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Management system to forming and developing effective innovation ecosystem

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Introductions. The systems approach to innovation research has generated a significant body of literature on different types of innovation systems, with a primary focus on actors and institutions. The conceptual development of innovation approaches has shown a shift in focus from innovation systems to innovation ecosystems, from competition to cooperation. The elements of an innovation ecosystem are seen as interconnected through complementarity, cooperation, and substitution (CS-relationships), which provide a balanced management of the innovation ecosystem and an understanding of what is happening in the innovation ecosystem. CS-relationships are central to shaping innovation ecosystem governance, strategies, and policies [1]. The shift in focus from innovation systems to innovation ecosystems reflects a paradigm shift in innovation research from static innovation systems focused on the set of elements and resource allocation to dynamic mechanisms of interaction between elements and subjects of innovation ecosystems. Innovation ecosystems focus not only on the composition of the elements of the system, but also include the interaction between elements and mechanisms of information exchange between elements and the environment, due to which the management system is always in a dynamic mode [2].

The concept of innovation ecosystem develops the concept of "innovation systems"; since traditional logic assumes that, the elements of a system must established before one can talk about their connections. From a management point of view, the construction and development of an institutional "innovation system" and an "innovation ecosystem" are two very different processes. An innovation ecosystem had viewed

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as a dynamic system characterized by localized interactions between a huge number of diverse agents – universities, enterprises, government agencies, society, resources, etc. Their interaction had based on the principle of self-organization. This means that reactions to the environment arise because of spontaneous "bottom-up" interactions without central control, which is strictly contrary to the approach to the development of innovation systems. Innovation ecosystems are highly adaptive and change their behavior in order to remain viable. Innovation ecosystems are smart systems due to their openness, interaction with the environment, self-organization, adaptability, fault tolerance and flexibility. The smart development of an innovation ecosystem should considered from the perspective of complexity theory. The development of innovation ecosystem is the result of the interaction of cultural, economic, institutional and technological factors and the dynamics of the smart development of innovation ecosystem participants and the creation of different sets of mechanisms depending on the specific problem [3]. The concept of innovation ecosystem is considered from the perspective of understanding boundaries, structure and coordination, as well as from the perspective of understanding three theoretical perspectives: value creation, network embeddedness, network perspective [4]. Central elements of innovation ecosystems: laws, regulations, voluntary agreements and codes of conduct, public support, ideas, education and entrepreneurship, university and research systems, media, civil society, communication, social reputation, scientists - researchers, small and medium-sized enterprises, corporations, research and business infrastructures, etc. Building on these elements, innovation ecosystems will promote creative thinking, free from bureaucratic constraints and one-sided regulatory focus, capable of achieving innovative solutions and able to address new challenges, as well as develop coherence with stakeholders. The concept of innovation ecosystems develops the Dublin Declaration on Innovation (2013), which calls for stimulating cooperation between citizens, business, universities and governments and for the transition from the European Research Area (ERA) to European innovation ecosystems [5]. Innovation ecosystems can represented according to two theoretical approaches: platform and territorial. According to the platform approach, an innovation ecosystem had defined as "a network of

interconnected organizations linked to a central firm or platform that includes participants from both the creation and production and use sides of innovations, which creates and appropriates new value through innovation". The platform approach had used as a mechanism for improving the productivity of new technology and value creation in innovation ecosystems. The dominant organization plans and offers a platform, which had defined as a common asset that the participants of the innovation ecosystem can use to develop their proposals and innovations. The dominant organization of the innovation ecosystem defines common goals, coordinates the capabilities of the participants to stimulate innovation, create and distribute value between the participants. Innovation ecosystems according to the territorial approach emphasize the spatial dimension of ecosystems, which had defined as institutional, geographical, economic different levels, such as industry, universities, and research institutions at the regional or national levels [6]. The concept of innovation ecosystem, or micro-communities of an innovation ecosystem, differs from innovation management in a single organization and includes uncertainty management, promoting transparency and trust, ensuring value creation, and sharing value between participants.

The management of innovation ecosystems c defines key management principles: cross-sectorial cooperation; clear common intention; customer-centric approach; decentralized network structure; strategic alignment of goals, strategies, and initiatives; continuous value creation; integration of technologies and tools to reduce costs; intellectual asset management [7].

Innovation ecosystem management focuses on managing a network of organizations that contribute to the systematic creation and implementation of innovations. An innovation ecosystem management system is a strategic approach and set of tools, often digital, used to optimize a network of organizations and different stakeholders to co-create value and achieve common innovation goals. This management system includes: strategies for managing interactions and resources, promoting trust, measuring results, accelerating the transformation of ideas into effective solutions, and supporting coherence within the innovation network [8]. The management of the innovation ecosystem takes place in 5 areas of activity, namely market education; creation of social

capital; access to knowledge; promotion of open innovation; internationalization [9].

Problems in managing innovation ecosystems can arise due to: fragmentation; complexity of management; weakness of digital and research infrastructure; lack of trust that hinders free communication, open communication, knowledge sharing; lack of qualified human capital; lack of diverse participants or shared resources that hinders collaboration; the need to overcome the mentality of large organizations; problems with intellectual property management; slow development of pilot projects; ineffective management of key events; the need to retain partners and interested participants; difficulties in forming a culture that supports risks and innovation [10, 11, 12].

Effective innovation ecosystems had characterized by a high level of interconnectedness, diversity, a supportive culture, and adaptive governance that fosters collaboration and innovation at a systemic level [13]. Using an innovation ecosystem provides a comprehensive and strategic approach to innovation that delivers sustainable ROI, aligns with strategic goals, leverages data effectively, fosters collaboration, and increases overall agility and market position. Effectively advantage an innovation ecosystem, companies can engage in various types of collaboration. These collaborative efforts leverage diverse perspectives and expertise, driving innovation and growth [14].

Aim. Based on the analysis of the concept of an innovation ecosystem, problems and principles of innovation ecosystem management, identify the key components of the management system of an effective innovation ecosystem.

Materials and methods. The methodological approach of the study was based on the use of a set of analytical methods of theoretical generalization, expert evaluation and synthesis.

Results and discussion. Innovation management focuses on managing innovation activities within a specific organization, ensuring the functioning of innovation processes that generate new ideas, products and services to increase the competitiveness of a specific organization. The innovation management system of a specific organization includes tools for managing resources, personnel, finances, marketing and production in the context of a specific organization. Innovation management at the level of a specific organization allows the organization to act in accordance with market challenges and consumer needs, bringing

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innovations to the market.

However, in today's rapidly changing environment, innovation is not created and implemented by organizations in isolation, but rather occurs within an ecosystem that includes a network of organizations working together to achieve sustainable growth and competitive advantage. Industries are transforming into cross-industry ecosystems of a growing ecosystem economy. This reality requires a shift from managing innovation within individual organizations to managing innovation ecosystems.

The innovation ecosystem management system focuses on managing a network of organizations that contribute to the systematic creation, implementation, and scaling of innovations at the regional, national, or international levels. The management system of the innovation ecosystem includes coordination of actions of various participants: startups, spin-off companies, large companies, scientific institutions, universities, investors, and government agencies. Ecosystem management tools: creation of favorable policies to stimulate cooperation and knowledge exchange, ensuring access to resources and financing for all participants in the innovation ecosystem. Innovation ecosystems develop from innovation systems of specific organizations, which reflects a paradigm shift in the field of innovation. The innovation ecosystem focuses not only on the composition of the elements of the system, but also includes interaction between elements and mechanisms for information exchange between elements and the environment, due to which the management system of the innovation ecosystem is always in dynamic mode.

Using a platform approach to the organizational structure of the innovation ecosystem, which is a network of interconnected organizations (universities, scientific institutions, government, industry, manufacturing, startups and spin-off companies, small and medium-sized businesses) connected to a central organization that, using a platform, unites all participants in the innovation ecosystem to accelerate the creation, implementation and scaling of innovations at the regional, national or international levels.

An effective innovation ecosystem management system should include the following key components responsible for managing:

- identification and analysis of technological and market

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trends to align innovation ecosystem strategies;

- spaces for collaboration of innovation ecosystem participants on joint priority innovation ideas, research results, projects;
- portfolio of innovations, research results and initiatives;
- pilot projects of the innovation ecosystem;
- databases of partners and stakeholders for managing relationships, tracking contributions and promoting cooperation;
- databases of intellectual property (patents, trademarks, license agreements) generated in the innovation ecosystem;
- databases of technologies that can be integrated into new products, services and processes;
- information and analytical dashboard for reporting and monitoring the activities of the innovation ecosystem;
- set of digital tools that facilitate the implementation of collaboration processes and value creation between various stakeholders and participants in the innovation ecosystem in the network;
- access to specialized innovation platforms that offer toolkits for idea management, technology search and community management of the innovation ecosystem;
- access to specialized collaboration, project management, technology transfer platforms that provide a flexible environment for organizing and storing information on research results, innovative developments, projects, participant data and cooperation progress;
- organization and promotion of events important for supporting the innovation ecosystem.

Conclusions. In today's rapidly changing environment, innovation creation and implementation are not carried out by organizations in isolation, but occur in ecosystems that include a network of organizations that work together to ensure sustainable growth and competitive advantages.

The paradigm shift from innovation systems of a specific organization to innovation ecosystems of a network of organizations is due to rapid changes in markets, the complexity of modern challenges, which requires diverse experience and resources distributed between different organizations that can ensure the creation, implementation and scaling of innovations that provide faster adaptation to market changes, supports open innovation strategies,

promoting cooperation with external partners and competition at the level of innovation ecosystems.

Based on the analysis of the concept of an innovation ecosystem, problems and principles of innovation ecosystem management, the key components of the management system of an effective innovation ecosystem have been identified, which allows: to effectively use the resources of a network of organizations; to provide access to talent and capital; to apply effective structured approaches to solving complex problems; to unite the network of organizations; to stimulate increased productivity; to systematically create innovations; to accelerate the entry of innovations into the market; to promote economic growth and increase the competitiveness of organizations of the innovation ecosystem; to solve modern socio-economic challenges of society.

Having an effective governance system is critical for effectively aligning goals, driving innovation efforts; coordinating collaboration across teams and projects to solve complex problems; managing resources and knowledge to create critical innovations; flexibly responding and adapting to market trends and changes; and monitoring and tracking the results of innovation creation, development, and commercialization.

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