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Institutional support for the development of eco-industrial parks in the conditions of the circular economy formation taking into account world experience

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Abstract

The article aims to substantiate the principles of institutional support for the development of eco-industrial parks in the conditions of formation of circular economy taking into account, the world experience. The methodological basis of the study is a systematic approach. It is based on the fact that the institutional support for the development of eco-industrial parks orients the actions of the authorities at different levels to establish certain norms, rules, restrictions, the order of their establishment and fulfillment in terms of achieving the goals of sustainable development, with interaction with the subjects of territorial communities. It is concluded that institutional support, should provide effective assistance in the development of public policies that underpin the eco-industrial parks, ensuring compliance with the rights and freedoms of business entities. In addition, the basis of institutional support for park

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development is based on a systemic approach, which is proposed in the form of a recurrent functional relationship. Measures aimed at ensuring institutional support for these parks are highlighted.

Keywords: pre-industrial park; institutional support; industrial park; sustainable development; circular economy.

Apoyo institucional para el desarrollo de parques ecoindustriales en las condiciones de formación de una economía circular teniendo en cuenta la experiencia mundial

Resumen

El artículo tiene por objeto fundamentar los principios de apoyo institucional para el desarrollo de parques eco-industriales en las condiciones de formación de la economía circular teniendo en cuenta, la experiencia mundial. La base metodológica del estudio es un enfoque sistemático. Se fundamenta que el apoyo institucional para el desarrollo de parques eco-industriales orienta el accionar de las autoridades en los diferentes niveles a establecer ciertas normas, reglas, restricciones, el orden de su establecimiento y cumplimiento en cuanto al logro de las metas del desarrollo sostenible, con interacción con los sujetos de las comunidades territoriales. Se concluye que el apoyo institucional, debe proporcionar una asistencia eficaz en el desarrollo de políticas públicas que apuntalen los parques eco-industriales, asegurando el cumplimiento de los derechos y libertades de las entidades comerciales. Además, la base del apoyo institucional para el desarrollo de parques se fundamenta mediante un enfoque sistémico, que se propone en forma de relación funcional recurrente. Se destacan las medidas destinadas a garantizar el apoyo institucional de estos parques.

Palabras clave: parque preindustrial; apoyo institucional; parque industrial; desarrollo sostenible; economía circular.

Introduction

Modern globalization challenges determine the formulation of the question regarding the further directions of development of the economies of the countries of the world, taking into account the principles of the circular economy. The principles of the circular economy formation

actualize the issue of industrial development on an innovative basis with the involvement of “green” technologies and a careful attitude to resources using creative approaches to management, the use of a sustainable development approach, etc.

The global concept of industrial development consists in ensuring competitive industrial production that would satisfy demand, taking into account the environmental friendliness of production and the principles of the circular economy.

This paradigm of industrial development corresponds to the direction of development of eco-industrial parks, which at the same time provide an opportunity for industrial enterprises to develop, attract investment resources, introduce innovations, ensure environmental sustainability of production, maximize the use of resources, implement waste-free production and increase the competitiveness of products. At the same time, the activation of the development of eco-industrial parks actualizes the issue of their institutional support and regulatory support for functioning and development in the conditions of the circular economy formation.

The topic of institutional support for the development of eco-industrial parks is becoming especially relevant for Ukraine, which will contribute to its post-war renewal. The development of eco-industrial parks in Ukraine will provide an opportunity to revitalize industrial enterprises, a large number of which have already suffered significant losses today, to increase resource efficiency, zero waste and environmental friendliness of production.

The purpose of the presented research is to justify the principles of institutional support for the development of eco-industrial parks in the conditions of the circular economy formation taking into account world experience. To achieve it, the following tasks were set and solved for the authors:

- The relevance of the research is substantiated, taking into account the existing globalization challenges of the development of the economies of the countries of the world, taking into account the principles of the circular economy.
- The advantages of the development of eco-industrial parks for the economic, ecological and social spheres are highlighted.
- Current regulatory and legislative acts regarding the development of industrial parks in Ukraine are defined.
- The essential difference between industrial and eco-industrial parks is singled out.
- The principles of institutional support of eco-industrial parks are clarified;

- The value of incentives and tax benefits for the development of eco-industrial parks, as well as their application in different countries of the world, is highlighted.
- To substantiate the foundations of institutional support for the development of eco-industrial parks in the conditions of the formation of a circular economy, a recurrent functional relationship is proposed.
- Measures to ensure institutional support of eco-industrial parks in the conditions of the formation of a circular economy taking into account world experience are substantiated.

The methodological basis of this research is a systematic approach, which makes it possible to comprehensively approach the issues of institutional support for the development of eco-industrial parks and take into account the multi-vector nature of this process in the conditions of the circular economy formation, which is possible if the principles of the systemic approach are followed.

1. Literature Review

The relevance of research topics is confirmed by numerous articles by leading scientists of the domestic and foreign level. Among the scientists who studied the peculiarities of the development of eco-industrial parks in the context of the circular economy and taking into account the modern trends of sustainable development of territories, the following should be noted: Abraham (2021); Butko (2020); Chin (2021); Cruz-Avilés (2021); Derhaliuk (2021); Maryam (2022); Negesa (2022); Nuhu (2021); Petrushenko (2021); Pohrebniak (2021); Popelo (2021); Revko (2021); Shevchuk (2021); Shkarlet (2020); Song (2021); Tseng (2021); Tulchynska (2015); Vovk (2021); Zhang (2021) and other.

The scientists' article (Nuhu *et al.*, 2021) is devoted to the evaluation and features of the application of tools of the geoinformation system and multi-criteria decision-making in determining and designing the locations of eco-industrial parks. Researchers (Maryam *et al.*, 2022) set out to identify the existing condition of the batik village area in Louvain Surakarta in order to transform it into an ecological industrial park.

The study found that medium-sized micro-enterprises in the Laweyan Batik Village area of Surakarta produce hazardous liquid, gaseous and solid waste. According to scientists, the creation of an eco-industrial park will have ecological, economic and social efficiency, in particular by transitioning from a linear industrial system to a circular system.

The article (Abraham *et al.*, 2021) analyzes the role of the circular economy in minimizing the consumption of fresh resources and maximizing the reuse of materials. As a result of the study, it was proved that an eco-industrial park can be profitable under the condition of strict restrictions on emissions and materials.

The practical significance of the research results (Chin *et al.*, 2021) is a proposal for the creation of an eco-industrial park on an industrial site, which will be aimed at solving the problem of reducing the consumption of fresh water or pollutants. The paper (Negesa *et al.*, 2022) is based on a study of the transition process and results of a typical African industrial park, the Hawassa Industrial Park (HIP) in Ethiopia. The authors took into account the international framework for eco-industrial parks and applied the framework of strategic management of the niche in order to reveal the efficiency and the transition process.

The authors of the article (Cruz-Avilés *et al.*, 2021) prove that eco-industrial parks are a relevant alternative for reducing and optimizing water consumption through reuse and recycling networks. The result of the study is a proposal for optimal design of water supply networks in eco-industrial parks. Scientists (Petrushenko *et al.*, 2021) are investigating the possibilities and directions of creating eco-industrial parks in the conditions of a transitional economy. The authors are convinced that one of the conditions for anticipatory sustainable development in Ukraine is the creation of a national program to support the transformation of innovation parks into their ecological versions, as well as investment in greenfield eco-industrial parks.

The authors prove (Tseng *et al.*, 2021) that their research will contribute to the creation of attributes for the transition to hierarchical eco-industrial parks with qualitative information. Scientists have proven that the policy and regulatory framework contribute to the cooperation of firms in the model of transition to an eco-industrial park.

The scientific work (Song *et al.*, 2021) demonstrated that the creation of a national eco-industrial park contributes to the reduction of industrial emissions. In the study (Zhang *et al.*, 2021), scientists analyze the advantages of applying the industrial symbiosis approach in agriculture and horticulture. As a result of the research, a project of an eco-industrial park combining dairy farming, greenhouse vegetable growing and mushroom cultivation is proposed.

Despite a number of studies on the peculiarities of the development of eco-industrial parks, the issue of institutional support for their development requires further study and analysis.

2. Results

Innovative infrastructure plays an important role in innovative development. Innovative infrastructure is represented by a wide range of diverse participants, including business incubators, innovation centers, industrial and eco-industrial parks, etc.

Industrial and eco-industrial parks are one of the powerful drivers of innovative development and the establishment of a circular economy. Regardless of the different legislative features of different countries of the world, the unifying factor for industrial and eco-industrial parks is that it is not only a certain plot of land on which industrial production is located, but it is a center of innovatively oriented enterprises for which a special regime of economic activity is extended for the further activation of innovative the direction of their activities. The development of eco-industrial parks has great advantages for ensuring the development of the economy and the formation of a circular economy, since they:

- intensify investment activity in innovative development, as a result of the fact that the unification of enterprises provides greater attractiveness and opportunities for diversification of sources of attraction of investment resources;
- provide subsidies for priority, high-tech areas of industrial production and their innovative orientation, including through preferential taxation;
- have an ecological orientation of production activities and apply the principles of the circular economy;
- activate employment and consumption of specific territories near which they are located;
- increase the self-sufficiency of territorial communities due to the payment of local taxes, etc.

The formation of industrial parks is not something new, since the first experience of such an association took place in Manchester back in 1896. Over time, the development of industrial parks became widespread. Today, the idea of industrial parks has transformed into eco-industrial parks. In Ukraine, the law “On Industrial Parks” currently operates, which defines that it is:

The territory designated by the initiator of the creation of the industrial park in accordance with the urban planning documentation, equipped with the appropriate infrastructure, within which the participants of the industrial park can carry out economic activities in various spheres (Shevchuk, 2021: 59).

In general, such a legally established definition reflects the general essence of an industrial park, which consists in the union of various production enterprises that may belong to different spheres of economic activity with the aim of attracting investment resources, reducing production costs, and producing innovative, competitive, environmentally friendly products with taking into account the principles of the circular economy.

The main difference between eco-industrial parks and industrial parks is the construction of a production model aimed at increasing resource efficiency and increasing not so much economic, but more ecological and social indicators of industrial production.

The development of eco-industrial parks in the conditions of the circular economy formation requires institutional support. Institutional support for the development of eco-industrial parks directs the actions of authorities at different levels to establish certain norms, rules, restrictions, the procedure for their establishment and compliance with the achievement of sustainable development goals with interaction with the subjects of territorial communities and eco-industrial parks.

Institutional support for the development of eco-industrial parks should provide effective support for the development of institutions supporting eco-industrial parks, ensuring compliance with the rights and freedoms of business entities, which can be provided directly or indirectly.

In turn, institutional support for the development of eco-industrial parks involves the work of relevant institutions and organizations in the direction of the development of legal regulations, as well as direct and indirect support of state and local authorities, corporate and entrepreneurial structures, specialized institutions in the field of industry, innovative development, direction in the direction of the establishment of a circular economy, etc.

A special place in institutional support is played by regulatory policy, which reflects the needs of society and acts as an activator of entrepreneurial activity in the direction of the creation and functioning of eco-industrial parks.

At this time, a number of important documents have been adopted in Ukraine, which, in addition to the Law of Ukraine "On Industrial Parks", includes the "National Economic Development Strategy of Ukraine for the period until 2030", which outlines the directions and principles of directing industrial parks in the direction of their reformation into eco-industrial parks. The problems of industrial parks are taken care of by the Ministry of Economy of Ukraine, which is entrusted with the responsibilities of ensuring and implementing state policy, the register, monitoring and control over compliance with the requirements for the functioning of Industrial Parks, providing informational and advisory support and activating the involvement of participants.

The main driver of the development of industrial and eco-industrial parks in the world is the consolidation of tax incentives and benefits (Fig. 1).

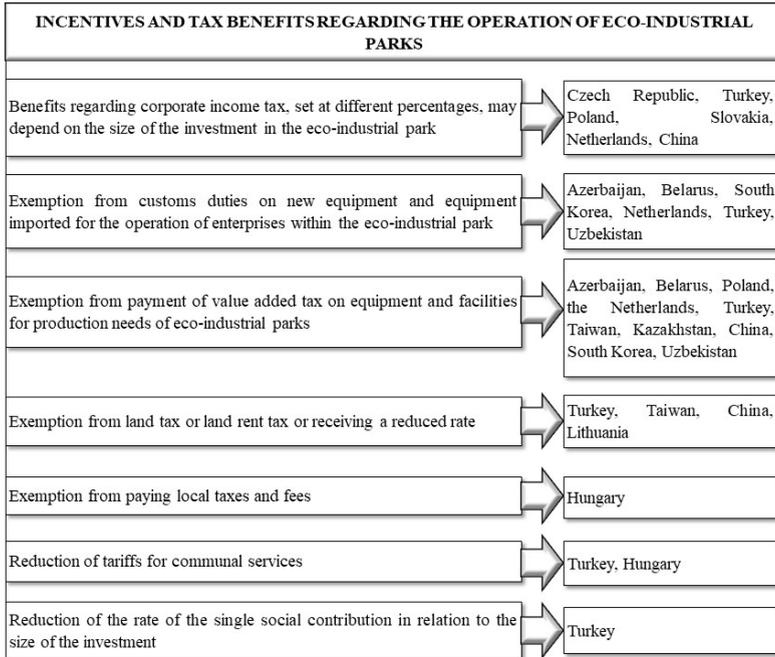


Fig. 1. Incentives and tax benefits for the operation of eco-industrial parks in the world. Source: generated by the authors

It should be noted that despite the uniformity of the concept of the development of eco-industrial parks in different countries, there are different vector directions of benefits for their activities. Among the most common and, as evidenced by experience, effective benefits are:

- Benefits in relation to corporate income tax, which are set at different percentages. This is the most widespread benefit for the activities of eco-industrial parks. It is used in such countries as the Czech Republic, Poland, Slovakia, the Netherlands, China, etc. The reduction of corporate income tax often depends on the size of investments in the eco-industrial park:
- Exemption from customs duties on new equipment and equipment imported for the operation of enterprises within the eco-industrial park. Regarding the exemption from import duties, deadlines may be set for the start of the park. This benefit is used in Azerbaijan, Belarus, South Korea, the Netherlands, Turkey, Uzbekistan, etc.

- Exemption from payment of value added tax on equipment and equipment for new equipment. Such benefits are provided in Azerbaijan, Belarus, Poland, the Netherlands, Turkey, Taiwan, Kazakhstan, China, South Korea, Uzbekistan.
- Exemption from land tax or land rent tax or receiving a reduced rate. Such benefits are used in Turkey, Taiwan, China, and Lithuania. In Turkey, plots of land are provided free of charge for the production needs of eco-industrial and industrial parks.
- Exemption from paying local taxes and fees. This benefit applies in Hungary.
- Reduction of tariffs for communal services is used as a benefit in Turkey and Hungary.
- A reduction in the rate of the single social contribution in relation to the size of the investment during the first ten years of operation of the eco-industrial park is applied in Turkey.

Also, different countries use a different approach to obtaining tax incentives and discounts for paying taxes. Most often, the size and calculation of preferential rates depends on the size of the investment in the eco-industrial park. Such a system of their calculation is used in Slovakia, Turkey, South Korea, Poland, and the Czech Republic. In South Korea and China, the calculation of tax discounts depends on the volume of exports of products of eco-industrial parks, issued.

To justify the principles of institutional support for the development of eco-industrial parks in Ukraine (EIP) in the conditions of the formation of a circular economy, we suggest using a systemic approach. Its visualization can be offered in the form of a recurrent functional relationship, which has the following form:

$$EIP = f \begin{cases} G(d, ep, me, er, i, sb), \\ BE, \\ NR(i, iec, tc, iip), \\ R, \\ A \end{cases} \quad (1)$$

where G – the goals of the development of eco-industrial parks in the conditions of the formation of a circular economy (development of the industrial sector of the economy, its revitalization (d), increasing the employment of the population (ep), ensuring the environmental friendliness of production (me), increasing the efficiency of the use of resources (er), attracting investments (i), activating small business (sb) etc.). Specifications and other goals that are planned to be achieved during the development of eco-industrial parks must have certain economic, social and environmental

indicators that illustrate the positive effect of their development;

BE – business entities subject to institutional and regulatory changes, including the application of preferential taxation and other incentives;

NR – norms and rules necessary for institutional support for the development of eco-industrial parks in the conditions of the formation of a circular economy. It includes spreading awareness of business entities and the population about the benefits and significance of eco-industrial parks (i), increasing innovative and ecological culture of the population (iec), activation of territorial communities regarding the creation of eco-industrial parks (tc), development of education and science capable of increasing intellectual and innovative potential (iip), etc;

R – resources that must be provided during the development of eco-industrial parks. Such resources include the possibility of allocating necessary land plots, providing them with the necessary infrastructure, attracting investment resources, including through public-private partnerships, etc.;

A – regulation that must be used in the formation of institutional support for the development of eco-industrial parks, which involves changes in the regulatory and legislative framework, the implementation of appropriate policies for the development of eco-industrial parks.

Thus, this recurrent functional relationship will make it possible to take into account the various directions of institutional support of eco-industrial parks in the conditions of the circular economy formation and to determine the effectiveness of such support.

Institutional support for the development of eco-industrial parks in the conditions of the circular economy formation, taking into account world experience, should include the following measures (Fig. 2):

- A study of the world experience in the development of industrial eco-industrial parks, as well as the transformation of industrial into eco-industrial parks.
- Determination of requirements for eco-industrial parks, taking into account the current situation in the country and its regions, as well as the principles of the circular economy.
- Substantiating the need and importance of institutional support for eco-industrial parks in the conditions of the formation of a circular economy.
- Introduction of changes in the regulatory and legislative field in the direction of the development of eco-industrial parks.

- Substantiation of the principles of institutional support for the development of eco-industrial parks, including with the help of a recurrent functional relationship.
- Assessment of the possibility of obtaining an effect in the economic, social and ecological spheres as a result of institutional support and development of eco-industrial parks in the conditions of the formation of a circular economy.
- Substantiating the benefits of incentive and preferential measures to encourage the development of eco-industrial parks, which are related to regulatory changes.
- Determining the effectiveness of the developed measures of institutional support for the development of eco-industrial parks in the conditions of the formation of a circular economy.
- Monitoring of changes in the institutional sphere in relation to the activation of the development of eco-industrial parks in the conditions of the formation of a circular economy.
- Analysis of macroeconomic indicators and determination of the impact on their changes as a result of institutional support for the development of eco-industrial parks in the conditions of the formation of a circular economy.

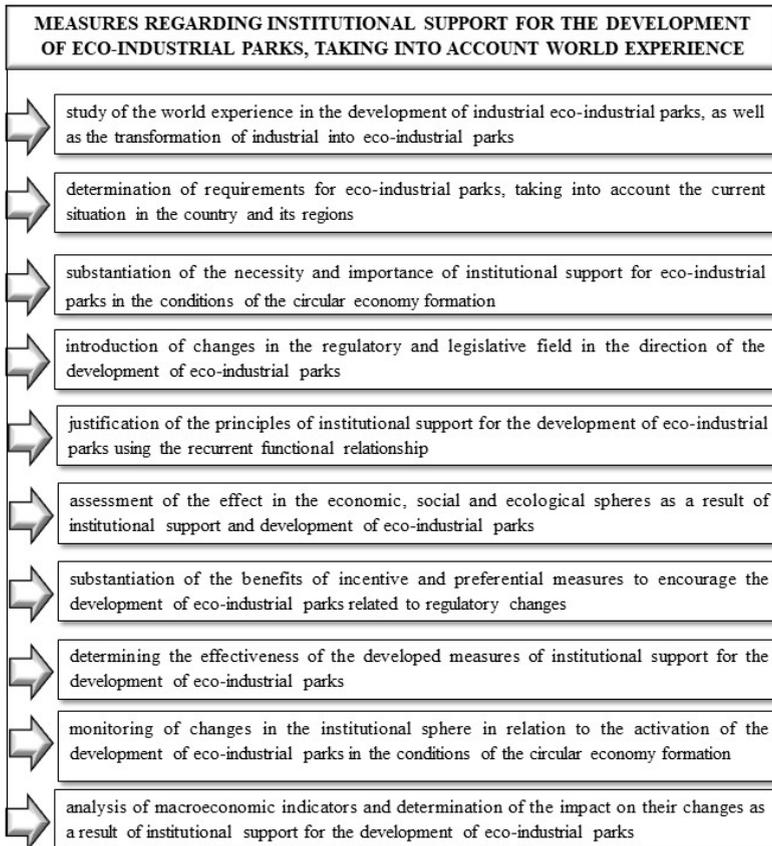


Fig. 2. Measures regarding institutional support for the development of eco-industrial parks in the conditions of the circular economy formation, taking into account world experience. Source: generated by the authors based on Industrial Parks, Law of Ukraine on June 21, 2012 № 5018-VI, National Economic Strategy 2030. Cabinet of Ministers of Ukraine. <https://nes2030.org.ua>.

Direct support for the development of eco-industrial parks can be provided from state and local budgets. Management companies can receive financing for equipping eco-industrial parks, developing infrastructure, preparing project documentation, setting aside land plots, etc.

Decision-making regarding institutional support for the development of eco-industrial parks in the conditions of the circular economy formation should take into account the national culture, political conditions, resource

opportunities and foresee the directions of the country's further economic development, taking into account the existing crisis phenomena.

Conclusion

The scientific novelty of this study is the substantiation of the principles of institutional support for the development of eco-industrial parks in the conditions of the circular economy formation using a systemic approach, which is proposed in the form of a recurrent functional relationship and includes taking into account the goals of the development of eco-industrial parks, the identification of business entities involved in the work of eco-industrial parks, norms and rules necessary for the institutional support of development in the conditions of the circular economy formation, resources for the development of eco-industrial parks in the country and regulatory measures necessary for directing economic policy to their development.

The practical significance of this update is that this functional recurrent relationship will make it possible to apply a conceptual and methodological approach to the assessment of efforts to institutional support the development of eco-industrial parks and will contribute to the achievement of the goals of the circular economy.

Institutional support for the development of eco-industrial parks in the conditions of the circular economy formation will contribute to obtaining such positive results for the post-war economy of Ukraine and will contribute to:

- revitalization of the industrial sphere of Ukraine's economy;
- activation of attraction of investment resources, including foreign investments;
- increasing the environmental friendliness of industrial production and its zero waste;
- use of "green" technologies, careful use of non-renewable resources;
- reduction of waste due to the implementation of circular economy principles;
- ensuring the improvement of the efficiency of the use of resources;
- ensuring increased self-sufficiency of territorial communities in the locations of eco-industrial parks;
- promote the interaction of the territorial community with business;
- increasing the employment of the population and the development of small businesses;

- obtaining a production symbiosis for the participants of the eco-industrial park, etc.

Issues related to the development of effective state management mechanisms for the activation of the attraction of investment resources for the development of eco-industrial parks, as well as the determination of the principles of transformation of existing industrial parks into eco-industrial parks, require further research.

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