of research on the development of Ukraine's competitive economy during the post-war period; the model of implementation of Open Science in Ukrainian universities should take into account relevant European practices, its basic principles, components, understanding of its key advantages in the context of increasing the level of economic competitiveness; to implement the proposed model it is necessary to introduce organizational and financial mechanisms for the development and use of Open Science practices, develop a culture of Open Science in the university environment, develop research infrastructure, access of academic staff to institutional and external research infrastructures, support cooperation between academic and non-academic sector, strengthen the role of universities as key actors in innovation ecosystems, promote international and stakeholder cooperation; during the post-war period in Ukraine there is a strong need to «intensify cooperation with partners, involving a wide range of stakeholders in the process of co-production and innovation»; models of such cooperation can be a regional consortium model, a professionalization model and a cluster model. Further research should focus on analyzing the effectiveness of the implementation of the proposed model of Open Science in universities, as well as on modeling the architecture of university partnerships aimed at research and innovation.

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Теоретичне значення статті полягає в тому, що в ній обґрунтовано модель упровадження відкритої науки як одну з можливих інновацій в управлінні університетами, доповнено принципи впровадження відкритої науки в університетах, виокремлено моделі взаємодії університетів зі стейкхолдерами в аспекті спільної дослідницької діяльності. Практичне значення статті полягає в тому, що авторами сформульовано рекомендації щодо ефективного впровадження моделі відкритої науки в університетах і запропоновано критерії вибору моделі взаємодії університетів зі стейкхолдерами.

Визначено, що потенційне зростання індексу глобальної конкурентоспроможності економіки України лежить у тому числі й у площині інноваційного управління університетами. Обґрунтовано необхідність запровадження в університетах концепції відкритої науки як однієї з інновацій в управлінні, яка сприятиме підвищенню ефективності та впливу досліджень на розвиток конкурентоспроможної економіки України в поствоєнний період.

Обґрунтовано модель упровадження відкритої науки у вузах України, яка враховує відповідні європейські практики, її засадні принципи, складові, розуміння її ключових переваг у контексті зростання інноваційної активності у вузах.

Сформульовано рекомендації щодо ефективного впровадження моделі відкритої науки в університетах у контексті запровадження нових організаційних та фінансових механізмів відкритої науки, формування культури відкритості науки в університетському середовищі, розвитку дослідницької інфраструктури, доступу академічного персоналу університету до інституційних і зовнішніх дослідницьких інфраструктур, підтримки взаємодії між науковими колами та неакадемічним сектором для посилення ролі університетів як центральних суб’єктів в інноваційних екосистемах, сприяння міжнародному співробітництву та співробітництву стейкхолдерів у контексті відкритої науки.

Обґрунтовано необхідність широкого партнерства університетів зі стейкхолдерами в аспекті спільної дослідницької діяльності. На основі вивчення міжнародного досвіду виокремлено три моделі такого співробітництва: модель регіонального консорціуму, модель професіоналізації та кластерну модель.

Ключові слова: конкурентоспроможність, університет, відкрита наука, партнерство, поствоєнний період, інновації, управління

JEL Класифікація: I22, O43