

Transformation of business ecosystems of the energy sector enterprises

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Abstract. Transformation of business ecosystems of the energy sector enterprises is a strategic necessity for their sustainable competitiveness in the context of changes in the global energy landscape, which determines the relevance of the study. The purpose of the study was to substantiate the need to transform the business ecosystems of the energy sector enterprises. The following methods are applied: scientific abstraction – in substantiating the meaning of “business ecosystem” and its definition; inductive, deductive – in collecting, systematising, and developing a conceptual model of a business ecosystem; abstract and logical – for theoretical generalisations and forming conclusions; systemic – for detailed development of a strategy for business ecosystems of energy sector enterprises. A conceptual model of the business ecosystem is proposed, which includes the relationship and interdependence of large, niche and key players. A mechanism for implementing the business ecosystem strategy is proposed. It is established that the success of implementing a business ecosystem strategy depends on the ability to effectively coordinate interaction between different participants in this ecosystem, and on existing agreements concluded. A mechanism for implementing the business ecosystem strategy is proposed in the following sequence: modernisation of the management vector of the business ecosystem, a system of cooperation between enterprises of the energy and related industries, investment support for enterprises of the energy sector, transition to “green” energy, and development of a vertical and horizontal business ecosystem. The features of developing the business ecosystem in the energy sector enterprises are revealed: energy and digital transformation, resistance to change, energy services, partnership and cooperation, and improvement of energy efficiency. It is proved that the business ecosystem of energy sector enterprises is a complex and multifaceted category, which is developed under the influence of a set of advantages, the combination of which forms a more stable position in the market for the enterprise. The practical value lies in developing recommendations that determine the transformation of business ecosystems of the energy sector enterprises and consist in the modernisation of the

Article's History: Received: 15.09.2023; Revised: 26.12.2023; Accepted: 22.03.2024

Suggested Citation:

Bochko, O., Zarichna, O., & Kuziak, V. (2024). Transformation of business ecosystems of the energy sector enterprises. *Development Management*, 23(1), 62-71. doi: 10.57111/devt/1.2024.62.

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management of the business ecosystem, the development of cooperation between energy and related industries, investment support for energy sector enterprises, and the need to switch to “green” energy, vertical and horizontal business ecosystem

Keywords: professional competencies; logistics manager; sales manager; HR manager; project manager; job advertisement; skill ratio

● INTRODUCTION

Ecosystem building is growing in popularity among businesses in various industries in Ukraine. However, ecosystem development is only one of the tools that can lead participants to a win-win model, where each of them receives additional profits and maximises the results of their work, which will occur within the built ecosystem. B. Shestopalov (2023) states that if an effective ecosystem is built, each participant receives uniqueness and can use it with maximum multiplication both for themselves and for others. It is also advisable to pay attention to the ecosystem approach, which encourages enterprises to enter foreign markets by manufacturing new products. The practical implementation of this approach will take place if concentration is created. However, it is necessary to prove the need to apply the ecosystem and build trust in it. According to research by O. Tsyhanenko *et al.* (2022), the ecosystem is the basis of business sustainability, which has the following main characteristics: stimulating cooperation between different business structures, which together can serve not only individual enterprises but also markets in general. The participants of the business ecosystem are bound by common interests, goals, and values that encourage everyone to develop. In this context, I.K. Bystriakov & D.V. Klynovyi (2019) specify that the subjects of business structures that can interact are the state authorities, business and the population that interact within information technology platforms in using natural assets. In this case, T. Kviatko (2023) points out the close relationship between business structures, both medium and small, in the development of business models. This is the fundamental basis of the ecosystem.

By forming the structure of the business ecosystem, its entities create a common platform to support entrepreneurs. This is not like a conventional infrastructure. The point is not about physical spaces or existing buildings, but about pooling capital or large institutions. Instead, the founders of the ecosystem focus on creating a consistent joint interaction of all participants in the structure. This refers to the process, not the product. In this context, I.K. Bystriakov & D.V. Klynovyi (2019) point out the conceptual foundations for the development of modern territorial business ecosystems based on natural assets using the tools and mechanisms of the platform economy in the context of the Fourth Industrial Revolution. The researchers focus on four phases of creating business ecosystems: economic management, project, programme and platform, with an emphasis on the development and application of advanced mechanisms for managing economic development. T. Kviatko (2023) proves that the development of ecosystems by companies is a progressive area of economic development. Given the current state of development of the digital society, the priority in creating an ecosystem of energy sector enterprises, according to V. Zamlynskyi *et al.* (2023) is the need to diagnose the company's readiness

at the initial stage of digital transformation, which allows identifying existing internal constraints that may become an obstacle to achieving the desired result. The functioning of the ecosystem is based on achieving the set goal of all business entities simultaneously. This leads to the development of each of them both in an innovative area and on a global scale. The business ecosystem of energy sector enterprises is a complex and multifaceted category, which is developed under the influence of a set of advantages, the combination of which creates a more stable position in the market for the enterprise.

The development of energy sector ecosystems is becoming a new profession at the intersection of economics and energy development in general. When building effective ecosystems, it is necessary to focus on a combination of conventional and modern approaches to economic development, based on the principle of “top-down”, considering the functioning of the environment managed by society, in which most entrepreneurs of the energy industry operate. Modern approaches to the development of the energy industry consist in the application of digitalisation ecosystems, which is ensured by the interaction of participants in the chain of forming the value of the final product, includes open interfaces and digital platforms for communication between the state, business, customers, etc. However, this may also apply to other industries. Therefore, the topic under study indicates the need to build business ecosystems of energy sector enterprises considering changes in the external environment. Among such changes in the modern world is Russia's full-scale invasion of Ukraine, which has exacerbated existing problems of business ecosystems, for example, the destruction of infrastructure, the lack of qualified human capital and labour, reduced demand for goods and services, and logistics problems. The main purpose of this study was to substantiate the transformation of business ecosystems of energy sector enterprises. To achieve this goal, it is necessary to perform the following tasks: to reveal the essence of the concept of “business ecosystem”; to substantiate the essence and components of the conceptual model of the business ecosystem; to identify the features of the business ecosystem of energy sector enterprises.

The tasks set in the study are solved using the following methods: scientific abstraction, which is used to substantiate the meaning and definition of “business ecosystem”. Inductive and deductive methods are used in collecting, systematising information and developing a modern conceptual model of the business ecosystem, the interests of all subjects of which are balanced. The comparison method is used in the study of economic and organisational tools for implementing the business ecosystem strategy. The abstract and logical method is used for making proposals for the process of performing tasks in accordance with the implementation of the business ecosystem strategy and when forming theoretical generalisations and summing up

conclusions. One of the most important approaches used in the study is systematic: it helped to develop a conceptual model of the business ecosystem, establish the stages of tasks in accordance with the implementation of the business ecosystem strategy, and identify the features of the development of the business ecosystem of energy sector enterprises. The study includes the investigation of the complexity of the ecosystem, benefits of its application in modern society, and the construction of a conceptual model of the business ecosystem. Using specified methods, the stages of implementation of the business ecosystem strategy are proposed, and the features of transformation of the business ecosystem of the energy sector are substantiated.

● THE ESSENCE OF THE BUSINESS ECOSYSTEM AND THE ADVANTAGES OF ITS APPLICATION IN MODERN SOCIETY

The need to develop business ecosystems of energy sector enterprises is provided by several key factors and strategic priorities. They consist in the use of the latest technologies that contribute to improving production efficiency and reducing emissions and the development of renewable energy sources; development and implementation of energy-efficient technologies and processes, ensuring the reduction of energy consumption and optimisation of available resources; introduction of digital initiatives such as the Internet of Things (IoT), data analytics, and artificial intelligence (AI); increasing automation and management of energy processes; development of sustainable partnerships between different actors in the energy sector. This contributes to the exchange of innovations, resources; development and modernisation of energy infrastructure to ensure the reliability and sustainability of systems; development and implementation of strategies aimed at ensuring the safety of energy systems in the face of growing threats to cybersecurity and natural disasters; introduction of environmentally friendly practices and measures to reduce the impact of energy production on the environment; ensuring the availability of qualified personnel who have the necessary knowledge and skills to develop and implement the latest technologies in the energy sector.

Such an integrated approach to the development of business ecosystems of energy sector enterprises guarantees their competitiveness, sustainability, and ability to adapt to changes in the global energy sector. The definition of “business ecosystem” was first used by J.F. Moore (1993). The researcher suggested considering enterprises as components of a business ecosystem that extends to other sectors of the economy. He pointed out the need to create innovative products. Any company can achieve success in a more efficient way than competitors in the relevant market segment. According to A. Polyanska *et al.* (2021), a business ecosystem is a network of organisations, including manufacturers, suppliers, distributors, customers, competitors, government agencies, etc., that are involved in the production and promotion of a particular product or service through competition and collaboration. As of the 2020s, a business ecosystem is a platform with a set of solutions to value propositions that its participants can use to meet their own needs (Burbelo *et al.*, 2022; Pavelko, 2023). Business ecosystems consist of a group of companies that collaborate with each other to introduce product innovation

(Espina-Romero *et al.*, 2023). Overall, business ecosystems offer three key benefits: access to a wide range of opportunities, fast scaling, flexibility, and stability. At launch, ecosystems can provide quick access to external innovations that would be too expensive or time-consuming to develop. Once launched, the ecosystem can scale much faster than companies with other management models. The ecosystem structure makes it easy and clear to add new entrants, and its simplified business model ensures rapid growth. Ultimately, part of the appeal of business ecosystems lies in their flexibility and stability.

An ecosystem has a central core or platform, a clear system for attracting new partners, and a modular structure where each component can be easily added or removed from the ecosystem. Therefore, such ecosystems provide more efficient work with consumers, in order to meet their most unpredictable needs, and with modern digital innovative technologies. N. Lyubomudrova & I. Sobol (2018) prove that in the conditions of the domestic economy, the innovation ecosystem is in its infancy, despite the presence of a significant number of technology parks, innovation centres, business incubators, venture funds, and start-ups. It is also necessary to consider the development of digital maturity of the enterprise in order to build a business ecosystem. A.Yu. Semenog (2019) proves that digitalisation encourages the creation of new value for consumers, which is manifested in financial savings, obtaining and implementing new experiences and the possibility of complicity in the creation of personal products and services.

The modern ecosystem is based on an idea. M.A. Teplyuk *et al.* (2020) prove that an ecosystem consists of a certain number of participants who have sufficient resources, capabilities, competence, and capital to implement the proposed idea. The idea has two main forms of manifestation: it either receives the support of the environment and is implemented practically, or it remains an “idea” without further implementation. The conceptual model of a business ecosystem consists of different layers, namely: leaders, contributors, users, and the environment. Notably, ecosystems are built for a fairly long period. It may take a decade or two to see the quality of the implemented ecosystem and the results obtained. Such a long time period is explained by the fact that the creation of a business and its level of efficiency is characterised by a long time period, and cultural changes occur rather slowly. Many modern business associations have elements of an ecosystem, but they remain not fully functional. Their structures may be small, isolated, or fragmented. Ecosystem developers actively work to expand opportunities and collaborate with others to build a common, unified business ecosystem. They are system entrepreneurs who work to improve their potential, while performing various roles: developer, intermediary, etc.

● CONSTRUCTION OF A CONCEPTUAL MODEL OF THE BUSINESS ECOSYSTEM

Each ecosystem has key players, they can be the main enterprises that define the idea and generally accepted rules of operation in the market. There are also niche players that can be intermediaries, distributors, suppliers, etc. Operating as part of an ecosystem, businesses expand their capabilities by strengthening the protagonists. In

order to gain an advantage in the market, large players (enterprises) surround themselves with niche players (intermediaries, distributors, suppliers). Niche players ensure the implementation of the tasks set. Within the business ecosystem, small system players can also function, which are parts of the overall system, but at the same time cannot have information about the main purpose of the business ecosystem functioning, but perform a secondary role. For example, territory cleaners and their functions

are secondary, but at the same time, the existence of a business ecosystem is impossible without them. Accordingly, provided that the interests of all business entities in the business ecosystem are balanced, the interest and mutual benefit of operating within such a system remains. Consequently, within an ecosystem, all structural actors are interconnected and interdependent. All participants understand their functions and benefit from their implementation (Fig. 1).

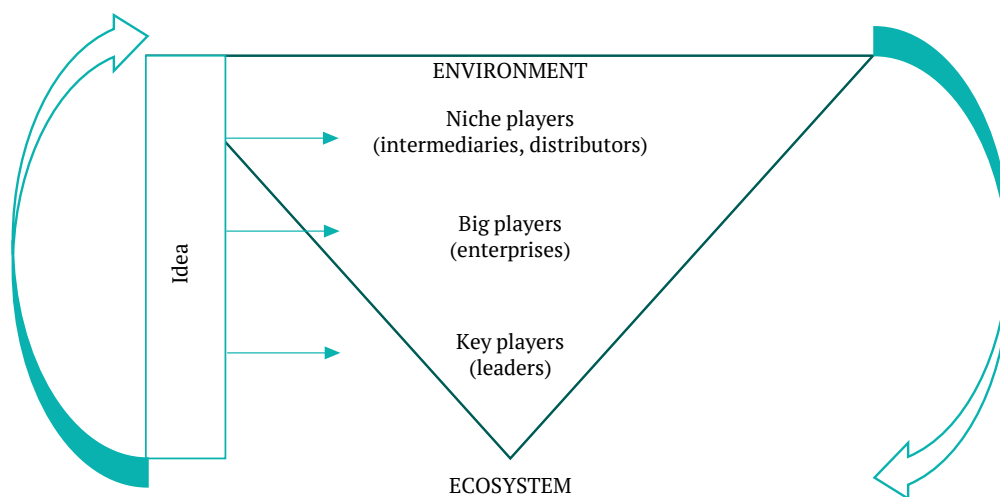


Figure 1. Conceptual model of the business ecosystem

Source: made by the authors

M. Peltoniemi & E. Vuori (2005) consider ecosystems as complex mechanisms consisting of interdependent components and characterised by the following features. Self-organisation is characterised by integrated dynamics that create systems and improve organisations. Emergence situation – the joint operation of interconnected system components creates qualitatively new and improved properties. Coevolution – a mechanism of interdependent changes caused by system components during development. Adaptability – the process by which the structure and properties of a system are purposefully changed in accordance with the influence of internal and external environmental factors. The ecosystem is endowed with the properties of stability, adaptability, coevolution, self-regulation, emergence, due to which its renewal and development is achieved (Lyubomudrova & Sobol, 2018). Thus, the ecosystem is characterised by the work of interdependent mechanisms that function effectively only if all of them simultaneously with one goal – to increase the profitability of all subjects of the ecosystem.

● DEVELOPMENT AND STAGE-BY-STAGE IMPLEMENTATION OF THE BUSINESS ECOSYSTEM STRATEGY

The success of an ecosystem often depends on several agreements: revenue sharing agreements, joint venture agreements, controlling stakes, and mergers and acquisitions.

To do this, it is necessary to focus on the internal key performance indicators of organisations involved in ecosystems to ensure strategy alignment (Business ecosystem..., 2019). Ecosystem logic allows high-tech businesses to maintain the required level of innovation and not lose ground. Ecosystem logic allows large holdings that have neither resources nor effective business models to be pulled out of the crisis (Demil *et al.*, 2018; Savruk, 2019). To implement a business ecosystem strategy, it is necessary to understand how it functions, i.e., not only to offer a perfect value proposition, but also to act as an intermediary in partnership agreements, which requires considerable effort. Such an offer should provide value to all parties to the transaction. The mechanism for implementing the business ecosystem strategy is presented in Figure 2. The goal of implementing a business ecosystem strategy is to formulate and effectively implement such a strategy. The strategy implementation is ensured by economic and organisational tools and the availability of investment, information, financial, credit, management, technological, human, and other types of resources. Based on the proposed conceptual and practical vision of the mechanism for implementing the business ecosystem strategy, the logic of implementing its tasks is proposed. The process of developing tools for implementing a business ecosystem strategy consists of organisational (ordinate) and economic (abscissa) directions (Fig. 3).

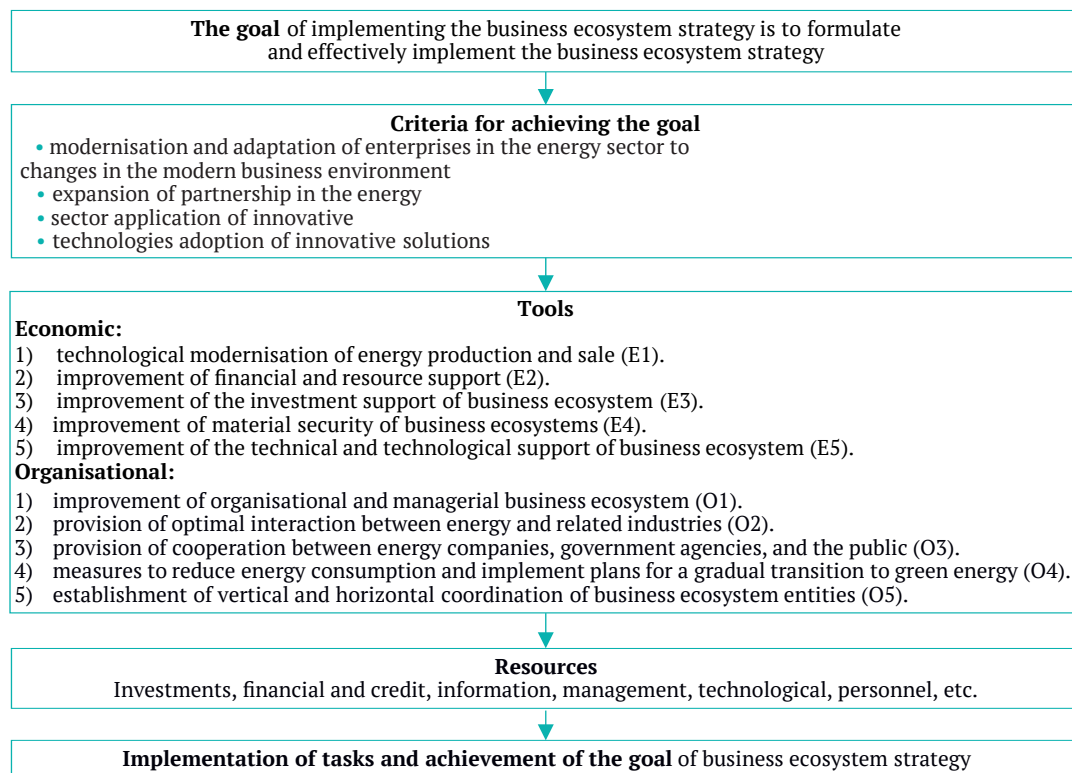


Figure 2. Mechanism for implementing the business ecosystem strategy

Source: made by the authors

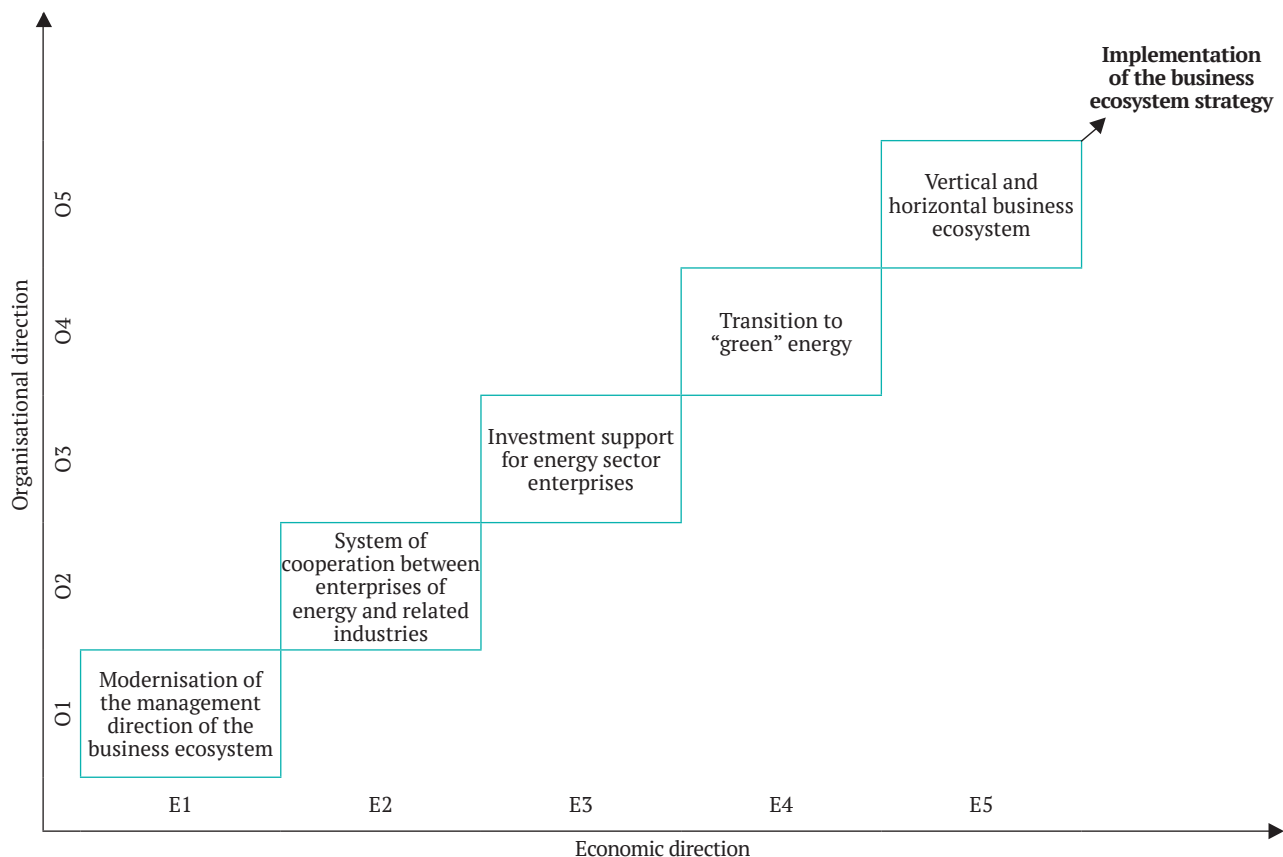


Figure 3. Logic for completing tasks in accordance with the implementation of the business ecosystem strategy

Source: developed by the authors

The success of implementing a business ecosystem strategy depends on the ability to effectively coordinate interaction between different participants in this ecosystem. Having supportive partnerships, mutual trust, and the ability to innovate resource sharing can determine the success of a strategy. The ability to adapt to changes in the internal and external environment, and to consider the needs and expectations of end users within the ecosystem, is also crucial. Notably, the success of implementing a business ecosystem strategy also often depends on existing agreements, including revenue sharing agreements, joint venture agreements, majority ownership, and mergers and acquisitions. And this requires focusing on the internal indicators of the ecosystem organisation in order to ensure strategic alignment. Companies cannot simply create systems that benefit their customers and meet the needs of their partners. Sooner or later, the organisers will also have to get additional value. Some companies focus on future success, which comes from increasing customer loyalty, driving growth, and increasing customer satisfaction. But ultimately, all ecosystems must create tangible value for their organisers. This requirement can be forgotten in a world of free finance, where private funds compete for investment and platforms are in full swing.

● FEATURES OF THE TRANSFORMATION OF THE ENERGY SECTOR BUSINESS ECOSYSTEM

In the energy sector, business ecosystems of enterprises have their own characteristics, which are the need for energy and digital transformation, resilience to change, the need for partnership and cooperation, and improvement of energy efficiency. Energy transformation in the energy system consists of the transition to renewable energy sources, energy-efficient technologies, and other innovations that can affect enterprises in the industry. Energy transformation means the transition of the global energy sector from fossil-based energy production and consumption systems, particularly oil, natural gas and coal, to renewable energy sources such as wind and solar, and using lithium-ion batteries. First of all, it concerns alternative ways of supplying energy to consumers, for example, through autonomous solutions. It is necessary to highlight several options for energy transformation: at the level of government, local authorities, business, and consumers.

At the government level, energy transformation consists in the development and implementation of regulatory support for the energy industry and state development programmes. At the local level, these are measures to reduce energy consumption and implement plans for a gradual “green” transition of communities. In order to consume less and more efficiently, local energy managers are required to monitor energy use and know how to fix problems through effective measures. Business structures should provide themselves with access to facilities equipped with solar power plants with energy storage systems. This is ensured by forming a corresponding request for renewable energy projects.

Consumers should have more opportunities and incentives to install electricity generation systems to meet their basic energy needs. In general, this implies the development and implementation of energy-efficient policies

at all levels, including the efficient use of local resources and a gradual increase in the share of energy production from renewable sources. In addition, the strategically proclaimed “green” transformation plays an important role in modern society, especially the decarbonisation of the energy sector, which will lead to the creation of small-scale decentralised electricity generation using renewable energy sources and high efficiency.

Digital transformation in the energy industry is characterised by the development of IoT, AI, data analysis, and other digital solutions to improve the efficiency and management of energy processes. Robotics, 3D printing, cloud computing, and advanced analytics play an important role in this process. Digital technologies are crucial for improving efficiency through better productivity and lower capital and operating costs. Resilience to change is determined by the adaptation of energy sector enterprises to various challenges, such as climate change, regulatory changes in legislation, and improvement of safety standards and sustainable technologies. Russia’s full-scale invasion of Ukraine has made adjustments to the development of the energy industry, in particular, damage has been caused to many energy infrastructure facilities, enterprises that were located in the temporarily occupied territory have been destroyed, electricity and heat supply networks have been damaged, and it is impossible to extract energy resources from individual fields.

Consideration of the transition from simple energy production to the provision of integrated energy services is characterised by energy efficiency and energy consumption management. The importance of energy services is shown in their ability to provide comprehensive solutions aimed at optimising energy consumption, introducing the latest technologies and improving existing energy systems. This helps to reduce energy losses, increase productivity, and reduce emissions of harmful substances. In addition, energy services play an important role in the transition to renewable energy sources and support sustainable practices in production and living environments. These services provide businesses with the opportunity to use state-of-the-art technologies to ensure high efficiency and meet the requirements of sustainable development.

The importance of partnership and cooperation in the energy sector is reflected in the ability to combine resources, expertise, and innovative approaches to meet the challenges of ensuring a sustainable and reliable energy supply. Cooperation between energy companies, government agencies and the public is becoming a key factor in developing and implementing energy efficiency strategies, developing renewable energy sources, and reducing emissions. Therefore, the partnership in the energy sector allows joining forces to create integrated systems aimed at improving production efficiency, ensuring energy security, and implementing the transition to a sustainable energy future.

The study of energy efficiency during wartime goes beyond the usual conditions and has its own characteristics and important aspects. Research in this area is an important effort to ensure the sustainability and restoration of energy systems during a period of military conflict, and also has great potential to introduce new technologies and strategies during this difficult time; consider measures to optimise the use of energy production and consumption,

in particular, with the help of the latest technologies and engineering solutions; analyse the impact of changes in legislation and regulation ensures changes in the strategy and operational activities of energy enterprises.

● DEVELOPMENT AND MANAGEMENT OF BUSINESS ECOSYSTEMS: FROM HISTORICAL ROOTS TO MODERN STRATEGIES

The study of the phenomenon of business ecosystem development is receiving more and more attention every year, both in scientific and practical aspects. The historical aspects and the origin of ecosystems was revealed in the paper by A.J. Willis (1997). In modern conditions, O. Tsyhanenko *et al.* (2022) prove that it is “a collection of elements that dynamically develop and interact with each other to achieve a single goal”. Investigating the conceptual approach, G. Sarafin (2021) states that “an ecosystem is a concept that recognises that in any closed system; members of that system must work with and around each other to keep the system stable, ideally optimising collective benefits”. E. Anggraeni *et al.* (2007) supporting the conceptual approach points to the prospects of ecosystem research to explore the relationships between firms and their business networks. At the same time, the process of creating an ecosystem is emergent, not linear and permanent. Ecosystem management mechanisms are implemented using roadmap by C.Y. Baldwin (2019). At its core, a roadmap is a form of technology that can form expectations about the behaviour of ecosystem participants and, consequently, the ecosystems themselves. It is a product of an ecosystem and reproduces it, confirms its boundaries, and connects the network connections that establish the same ecosystem.

Exploring the components of the business ecosystem, A. Hayes (2021) refers to a network of organisations, including suppliers, distributors, customers, competitors, government agencies, etc., that are involved in delivering a particular product or service through competition and collaboration. In this case, E.V. Zubko & M.A. Teplyuk (2020) argue that “...a well-organised business model can bring synergistic results when interacting with stakeholders, and the more involved they are, the stronger the system as a whole”. P.W. De Langen *et al.* (2020) proved the cyclical nature of the business ecosystem, which is carried out through the development of synergy of industrial ecology and the education and attraction of new innovative companies. The cyclical transition leads to changes in the business model, with more attention being paid to new services that create synergy.

Modern approaches to the development of ecosystems are considered by various researchers. M.J. Spaniol & N.J. Rowland (2022) prove that ecosystems are important sources of innovation that can be applied in various industries. In particular, researchers focus on the need for corporate forecasting in the ecosystem. It is necessary to pay attention to the need to involve various ecosystem participants in the development of a common strategy by planning the collective application of innovations, policies, etc. L.C. Espina-Romero *et al.* (2023) prove that the study of business ecosystem has a significant impact on how companies interact with the environment and compete in the marketplace. Companies that innovate, collaborate, adapt to

market conditions in a timely manner, create shared value, and perform better in a proactive and competitive business.

In particular, N.A. Tukhtenko *et al.* (2021) point out the need for digitalisation to develop modern business ecosystems. The vast majority of enterprises are aimed at building relationships with consumers of new quality within the framework of an ecosystem approach. J. Fuller *et al.* (2019) exploring the benefits of the ecosystem, point to the new opportunities they create for products and services that go beyond traditional boundaries, such as digital platforms, IoT technologies, and new tools for data collection and analysis. D. Wellers (2018) proves the profitability of creating ecosystems through the possibility of selling products and services that were impossible for a separate company on its own. It is their differences, their combined ability to learn, innovate, and perform, that make them successful. The growing interest in ecosystem development is also conditioned by the rapid pace of environmental change and the emergence of new opportunities.

Pointing out the need to modernise the principles of ecosystem management, N. Degtyar (2012) proves that such changes can occur only on the basis of Ukraine's involvement in international trends in the inclusion of natural ecosystem services in the mechanisms of economic development. The researcher argues that separate methodological approaches to evaluating some ecosystem services in Ukraine have already been created and applied in the context of using the Kyoto Protocol. L. Espina-Romero *et al.* (2022) investigated theoretical and methodological aspects of business ecosystems in the scientific environment during 2018-2022 and found that the topic is widespread and relevant. The researchers examined 96 documents based on the results of which they found that the annual growth rate of the topic under study is 13.21%. Therefore, this once again confirms the relevance of the subject matter and its prevalence in scientific discourse.

● CONCLUSIONS

Businesses need to respond quickly to market changes in order to be competitive in today's fast-paced and changing world. Such competitiveness can be ensured through a social and technical corporation, scalability, integration into other businesses with unique and similar goals, sustainable development plans, and existing technological innovations. The dynamism of change also stimulates the development of business ecosystems, which is implemented through partnerships, the application of innovations, and their practical implementation. A characteristic element of the business ecosystem structure is high entry barriers that protect the knowledge accumulated in the ecosystem, its technologies, know-how, patents, research resources, and specific conditions for cooperation. It is the unique combination of the above elements that allows increasing the potential of the ecosystem, achieve synergy, and gain a competitive advantage.

The transformation of business ecosystems in the energy sector should be carried out at two levels. At the state level, within which it is advisable to focus on the development and implementation of regulatory support for the energy industry and state development programmes, and at the local level. At the local level, there is a need for rational energy consumption and implementation of plans for a

gradual “green” transition of communities. In order to consume less and more efficiently, local energy managers are required to monitor energy use and know how to fix problems through effective measures. Based on the proposed conceptual and practical vision of the mechanism for implementing the business ecosystem strategy, it is proposed to perform tasks in accordance with the implementation of the business ecosystem strategy in the following sequence: modernisation of the management vector of the business ecosystem, a system of cooperation between enterprises of the energy and related industries, investment support for enterprises of the energy sector, transition to “green” energy, vertical and horizontal business ecosystem.

The transformation of business ecosystems in the energy industry is associated with the use of renewable energy sources, energy-efficient technologies, and other innovations that can affect the enterprises of the industry. The role of energy companies is to expand business ecosystems through strategic partnerships and cooperation with other players in the energy sector and other

related industries. Therefore, the transformation of business ecosystems of enterprises in the energy industry reflects the processes and challenges that are associated with the modernisation and adaptation of enterprises in the energy sector to changes in the modern business environment. It is important to understand the need to strengthen partnerships in the energy sector to promote the exchange of experiences, technologies and innovative solutions, which are important components for achieving global goals to reduce the carbon footprint and create a sustainable energy landscape. Prospects for further research in this area are to investigate the influence of external and internal factors on the development of business ecosystems in the energy industry.

● ACKNOWLEDGEMENTS

None.

● CONFLICT OF INTEREST

None.

● REFERENCES

- [1] Anggraeni, E., den Hartigh, E., & Zegveld, M. (2007). [Business ecosystem as a perspective for studying the relations between firms and their business networks](#). *ECCON Annual Meeting*, 2007, 1-28.
- [2] Baldwin, C.Y. (2019). [Introducing open platforms and business ecosystems](#). *HBS Working Paper*, article number 19-035.
- [3] Burbelo, O., Akhromkin, E., & Zabłodska, D. (2022). Startups in the business ecosystem: Theoretical and practical aspects. *Time Description of Economic Reforms*, 1(45), 6-13. doi: 10.32620/cher.2022.1.01.
- [4] Business ecosystem: Why combine projects from different fields. (2019). Retrieved from <https://mind.ua/publications/20205413-biznes-ekosistema-navishcho-ob-ednuvati-proekti-z-riznih-sfer>.
- [5] Bystriakov, I.K., & Klynovy, D.V. (2019). Platform economy of spatial business ecosystems: An innovative trend of sustainable development. *Science and Science of Science*, 3(105), 3-25. doi: 10.15407/sofs2019.03.003.
- [6] De Langen, P.W., Sornn-Friese, H., & Hallworth, J. (2020). The role of port development companies in transitioning the port business ecosystem: The case of port of Amsterdam’s circular activities. *Sustainability*, 12(11), article number 4397. doi: 10.3390/su12114397.
- [7] Degtyar, N. (2012). [Modern methods of the economic valuation of ecosystem services](#). *Efficient Economy*, 2.
- [8] Demil, B., Lecocq, X., & Warnier, V. (2018). “Business model thinking”, business ecosystems and platforms: The new perspective on the environment of the organization. *M@n@gement*, 21(4), 1213-1228. doi: 10.3917/mana.214.1213.
- [9] Espina-Romero, L., Guerrero-Alcedo, J., Noroño Sánchez, J.G., & Ochoa-Díaz, A. (2022) What are the topics that business ecosystems navigate? Updating of scientific activity and future research agenda. *Sustainability*, 14(23), article number 16224. doi: 10.3390/su142316224.
- [10] Espina-Romero, L.C., Guerrero-Alcedo, J.M., & Ossio, C. (2023). 7 topics that business ecosystems navigate: Assessment of scientific activity and future research agenda. *Heliyon*, 9(6), article number e16667. doi: 10.1016/j.heliyon.2023.e16667.
- [11] Fuller, J., Jacobides, M.G., & Reeves, M. (2019). *The myths and realities of business ecosystems*. Retrieved from <https://sloanreview.mit.edu/article/the-myths-and-realities-of-business-ecosystems>.
- [12] Hayes, A. (2021). *What is a business ecosystem and how does it work?* Retrieved from <https://www.investopedia.com/terms/b/business-ecosystem.asp>.
- [13] Kviatko, T. (2023). Features of business ecosystem formation in modern conditions. *University Economic Bulletin*, 57, 57-62. doi: 10.31470/2306-546X-2023-57-57-62.
- [14] Lyubomudrova, N., & Sobol, I. (2018). [Ecosystem in innovation theory and domestic practice](#). In *Management of innovation process in Ukraine: Problems of commercialization of scientific and technical researches* (pp. 89-91). Lviv: Lviv Politechnic Publishing House.
- [15] Moore, J.F. (1993). [Predators and prey: A new ecology of competition](#). *Harvard Business Review*, 71(3), 75-86.
- [16] Pavelko, V. (2023). *Keystone advantage: Roles and strategies in the business ecosystem*. Retrieved from <https://transform-wise.com/portal/keystone-advantage-rol-i-ta-strategiyi-v-biznes-ekosystemi>.
- [17] Peltoniemi, M., & Vuori, E. (2005). [Business ecosystem as the new approach to complex adaptive business environments](#). In M. Seppä, M. Hannula, A.-M. Järvelin., J. Kujala, M. Ruohonen & T. Tiainen (Eds.), *Frontiers of e-business research 2004* (pp. 267-281). Tampere: University of Tampere.
- [18] Polyanska, A., Martynets, V., & Melnychuk, I. (2021). Establishing interaction with stakeholders as a prerequisite for the formation of a business ecosystem of energy enterprises. *Scientific Bulletin of Ivano-Frankivsk National Technical University of Oil and Gas (Series: Economics and Management in the Oil and Gas Industry)*, 2(24), 25-36. doi: 10.31471/2409-0948-2021-2(24)-25-36.

- [19] Sarafin, G. (2021). *Companies that utilize business ecosystems will be better positioned to drive innovation and capital efficiency to create customer value*. Retrieved from https://www.ey.com/en_gl/alliances/what-business-ecosystem-means-and-why-it-matters.
- [20] Savruk, H. (2019). *Business ecosystems: How local Ukrainian companies can cooperate with giants*. Retrieved from <https://kmbs.ua/ua/article/business-ecosystems>.
- [21] Semenog, A.Yu. (2019). Digital platform ecosystems as a factor of business transformation within digital economy framework. *Bulletin of the Kyiv National University of Technologies and Design. Series: Economic Sciences*, 137(4), 39-50. doi: 10.30857/2413-0117.2019.4.4.
- [22] Shestopalov, B. (2023). *Building an ecosystem in business: Why it is necessary and what should be taken into account*. Retrieved from <https://mind.ua/openmind/20265463-pobudova-ekosistemi-v-biznesi-navishcho-ce-potribno-i-shcho-slid-vrahuvati>.
- [23] Spaniol, M.J., & Rowland, N.J. (2022). Business ecosystems and the view from the future: The use of corporate foresight by stakeholders of the Ro-Ro shipping ecosystem in the Baltic Sea region. *Technological Forecasting and Social Change*, 184, article number 121966. doi: 10.1016/j.techfore.2022.121966.
- [24] Teplyuk, M.A., Koval, A.Yu., & Zubko, E.V. (2020). Modern approaches to the formation of innovative business ecosystem. *Scientific Notes*, 25(4), 42-50. doi: 10.33111/vz_kneu.25.21.04.04.026.032.
- [25] Tsyhanenko, O., Zubko, K., & Samus, H. (2022). Formation of the company's ecosystem as a basis for increasing business sustainability. *Economy and Society*, 37. doi: 10.32782/2524-0072/2022-37-65.
- [26] Tukhtenko, N.A., Barna, M.Yu., & Kazakova, T.S. (2021). Digitalization as a factor in providing a new marketing philosophy of modern business systems. *The Bulletin of the Kharkiv National Agricultural University of V.V. Dokuchaev*, 1, 291-302. doi: 10.31359/2312-3427-2021-1-291.
- [27] Wellers, D. (2018). *Beyond industries: Ecosystems of co-innovation drive the future*. Retrieved from <https://www.forbes.com/sites/sap/2018/02/14/beyond-industries-ecosystems-of-co-innovation-drive-the-future/?sh=6eb1982377fb>.
- [28] Willis, A.J. (1997). *The ecosystem: An evolving concept*. *Functional Ecology*, 11(2), 268-271.
- [29] Zamlynskyi, V., Zhuk, N., Osyk, S., & Martiyanova, M. (2023). Modern business diagnostics: Digital maturity and ecosystem recovery. *Ukrainian Journal of Applied Economics and Technology*, 8(3), 18-25. doi: 10.36887/2415-8453-2023-3-2.
- [30] Zubko, E.V., & Teplyuk, M.A. (2020). *Economic effects of enterprise participation in the business ecosystem*. In *Materials of the all-Ukrainian scientific and practical conference of higher education graduates and young scientists "Perspectives for territorial development: Theory and practice"* (pp. 153-156). Kharkiv: O.M. Beketov National University of Urban Economy in Kharkiv.

Трансформація бізнес екосистем підприємств енергетичної галузі

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Анотація. Трансформація бізнес-екосистем підприємств енергетичної галузі є стратегічною необхідністю для їх сталої конкурентоспроможності в умовах змін у глобальному енергетичному ландшафті, що зумовлює актуальність досліджуваної теми. Метою дослідження було обґрунтування необхідності трансформації бізнес-екосистем підприємств енергетичної галузі. Було використано наступні методи: наукова абстракція – при обґрунтуванні значення «бізнес-екосистеми» та її визначення; індуктивний, дедуктивний – при зборі, систематизації та розробці концептуальної моделі бізнес-екосистеми; абстрактно-логічний – для теоретичних узагальнень і формування висновків; системний – для детальної розробки стратегії бізнес-екосистем підприємств енергетичної галузі. Запропоновано концептуальну модель бізнес-екосистеми, яка враховує взаємозв'язок та взаємозалежність великих, нішевих та ключових гравців. Запропоновано механізм реалізації стратегії бізнес-екосистеми. Встановлено, що успіх реалізації стратегії бізнес-екосистеми залежить від вміння ефективно координувати взаємодію між різними учасниками цієї екосистеми, а також від наявних укладених угод. Запропоновано механізм реалізації стратегії бізнес-екосистеми в наступній послідовності: модернізація управлінського напрямку бізнес-екосистеми, система співпраці між підприємствами енергетичної та суміжних галузей, інвестиційне забезпечення підприємств енергетичної сфери, перехід до «зеленої» енергетики, формування вертикальної та горизонтальної бізнес-екосистеми. Виявлено особливості формування бізнес-екосистеми підприємств енергетичної галузі, це: енергетична та цифрова трансформація, стійкість до змін, енергетичні сервіси, партнерство та співпраця, підвищення енергетичної ефективності. Доведено, що бізнес екосистеми підприємств енергетичної галузі є комплексною та багатогранною категорією, яка формується під впливом сукупності переваг, поєднання яких формує для підприємства більш стійкі позиції на ринку. Практична значимість полягає в розробці рекомендацій, які зумовлюють трансформацію бізнес екосистем підприємств енергетичної галузі, та полягають у модернізації управлінського напрямку бізнес-екосистеми, розвитку співпраці між підприємствами енергетичної та суміжних галузей, інвестиційному забезпеченні підприємств енергетичної сфери, та необхідності переходу до «зеленої» енергетики, вертикальної та горизонтальної бізнес-екосистеми

Ключові слова: інноваційна екосистема; концептуальна модель; бізнес-екоструктура; підприємство; платформа; енергетичний сектор