DOI: 10.31499/2306-5532.2.2024.319847

INNOVATIVE ECOSYSTEMS AND COOPERATION OF UKRAINIAN UNIVERSITIES WITH BUSINESS AND PUBLIC INSTITUTIONS

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The article discusses the state of innovative ecosystems in Ukraine and the experience of their functioning in the European Union. The author outlines the notion of innovative ecosystems and describes some cases of Ukrainian and European cases of organizing and functioning of innovative ecosystems on the basis of universities in cooperation with business, enterprises and public institutions. The strengths and weaknesses of Ukrainian ecosystems from the results of other Ukrainian and foreign research, analytical reports represented by Ukrainian ministries and international organizations, Ukrainian and European databases, the official sites of Ukrainian higher education institutions, the project reports of their participants are analysed, the prospects for new opportunities are described. The impact of international projects and programmes on the development of innovative ecosystems is studied. The outline of such programmes as Horizon Europe, Erasmus+, Digital Europe Programme, Junior Achievement Ukraine is presented as the most valuable for Ukraine as they support innovative projects and ecosystems within their scope regarding separate economy sectors and directions. Besides considering the separate projects or experiences focusing on creation, functioning or improvement of innovative ecosystems in Ukraine, Italy, Czech Republic and Latvia, the article presents the experience of addressing the issues of innovative ecosystems within the third mission of a university and the interim result of Erasmus+ project "Universities - communities: strengthening cooperation".

Key words: innovative ecosystems, higher education institutions, business, international projects, public institutions.

У статті розглядається стан інноваційних екосистем в Україні та досвід їх функціонування в Європейському Союзі. Автор окреслює поняття інноваційних екосистем та описує окремі українські і європейські кейси організації і функціонування інноваційних екосистем на базі університетів у співпраці з бізнесом, підприємствами

та державними установами. Проаналізовано сильні та слабкі сторони українських екосистем за результатами інших українських та закордонних досліджень, аналітичних звітів українських міністерств та міжнародних організацій, українських та європейських баз даних, офіційних сайтів українських вищих навчальних закладів, проєктних звітів їх учасників, описано перспективи нових можливостей. Досліджено вплив міжнародних проєктів і програм на розвиток інноваційних екосистем. Вплив таких програм, як Horizon Europe, Erasmus+, Digital Europe Programme, Junior Achievement Ukraine, представлено як найцінніший для України, оскільки вони підтримують її інноваційні проєкти та екосистеми в межах своєї діяльності щодо окремих секторів і напрямків економіки. Окрім розгляду окремих проєктів чи досвіду, спрямованого на створення, функціонування чи вдосконалення інноваційних екосистем в Україні, Італії, Чехії та Латвії, у статті представлено досвід вирішення питань інноваційних екосистем у рамках третьої місії університету та проміжних результатів проєкту програми Еразмус+ "Університети - громади: посилення співпраці".

Ключові слова: інноваційні екосистеми, заклади вищої освіти, бізнес, міжнародні проєкти, громадські інституції.

Introduction. All over the world, higher education is being transformed and becoming more and more flexible in its responses to the society's demands. The great impact of universities on the national cohesion and prosperity is indisputable as they are the centres for education, science and civic engagement and entrepreneurship. Their contribution to the development of innovative ecosystems and cooperation with business and public institutions is also worth consideration and recognition.

The evaluation of the state of innovative ecosystems depends on the economic development of the country, its investments in infrastructure, social wellbeing and other numerous factors. The most progressive innovative ecosystems are represented by the countries with well-developed economy and wide innovative network. This dependence has also the reverse effect as the economic equilibrium of a country is based, besides of other factors, on its "engagement in innovations and technological progress. Conscious perception of innovation and technological progress becomes fundamental in maintaining competitiveness in the global economic arena. Pioneering technological advances drive economic expansion and productivity, culminating in sustainability" (Hapieieva, Vitiutin, 2024). Hapieieva & Vitiutin (2024) state that considering of the concept of economic stability should include such aspects as globalization, technical progress, environmental issues, geopolitical tensions and conflicts, demographic issues, availability of quality education and health care. All these components have direct connection with education and research.

In the European Union there is a wide range of requirements to the higher education institutions among which is having an adequate research programme including "the strategies for:

- the incorporation of scientific talent;
- the acquisition, use and/or construction of scientific-technical infrastructures;
- the participation in competitive research projects at regional, national and international level;
- the collaboration with the productive sector in R&D&I matters, including the indicators to be established for their evaluation" (National Education Systems, 2024).

Higher education institutions in Ukraine, similarly to the European ones, besides of "conducting study activities, must carry out scientific, research and technical, innovative

and/or methodological activities, ensure the organization of the study process and obtaining higher education, postgraduate education by individuals taking into account their vocations, interests and abilities" according to the Law of Ukraine "On Higher Education" (National Education Systems, 2024).

As we can see, in both cases higher education institutions' functioning is integral with innovative activity. Considering their societal or third mission, we also understand that they are the key players contributing to the development of innovative ecosystems.

The purpose of the paper is to analyse and compare the innovative ecosystems and cooperation of Ukrainian universities with business and public institutions.

Materials and Methods. The materials of our scientific investigation were represented with the results of other Ukrainian and foreign research, analytical reports represented by Ukrainian ministries and international organizations, Ukrainian and European databases, the official sites of Ukrainian higher education institutions, the project reports of their participants. All the data were taken from open access resources.

The methods of research were represented by the critical analysis of scientific literature and resources on the issues of organizing innovative ecosystems, ways of cooperation of higher education institutions with innovation stakeholders, the results of international projects which influenced research and innovations both in universities and became valuable for stakeholders, analysis of quantitative and qualitative data presented in R&D project reports of universities, analysis of survey reports on the issues of cooperation between Ukrainian universities and business and enterprises conducted by Ukrainian ministries, comparative analysis of R&D project results influencing innovative ecosystems. The synthesis was used to determine conceptual provisions and formulate conclusions. The elements of SWOT analysis were used to outline the strengths, weaknesses, opportunities and threats in innovative ecosystems in Ukraine. The analysis of these aspects helped to identify potential actions and strategies for strengthening cooperation between Ukrainian universities, business, enterprises and public institutions, and for improving innovative ecosystems in Ukraine.

Results and Their Discussion. The potential of the university to create an innovative ecosystem is rather high as it usually comprises scientific schools investigating in different areas and its staff represents researchers working in various directions including interdisciplinary ones. Bittencourt et al. state that "there has been a strong growth of the movement of universities and the recognition of its role as inducer of technological development and of innovations. Universities are considered important infrastructures that sustain innovation ecosystems and, at the same time, institutional mechanisms that stimulate local and regional development" (Bittencourt et al., 2020). The authors speak of a university being a bridge between innovations and society contributing to the societal innovative development.

Innovation ecosystems as a unique and specific type of networks encompassing a diverse community of actors with multilateral and multisectoral ties, spanning the boundaries of a single industry and emphasizing increased interdependence as well as symbiotic potential among actors (Adner, 2017).

In 2020 a profound analysis on the current discourse and recommendations for a sustainable, adaptive, and stable innovation ecosystem in Ukraine were made by the authors of the monograph "Innovative Ecosystem of Ukraine: a Contemporary Review" (Antoniuk et al., 2020). They present the history of innovative ecosystem, reveal its anatomy, compare the world experience and Ukrainian reality, and give recommendations regarding creating conditions favourable for the development of Ukrainian innovative ecosystem.

Ukraine's involvement in the European integration contributes to the innovative ecosystems development and their impact on business. Joint efforts of two Ministries - the

Ministry of Digital Transformation of Ukraine and Ministry of Education and Science of Ukraine - are aimed at supporting Ukrainian business by means of innovative ecosystems. The Ukrainian Startup Fund cooperates with both Ministries and helps innovative projects and tech startups raise funds at the early stages and launch their own projects. The Ukrainian Startup Fund gives special support to the projects that can be used both during the war and for post-war modernisation. The Rebuilding Ukraine programme as part of the Seeds of Bravery project has become the most impactful recently. Nowadays these three institutions actively engage higher education institutions to the joint projects and generating innovations valuable for the business and economics of Ukraine and beyond its borders.

In October 2024 the "Seeds of Bravery" project announced the last call for the programme "Innovative Resources". During all previous calls it has awarded €1.25m to 38 Ukrainian startups. The priority aim was to stimulate innovation in the technology sector in Ukraine. The project has a lot of stakeholders, primarily, Ukrainian institutions and organisations contributing to the development of technological innovations, and the European Innovation Council (EIC), which launched the project. The EIC is led by a consortium of 19 organisations in 12 countries. The conditions of the programme are transparent and the information about its calls and results are published in open resources of the stakeholders. The funding is part of a two-year, €20m global plan to support Ukrainian technology companies and integrate them into the European Union's innovation ecosystem (Suay, 2024). The main areas supported within the programme are business continuity, promote women-led enterprises, early-stage startups, rapid post-war reconstruction, development of companies' prototypes and accessing new markets.

One of the brightest results of the project is that Ukraine was ranked 46th out of 100 countries in the updated Global Startup Ecosystem Index 2024, where "the international business community unite to show support for Ukrainian startups: Google has launched the Ukraine Support Fund, the EU has included targeted support for Ukraine in its Horizon Europe Research and Innovation Programme for the first time, and Network VC (USA) has created a dedicated Venture Fund and a Support Programme for Ukrainian startups" (Global Startup Ecosystem Index, 2024).

There were several reports and some investigations devoted to the analysis of Ukrainian innovative ecosystem conducted in 2020s. One of them was conducted by the Ministry of Education and Science in cooperation with the Ministry of Digital Transformation of Ukraine and the Ministry of Development of Economy, Trade and Agriculture of Ukraine at the beginning of 2020 and was devoted to the needs analysis of business representatives considering innovations, research and development. 108 enterprises participated in the survey and 86% expressed their necessity for special training of their staff in innovative activity management, technologies transfer, digital skills, project presentation, basics of entrepreneurship, financial literacy, intellectual property protection. The companies functioning in the fields of pharmaceuticals, forestry, aviation and space, IT, energy, medicine, construction, biotechnology, and metallurgy demonstrated a high innovation index. The lowest level demonstrated the companies specialising in transport, chemical industry, education and food industry (Survey, 2020).

The issues in innovative ecosystems functioning are caused by restricted informing potential stakeholders on their functions and services, ineffective communication, clear marketing policy, lack of efficient time-management, absence of ongoing study of innovation needs and demands of business, quality of R&D, prototypes instead of ready-made solutions or products, high price of Ukrainian R&D, focus on big business. The survey also revealed that 72,5 % of companies dealt with the higher education institutions and/or research institutions, among which 48,6 % or respondents on a regular basis and 2,9 % as a one-time action. The

respondents mentioned the National University of Life and Environmental Sciences of Ukraine, the National Technical University "Kharkiv Polytechnic Institute", the National Aerospace University "Kharkiv Aviation Institute", the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Oles Honchar Dnipro National University, Taras Shevchenko National University of Kyiv, Dnipro University of Technology, National University "Zaporizhzhia Polytechnic", National University "Lviv Polytechnic", Kharkiv National University of Radio Electronics, Central Ukrainian National Technical University most often and proved their active contribution to R&D and cooperation with business in this field. Most of tehese universities are leaders among Ukrainian higher education institutions in the number and quality of implemented and ongoing international projects.

The crucial role of Ukrainian higher education institutions and research institutions in development of innovative ecosystems is caused by such factors as high level of knowledge of scientists in the relevant areas; the opportunity to involve active young staff to work in the company; willingness to cooperate on the part of scientists; high level of professionalism of representatives of scientific institutions and/or higher education institutions; obtaining new knowledge; scientific potential; high-quality intellectual and technological product; advanced training; the opportunity to receive expert and technological assistance; innovative thinking of the staff; high economic efficiency of the proposed solutions. Most of these advantages emerge as a result of HEIs' and RIs' participation in international projects.

The analysis of weaknesses also gave the food for thought as such phenomena as bureaucratized management system; lack of modern material and technical base for carrying out developments; isolation of science from practice and market needs; conservatism; lack of co-financing from HEIs and/or scientific institutions; organization of the cooperation process; weak orientation of scientists to the final practical result; an overly theoretical approach; lack of state financial support for such cooperation hinder the process of innovations creation and promotion, disable networking and cooperation.

Nevertheless, the survey helped to find the solutions for the development of innovative ecosystems in Ukraine, they are: involving small and medium business; better networking, advertising and informing on all facilities and opportunities for cooperation with business and enterprises; holding conferences, fairs, exhibitions and other promotion and dissemination events; needs surveys, communicating and quick responses to emerging demands via social media and other ways of communication; cooperation with other innovative ecosystems of Ukraine and abroad; promulgation of activity results by means of publications in journals and other editions; implementing of joint with stakeholders projects, startups, spin-offs; creation of new technological databases or contributing to the existing ones; meeting the needs of business and enterprises by organising professional development of their staff; development of youth startup movement (Survey, 2020).

In 2021 Ministry of Education and Science of Ukraine continued this investigation and organized a survey among such participants of innovations as students, entrepreneurs, professionals, investors, universities, organizations, research centres, funds and companies for the sake of the Ukrainian innovative ecosystem improvement. The survey was devoted to the assessment of the Ukrainian innovative ecosystem, its issues and the role of Ukrainian legislation in the sphere of innovations (Survey, 2021). The results of the survey were not published as the full-scale invasion started in Ukraine. So, nowadays the system state is crucial and demands a profound analysis and a strategy of its development on both national and local levels.

It is important to remark that focusing on innovative ecosystems makes cooperation of Ukrainian universities with business and public institutions two-sided: the universities do a lot

of research, prepare the ground for discoveries and innovations "birth", at the same time the study process for students becomes more relevant when professionals from business and other similar sectors come to classes and laboratories and demonstrate the practical side of a phenomenon either takes students to the enterprise or company and immerse them in the atmosphere of real-time processes. That is how the principle "learning by doing" works in education.

In spite of the fact that in Ukraine there are such large-scale projects led by Ministries, not so many universities, mainly the biggest and those which have well developed research infrastructure, have their own innovative ecosystems. The examples of such activity are represented by Sumy State University and its New Generation Startup-Center which was created with the support of SUCSID TEMPUS Project funded by the lifelong leaning Programme of the European Commission. The University is also famous for its UNIDO GCIP regional accelerator center for innovation, technology, and start-ups in Sumy region of Ukraine. They deliver seminars, trainings, business games with enterprises participation, presentations, crash-tests, brainstorming; support participation of the youth in all-Ukrainian and international competitions; develop partnership and mentoring with the leading startup-projects, startup-hubs, investing funds.

One of the advantages of this innovative ecosystem is that the University develops networking with other innovative ecosystems, e.g. "Sikorsky Challenge", "Scientific Park Taras Shevchenko Kyiv University", "Association of enterprises of industrial automation of Ukraine", etc. They are cooperating not just with the similar innovative ecosystems of other universities, but also with business, enterprises and NGOs uniting representatives of various enterprises that helps them to upscale their impact on the development of national economy.

Sumy State University implemented numerous international innovative projects such as "Inter-university start-up centers for students' innovations development & promotion" (530349-TEMPUS-1-2012-1-FR-TEMPUS-JPHES), "3D printer functional elements for flexible electronic devices" (NATO Science for Peace and Security G5916), "European standards for protection of rights of consumers of financial services" (619998-EPP-1-2020-1-UA-EPPJMO-MODULE), "EU legislative, economic and social transition to sustainable society within industry" (619997-EPP-1-2020-1-UA-EPPJMO-CHAIR), "Disruptive technologies for sustainable development in conditions of Industries 4.0 and 5.0: the EU Experience" (101083435 - DTSDI - ERASMUS-JMO-2022- HEI-TCH-RSCH) etc. On the one hand, implementing these projects has contributed to the promotion of innovations in the society, especially valuable for the young generation. On the other hand, they are restricted in time and their long-term effect requires special study. At the same time, the best their impact resulted in creation of New Generation Startup-Center, the foundation for which became the powerful technological basis, experienced staff, open for innovations and cooperation, skillful at working in various teams. In spite of all challenges and issues since the start of the Martial Law in Ukraine, the innovative ecosystem is being developed and contributing to the national business and economy improvement.

Another open to innovations institution of higher education is the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Its Innovation Ecosystem Sikorsky Challenge (INESC) has been designed to carry out the selection, recruitment and training of creative people to create their own business and start-ups, to help them find the investors and to promote their start-ups. This innovation ecosystem consists of Startup School «Sikorsky Challenge», Business Incubator «Sikorsky Challenge», Innovative technological environment «Sikorsky Lab», Center for Intellectual Property, Venture Fund «Sikorsky Challenge» and holds Festival of innovation projects «Sikorsky Challenge».

On the official site of INESC a wide range of opportunities is presented among which there

are engaging creative people in innovative entrepreneurship, training of the selected participants innovative entrepreneurship and the creation of incentives for them to shape their technological ideas, inspiring them for business ideas and development of projects and prototyping products business, help with finding investors or business angels, training participants to meet the investors requirements, participation in the opening and running start-up companies, protection of intellectual property rights, providing legal, organizational, accounting support start-up companies and assistance in bringing them to an international level (Sikorsky Challenge Ukraine, 2024). This innovative ecosystem is one of the most efficient concerning all the necessary responses to business and start-up companies.

There are numerous ways to engage Ukrainian universities to make more impressive impact on the national economy and they are quite effective and help them to start contributing to the innovative ecosystems development. Such example is involving Ukrainian universities in cooperation with European ones within the join international projects. One of such experiences is represented by Transform4Europe project, where eleven European universities have joined forces in the Transform4Europe Alliance. They are creating a common multilingual campus in order to take care of the future of our regions, countries and the whole of Europe (Transfor4Europe, 2024). Mariupol State University is an associated partner in this project. In this project Research & Innovation Ecosystems comprise Transformation Labs focusing on smart cities and regions, critical heritage, knowledge entrepreneurship, Matchmaking for excellence which stands for research cooperation development (inclusion with study offer developments), matchmaking events, T4EU Seed funding programme, Joint Grants Office and Connect4Research Platform. The mission of this alliance is to create efficient joint governance structures, infrastructures and services, cutting-edge academic programmes and innovative learning environments for students, scientists and practitioners from all over the world (Transfor4Europe, 2024). They focus on mobility, interdisciplinarity and inclusion. The communities of the universities which are the project participants share "a strong European identity and perceive themselves as active agents of transformation" (Transfor4Europe, 2024). Most of efforts are paid to making the T4EU universities creators of "networked European knowledge and innovation ecosystems, driving excellence in research and largely contributing to the attractiveness and competitiveness of the EEA and Europe as a whole" (Transfor4Europe, 2024).

Among other numerous advantages of the Transform4Europe Alliance their educating and training future European knowledge-entrepreneurs with a joint academic offering portfolio is especially valuable. It becomes possible due to "including customised transdisciplinary study and training programmes, integrating the transformative knowledge-entrepreneurialism perspective into all education and training activities and making it a key concept for active European citizenship". The focus is on providing students with creative and innovative entrepreneurial mind-set, intercultural competencies and language skills.

One more important action within the Alliance is associated with focusing on establishing structured partnerships with key regional stakeholders and facilitating interactions among them in the project Transformation Labs. The added value of it is strengthened with flexibility and adjusting to different contexts in the process of knowledge transfer and knowledge-entrepreneurship. So, now the process of creating networked European knowledge and innovation ecosystems is developed and that "will contribute to European economic and environmental sustainability as breeding grounds for excellent research and knowledge transfer" (Transfor4Europe, 2024). There are rather good grounds and prospects for Mariupol State University to share this valuable experience for the sake of development of Ukrainian innovative ecosystems.

Overall task for effective functioning of Ukrainian innovative ecosystems is connected with transferring knowledge, skills and tools for sustainable economic development to various stakeholders primarily represented by communities. The universities have a good potential for contributing to the sustainable economic development mindset by organizing outreach programmes on the ways of strategic planning and development of communities by means of its social capital, resource management, the process of producing and implementing innovative solutions, using various cooperation forms to improve the communities life quality. Delivering such outreach programmes can become the first stage of joint innovations of universities and communities. But such programmes should become the source of further cooperation, so both the content and study process should reveal such opportunities through involving learner-centred classroom, using surveys, feedback sessions, inviting stakeholders to be co-trainers and co-teachers. Such programmes should have the so-called "bridges" to the next stage of strategic planning of cooperation in thee field of research and innovations. After that it is possible to start creating innovative production.

All stages on the way to the development of an innovative ecosystem should be practice oriented and contribute to modelling its prototype. Immersion of all potential partners of the innovative ecosystem can be realized by means of joint mastering practical tools, methods and cases, development of wide range of soft skills including leadership, change-making, interdisciplinary team-building and communication, fundraising skills, digital data collection and analysis, raising awareness of universities research potential and their opportunities for innovations production and implementation.

The contribution of different types of Ukrainian universities to the development of innovative ecosystems can become a part of their third mission. The examples of such experience can be observed in the universities-participants of the consortium of the Erasmus+ KA2 CBHE project 101083077 "Universities - Communities: Strengthening Cooperation" (UniCom, 2024). The project team represented by 7 Ukrainian universities: Dragomanov Ukrainian State University, Bogdan Khmelnitsky Melitopol State Pedagogical University, Sumy National Agrarian University, Ivan Franko National University of Lviv, Kharkiv National University of Radio Electronics, Donetsk State University of Internal Affairs, National Pirogov Memorial Medical University and two NGOs: Ukrainian Association of Professors and Researchers of European Integration, Ukrainian Association of European Studies prepared a set of Training Kits for other Ukrainian universities and communities to develop various directions of cooperation including research and innovations.

Before designing the Training Kits there was a lot of preparation work done by the members of UNICOM Consortium. The representatives of Ukrainian universities were trained to get awareness of the Third Mission and the ways of its implementation. The European partners also organized study visits to their universities for sharing their experience on implementing the Third Mission including their impact on the development of innovative ecosystems. The most profound experience regarding innovative ecosystems and their elements was presented at the University of Genoa, University of Latvia and Czech University of Life Sciences Prague.

The University of Genoa, the coordinator of the project, shared with the participants the concepts of technology transfer and popularizing science and research in communities. The "Technology Transfer Organization" aims at providing facilities and legal support to researchers and students in starting-up new businesses activities and exploiting intellectual property rights. The cornerstones of the Organization's activity are based on the University of Genoa's innovative solutions and IP rights protection, involving human resources and resources in cooperation with industry which articulates its demands on intellectual property

and legal concerns, communicates its requirements to be met by the University of Genoa and gives all the necessary financial support for these actions. The University greatly contribute to innovative entrepreneurship by supporting the start up phase of high-tech, innovative and spin-off companies, functioning of research laboratories, a digital matchmaking platform "Knowledgeshare" for the valorization of the Italian research results whose aim is to connect research teams with companies and investors, development of relationships with public and private bodies of the territorial, economic and social context (incubators, CDP, Ligur capital, MITO Technology, etc.) and with thematic networks (Netval, ASTP, etc.). There are also numerous events aimed at netwoking and trust building with local industries, promoting and exploiting university's patents, promotion of research by means of participating in such events as European Researcher's Night, FameLab, Genoa Science Festival which can become prototypes for promotion of research in Ukraine (UniCom, 2024).

A series of valuable cases were introduced to Ukrainian partners by Czech University of Life Sciences Prague, which emphasizes education and research in sustainable development and the conservation of biodiversity along with the responsible use of natural resources and alternative, renewable means of energy production. Within its third mission the University promotes entrepreneurship and innovation among its students and staff, encouraging them to develop their ideas and start their own businesses, provides support for technology transfer and commercialization of research results, helping to bring new products and services to the market, contributes to the sustainable management of natural resources, the improvement of agricultural practices, and the protection of the environment. BioResources & Technology is a part of innovative ecosystem at the university and its main objective is to determine the real impact of small biogas plants (both in developing and developed countries) on the environment, climate change and society and to contribute crucially to the current global debate on small biogas technology. Its impact goes beyond regional and national interests, the team strives for achieving the results valuable for the global ecology.

The University of Latvia is utilizing the university's research capabilities to address local issues, such as urban planning, public health, environmental sustainability, and social services; is working together with local municipalities to stimulate economic development through innovation events and partnerships with local businesses; is providing expertise and data to assist municipalities in policy-making and strategic planning. Thus, the higher education institution supports stakeholders' oriented research applications, economic growth and policy development, methodologies for innovation project management to stimulate growth and entrepreneurship. Its key collaboration areas are crisis management and civil protection, environmental management and sustainability, regional growth strategies, support systems for businesses in distress.

On the basis of rich experience the representatives of the University of Latvia suggest such "ways of fostering innovation and knowledge transfer, establishing the university as a pivotal contributor to local and regional innovation ecosystems:

Cultivating Partnerships: Building strong connections between the university, industry, and government to create a collaborative innovation network.

• Knowledge Transfer Initiatives: Establishing programs that allow for the sharing of research findings and expertise between the university and external entities.

• Support for Start-ups and Entrepreneurs: Providing resources and guidance to nurture new businesses and encourage entrepreneurial ventures within the region.

• Research and Development (R&D) Investments: Encouraging investment in R&D to drive innovation across various sectors.

• Educational Programs for Skill Development: Offering training and educational

programs that equip students and professionals with the skills necessary to thrive in an innovation-driven economy.

• Policy Development for Innovation: Assisting in the formulation of policies that foster an environment conducive to innovation and the commercialization of research (UniCom, 2024).

Depending on the fields of research and education the universities mostly focus on, they shared their experience of cooperation with communities, demonstrating existing practices of joint projects and outlining the possible prospects for further actions and contribution to the development of innovative ecosystems; in another part of the training kits there is the content and guidelines for outreach modules devoted to the topics of Green Deal, inclusion, gender equality, public health, resilience and social cohesion, economic sustainable growth, implementation and protection of citizens' rights to participate in public and political life, digitalisation, each of which is valuable for stakeholders. But the most valuable for the development of innovative ecosystems are Green Deal, digitalisation, economic sustainable growth as they suggest innovative solutions for the society, including a new model of ecologically sustainable economy, green technologies and startups, a business-model of circular economy, green marketing tools; auditing existing data and processes to assess the current state of data that are collected, stored, and used for decision-making; data quality and availability of necessary resources to process them; unifying all relevant data into a centralized platform for easier access and management; data security and access control; innovative approaches to solving local problems, such as energy efficiency, waste management, development of sustainable development strategies for businesses or public organizations, analysis of modern challenges of sustainable development; application of creative approaches to solving environmental, social and economic problems, urbanization, smart-cities and their contribution to the sustainable development, joint efforts aimed at investment involvement for the development of smart-cities.

The latter concept could become a good point for cooperation between universities, business and public institutions as there are three biggest issues on the way of making Ukrainian cities smart: absence of strategic vision, lack of financing, lack of qualified and experienced staff. Innovative ecosystems' contribution to the solution of this issue can be joint strategic planning to which it is important to involve national and local government, business, higher education institutions (which in small cities are considered to be city-creating) and non-governmental organizations. They can be overcome with joint efforts. Business can become a crucial financial support, and higher education institutions prepare, reskill and up-skill qualified staff for the development of the systems of smart-cities and making Ukraine innovative, competitive and attractive for Ukrainians and foreign citizens, but will also attract a significantly larger number of investors to the development of the state (Smart City Ukraine, 2023). Smart-specialization of a city or any area can become the dominant of its competitive development.

The universities have qualified staff or can create conditions for necessary up-skilling, have sufficient resources or can create relevant environment for stimulating entrepreneurship. A wide range of international programmes and European tools support such initiatives as creating agencies for regional development, business-incubators, accelerators, technological and industrial parks and consider universities as education and research centres for innovative ecosystems functioning and development of communities.

In 2020 V. Shadura and A. Shevchenko analysed the European tools supporting research and innovations in post-pandemic period and emphasised the role of such as Horizon Europe, Euratom, European Regional Development Fund, European Agricultural Guarantee Fund, European Social Fund Plus, European Unity Foundation, Erasmus+, Just Transition Fund, EU

Space Programme, InvestEU, Internal Security Fund, Digital Europe Programme, European Maritime, Fisheries and Aquaculture Fund, Programme for the Environment and Climate Action, Joint Capital Market Program (Shadura & Shevchenko, 2020). Each of these programme and fund supports innovative projects and ecosystems within their scope regarding separate economy sectors and directions.

One of the most powerful European programmes which enhance the development of Ukrainian innovative ecosystems is Horizon Europe, which facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges. There are three pillars in this programme: Excellent Science with its European Research Council, Marie Skłodowska-Curie Actions, and Research infrastructures opportunities; Global Challenges and European Industrial Competitiveness having 5 clasters: 1) Health, 2) Culture, Creativity and Inclusive Society, 3) Civil security for society, 4) Digital, Industry and Space, 5) Climate, Energy and Mobility; and Innovative Europe with the opportunities to apply for European Innovation Council, European Institute of Innovation & Technology, and European Innovation Ecosystems. The latter sub-pillar comprises initiatives at national, regional and local level as well as private and third sector initiatives. It builds interconnected, inclusive innovation ecosystems across Europe and supports the green, digital, and social transitions; reinforces network connectivity within and between innovation ecosystems to accelerate sustainable business growth with high societal value; supports the European Partnership for Innovative SMEs; complements the European Regional Development Fund support for innovation ecosystems and interregional partnerships around smart specialisation topics (Horizon Europe Office in Ukraine, 2024). The representatives of business are welcome to join all the initiatives on the stages of preparing proposals and implementing projects and to be engaged in creating more connected, inclusive, and efficient innovation ecosystems and supporting the scaling of companies.

A special attention in the society is also paid to the social entrepreneurship and the impact of socially responsible business on economic development of territories. In this area Junior Achievement Worldwide inspires and prepares young people to succeed in a global economy. Its member Junior Achievement Ukraine has the same mission and contributes to the engagement of Ukrainian youth to entrepreneurship and making their voice matter in the development of Ukrainian economy. Their programmes are delivered in cooperation with business and have a clear practical focus.

Conclusion. Ukrainian society has reconceptualized its identity as a European one and is on its way to joining the European Union. One of the crucial transition is to align Ukrainian higher education to the European higher education area. Similarly to the European ones, the Ukrainian higher education institutions can be competitive in case of integral implementing their three missions: educational, research and societal. The collaboration with the productive sector in research and development and innovation is also an integral part of any contemporary university.

Innovative ecosystems represent a unique and specific type of networks comprising a wide range of stakeholders, spanning the boundaries of different sectors of economy and involving all possible resources for the sake of positive impact on it and its development.

The key stakeholders in the process of creating and functioning of innovative ecosystems are business, enterprises, companies, as well as higher education institutions, ministries and all society. The impact of the Ministry of Digital Transformation of Ukraine and Ministry of Education and Science of Ukraine on the Ukrainian innovative ecosystems is great and is strengthened in cooperation with Ukrainian Startup Fund, other organizations and offices like Erasmus+ Office in Ukraine and Horizon Europe Office in Ukraine.

Ukrainian higher education institutions and research institutions have such advantages in contributing to the development of innovative ecosystems: professional, experienced and open to innovations scientists in the relevant areas; active young staff ready to work in companies; scientists' willingness to cooperate; obtaining new knowledge; scientific potential; high-quality intellectual and technological product; advanced training; expert and technological assistance; high economic efficiency of the proposed solutions.

At the same time there are barriers which hinder the process of innovative ecosystems development: limited financial resources; rigid, hierarchical governing at universities; lack of funding, recognition or other incentives for the researchers and other agents of changes; brain drain; lack of collaboration between universities and industries; lack of promotion of universities' innovative potential and stakeholders' needs and demands.

Nevertheless, with the support of European and other international programmes, European and other international higher education and research institutions the innovative projects and ecosystems in Ukraine are being non-stop implemented and contributing to its sustainable development and European integration.

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