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FORMATION AND DEVELOPMENT OF AN INNOVATIVE ECOSYSTEM OF HIGHER EDUCATION INSTITUTIONS IN THE CONTEXT OF EUROPEAN INTEGRATION

The current stage of Ukraine's development is characterized by profound transformations related to European integration processes, economic modernization, and the growing role of innovation as a key factor in competitiveness and sustainability. In these conditions, the ability of higher education institutions (HEIs) to form their own innovation ecosystems – open platforms that integrate scientific developments, educational practices, entrepreneurship, digital solutions, and partnerships with business, government, and international institutions – becomes particularly important. Such an ecosystem becomes a driver for the development of human capital, regional innovation clusters, and the national economy as a whole [1-4].

Ukraine's European development vector requires universities to comply with the principles of the European Research Area (ERA), digital transformation, open science, internationalization, and sustainable development. Therefore, the issue of creating an effective innovation ecosystem for higher education institutions goes beyond the internal improvement of the university – it becomes the core of the adaptation of Ukrainian higher education to EU standards.

The innovative ecosystem of higher education institutions is seen as a set of interconnected structures and processes that ensure the generation of knowledge, its commercialization, technology transfer, the development of entrepreneurial activity, and the involvement of external stakeholders. The theoretical basis of the concept is the triple helix (university-business-government), quadruple helix (adding civil society), and quintuple helix (with an emphasis on the natural and environmental component) models.

European approaches, particularly those implemented in the Horizon Europe, Erasmus+, and EIT KICs programs, emphasize the importance of

inclusiveness, interdisciplinarity, open access to research, and the broad involvement of young people in innovative activities [4-7].

Universities are becoming not only educational institutions but also centers of innovative development, performing the following key functions: generating knowledge through fundamental and applied scientific research; creating new technological solutions and start-ups; building competencies for the digital and innovation economy; promoting the development of regional innovation clusters; integration into international scientific and educational networks. In this context, the innovative ecosystem of higher education institutions is an open dynamic system based on the synergy of the academic community, business, industrial partners, students, and international organizations [1-7].

European integration defines a new development format for Ukrainian higher education institutions, based on:

1. The principles of the European Research Area (ERA): openness of scientific data and open access to publications; mobility of scientists; support for young researchers; gender equality in science; international cooperation and integration into EU projects.

2. The European Framework for Innovation Activities of Universities: leadership and innovation management; entrepreneurship-oriented educational activities; stimulation of student entrepreneurial activity; knowledge and technology transfer; international orientation; partnerships and resource mobility; intellectual property management; institutional support for innovation.

3. Smart Specialization (S3) logic. The university is at the core of regional S3 innovation strategies, forming the scientific and educational basis for the development of innovation clusters, technology parks, business incubators, prototyping laboratories, and digital innovation centers.

Thus, European integration requirements create a new framework of responsibilities and opportunities for Ukrainian universities, where innovation becomes an indicator of effectiveness. The main components of the HEI innovation ecosystem are defined as follows:

1. Educational component: modernization of educational programs; integration of STEM/STEAM; development of digital and entrepreneurial competencies; formation of flexible learning trajectories; dual education and

practice-oriented approach. Students become active co-creators of innovation rather than passive recipients of knowledge.

2. Research component: creation of interdisciplinary research groups; participation in international grant programs; formation of innovation laboratories and research centers; implementation of open science policies.

3. Entrepreneurial and startup component: business incubators; acceleration programs; mentoring hubs; startup schools and innovation courses; creation of university venture funds. This element ensures the commercialization of scientific results and fosters an entrepreneurial culture among students and teachers.

4. Infrastructure component: FabLab laboratories and prototyping workshops; technology parks and technology transfer centers; digital platforms for communication and research; data centers, VR/AR laboratories.

5. Partnership and network interaction: cooperation with business: joint projects, internships, dual education; international partnerships with EU universities; participation in European university alliances; interaction with authorities and the community. Networking is a key principle of a successful ecosystem – it is through partnerships that innovation is scaled up.

Strategic directions for the development of the innovative ecosystem of higher education institutions:

1. Digital transformation of the university. Creation of digital platforms for scientific research, electronic repositories, open science tools, and digital innovation management services.

2. Internationalization of research and education. Active participation in ERA, launch of joint Double Degree master's programs, creation of international scientific consortia.

3. Support for student innovation entrepreneurship. Creation of integrated startup centers, introduction of entrepreneurship courses, student participation in grants.

4. Development of technology transfer and patent activity. Creation of commercialization offices, training of IP management experts, formation of a database of innovative developments.

5. Development of innovative infrastructure at higher education institutions. Development of digital laboratories, FabLabs, technology parks, and acceleration platforms.

6. Integration of higher education institutions into regional and European innovation clusters. Building partnerships with businesses, government agencies, and public institutions.

Thus, the formation and development of an innovative ecosystem of higher education institutions in Ukraine is a key condition for successful integration into the European educational and scientific space. The innovative ecosystem of a university is not only a tool for improving the efficiency of the educational process, but also a strategic resource for the country's economic development. The university becomes a center for generating innovation, professional growth of young people, development of startups, formation of innovation clusters, and strengthening international cooperation. Accelerated digitalization, participation in EU programs, infrastructure development, and active partnership with business create favorable conditions for transforming Ukrainian HEIs into full-fledged players in the European innovation space [1-7].

In the long term, it is university innovation ecosystems that can become the basis for the formation of a knowledge economy, the growth of Ukraine's international competitiveness, and ensuring its sustainable development in conditions of global turbulence.

References

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