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ORGANIZATIONAL AND ECONOMIC TOOLS FOR THE DEVELOPMENT OF ENVIRONMENTAL ENTREPRENEURSHIP

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ABSTRACT

The article considers the main aspects and organizational and economic tools for the development of environmental entrepreneurship. The criteria of ecological entrepreneurship are highlighted. The analysis of systems of estimation of greening is carried out, systems are presentedassessments of the introduction of greening the economy. The global ratings of the assessment of the development of the "green" economy on the example of best world practices are considered. Global trends are considered, the main patterns of leaders in the processes of building a sustainable economy are highlighted.The analysis showed low innovation activity of industrial enterprises of Ukraine. The world experience was considered, on the basis of which the main shortcomings and problems concerning the development of ecological entrepreneurship in Ukraine were revealed. During the simulation, the method of dynamic games withimplementation of the "fair play mechanism". At the heart of the organizational and economic mechanism to ensure the development of environmental entrepreneurship is a mandatory condition for the formation of the ecological

environment. The main organizational measures and tools for the development of environmental entrepreneurship are considered.

Key words: ecological entrepreneurship, green economy, sustainable development, greening

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1. INTRODUCTION

1.1. Relevance of the Topic and Problem Statement

Ecological entrepreneurship is sustainable, social. It based on the activities of "green" technology, this is its value (Austin et al., 2006). To address existing environmental problems that threaten the ecosystem (Cohen & Winn 2007; Mitryasova 2016; Pohrebennyk & Petryk 2017; Ishchenko 2017), alternatives are offered in the environmental market, using advances in renewable energy, fuel cells, green building, natural foods and emissions carbon (Dean & McMullen 2007; Nekrasenko et al., 2015). The methods for solving such problems are considered in the concept of sustainable development, which are a process of technological development and organizational change to harmonize the needs of both current and future generations (Crals & Vereeck 2005). Excessive use of natural resources is currently taking place, and industry is polluting the environment with waste and emissions (Global Footprint Network, 2019). Ecological entrepreneurship is designed to solve environmental problems through innovative measures. Ecological entrepreneurship combines sustainability, marketability, innovation. This is a controlled form of value creation through environmentally or socially useful innovations and products (Hall et al., 2010). Environmental focus of enterprises concerns, primarily, environmental innovation (Prokopenko 2011). These innovations are also called sustainable («green»), they have the character of gradual changes, and when bringing to market goods and services, resulting in a real change, requires the use of radical reconstruction of existing ecosystems (Klewitz & Hansen, 2014; Borglund et al., 2017). The sustainable («green») innovations - it is innovatioms that have been achieved in the highest number of industries that have been evaluated on resource efficiency (Tamayo-Orbegozo et al., 2017).

In the framework of this study, the following problematic issues are identified:

- to identify featuresand main problems development of ecological entrepreneurship;
- to develop a mechanism of organizational and economic support for the development of environmental entrepreneurship.

2. THEORETICAL SECTION.

2.1. The Essence and Classification of Individual differences

Ecological entrepreneurship (ecoprinnership) is an important element in ensuring the sustainable development of countries and regions. Environmental entrepreneurship in their research, scientists sometimes call the terms that characterize this activity, complementing each other: environmental entrepreneur (-ship), green entrepreneur (-ship), ecological entrepreneur (-ship), eco-entrepreneur (-ship) and ecopreneur (-ship), as well as green-green business, considering them synonymous (Isaac, 1997; Schaper, 2002; Kirkwood, 2014).

Researchers have identified two approaches to the definition of environmental entrepreneurship: as environmental modernization (Beveridge & Guy, 2005; Gibbs, 2009), and as society's response to emerging market failures in this area (Cohen & Winn, 2007; Nikolaou et al., 2011).

Environmental modernization is a set of political actions that declare the demand for the creation of such forms of entrepreneurship. It accumulates both economic aspects of solving specific issues and environmental ones. Currently, there is a demand in society for the greening of food, urban space, solid waste. The development of ecological entrepreneurship stimulates the emergence of new needs and requirements of society, which can be met only by "green" technologies, which will further ensure the development of the market of ecological goods and services.

Thus, environmental entrepreneurship is an entrepreneurial activity aimed at identifying and addressing environmental and economic demands of society by means of manufacturing products / providing services with a high percentage of environmental value.

If we consider environmental entrepreneurship as an opportunity created by market failures, then such failures in environmental issues have become an impetus for businesses to find a new niche. For the state and society, the creation of environmental entrepreneurship is a practical opportunity to reduce the negative impact of industry on the environment.

To identify tools for government support for environmental entrepreneurship, it is important to understand the criteria by which businesses are considered environmentally friendly (Svitlana Bondarenko et al., 2020). Criteria for environmental entrepreneurship are presented in Figure 1.

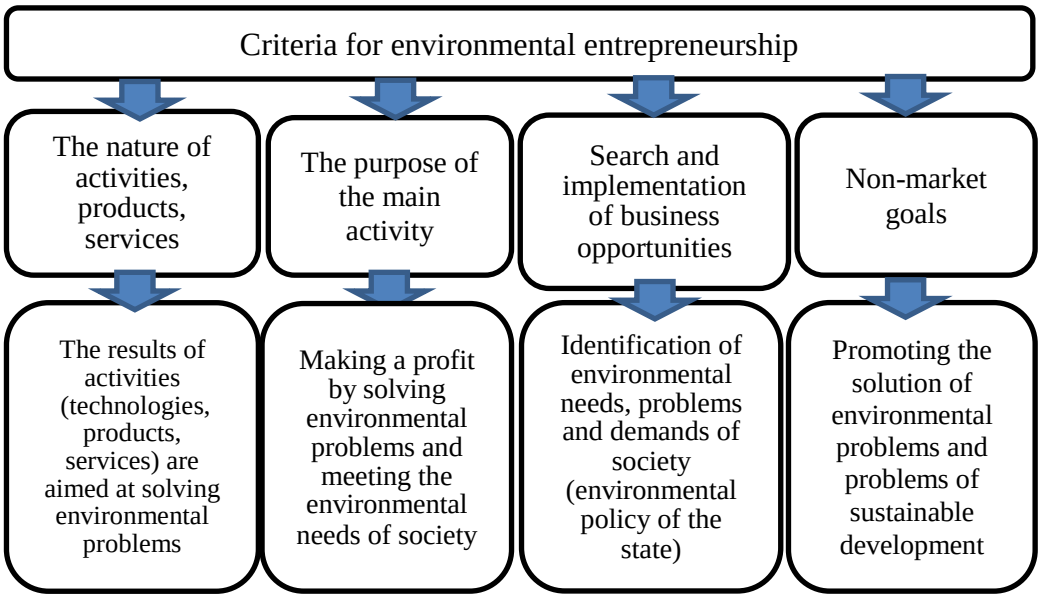

Figure 1. Criteria for determining environmental entrepreneurship

Environmental entrepreneurship is an element of the "green" economy, which is implemented on the basis of the basic provisions of the theory of social justice, inclusive growth and the welfare economy. In a broad sense, greening affects the entire socio-economic system. In a narrower sense, the green economy is a reflection of the development of environmental entrepreneurship and the main aspects of greening the economy.

United Nations Environment Program (UNEP) formulated recommendations for the transition to a green economy

- institutional and regulatory framework;
- public investment and stimulation of the green economy sectors;
- development of human capital, ecological education, training, education;
- formation and strengthening of international relations of sustainable development.

This vision of solving the problem of creating a green economy and the development of environmental entrepreneurship emphasizes the role of the state as an institution by means of improving public policy, legal mechanisms, special incentives.

3. METHODOLOGY

The methodological basis of this article was a systematic approach to understanding the process of greening, the formation of the foundations of the "green economy" on the basis of sustainable development. The study used general and special scientific methods: operationalization of scientific research categories; statistical and economic analysis - to identify patterns, factors and indicators of environmental entrepreneurship; abstract-logical approach, methods of induction and deduction, analogies and comparisons - for theoretical and methodological generalization of mechanisms of ecological entrepreneurship development.

Based on the analytical study of greening assessment systems, the systems are presented evaluation of the implementation of the idea of greening the economy. Global trends are considered, the main patterns of leaders in the processes of building a sustainable economy are highlighted. It is proposed to consider environmental taxes and the main sources of financing - "green" investments as tools for stimulating ecological entrepreneurship - as a tool to stimulate environmental entrepreneurship.

Innovation activity is offered as an indicator of enterprises' readiness for the process of greening. The analysis of introduction of ecological innovations by the enterprises is carried out. The study was conducted on the example of Ukraine. The world experience was considered, on the basis of which the main shortcomings and problems concerning the development of ecological entrepreneurship in Ukraine were revealed. During the simulation, the method of dynamic games was applied. An organizational and economic mechanism for ensuring the development of environmental entrepreneurship with the identification of methodological tools has been developed.

4. ANALYSIS OF RESULTS

4.1. Description System for Assessing the Greening of the Economy

There are a number of systems for evaluating the implementation of the idea of greening the economy.

The Global Green Economy Index (GGEI), measures the efficiency and dynamics of the "green" economy in 130 countries based on an expert survey.

The index of "green" economy (2018) for some countries is presented in Figure 2a,index of environmentally friendly innovations (2017) - in Figure 2b.

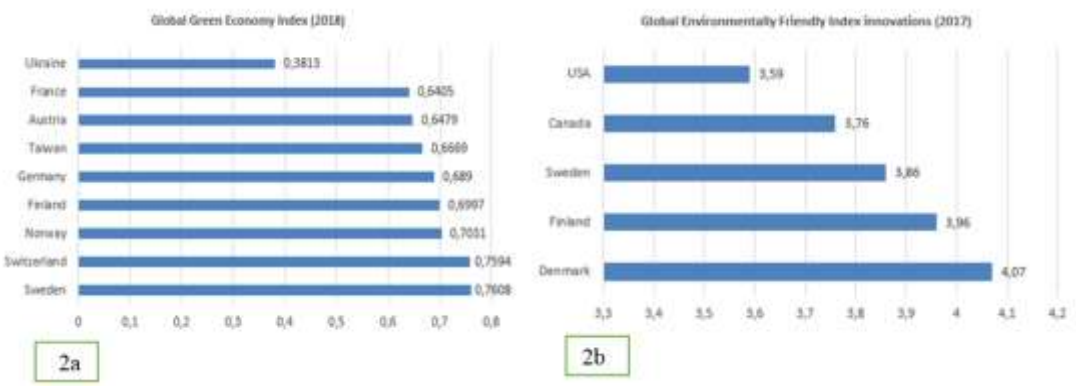

Figure 2. Global greening indices

Sweden is recognized as a leader in the field of greening the world economy. Ukraine ranks 120th forGlobal index of "green" economy.

*Global Cleantech innovation Index*is calculated for 40 countries as a weighted sum of estimates of two groups of indicators: (1) available resources and conditions for innovation (Inputs to Innovation) and (2) the achieved practical results of innovation (Outputs of Innovation). The final index (Fig. 2b) is the ratio of costs for the development of innovations and the effect obtained from their implementation. Denmark is a leader in implementing eco-innovation.

The introduction of the concept of sustainable development and greening of the economy already has a positive effect - the environmental burden with the growth of industry in some countries has not led to an increase in emissions. This is clearly shown in Figure 3, which shows the dynamics of the indicatorcarbon content of GDP.

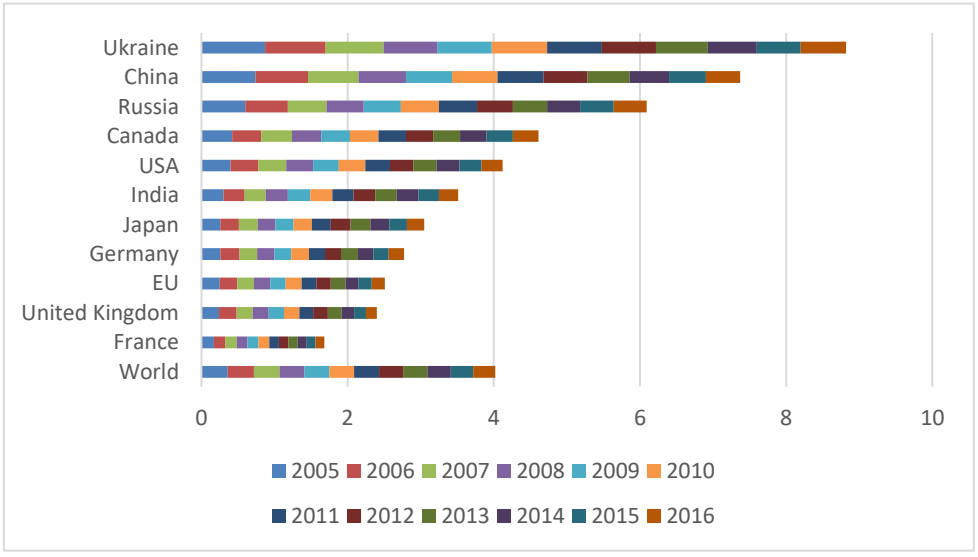

Figure 3. Dynamics of carbon intensity of GDP (CO2 / GDP), kg CO2 / $

As can be seen from the figure, carbon content of GDPUkraine significantly exceeds this figure in the world. The high value of this indicator can be noted for China, Russia and Canada. Overall, between 1990 and 2017, total EU GDP fell by 55% and total greenhouse gas emissions fell by 24% (Eurostat).

The rational use of nature is developing more and more, the market of "ecological" consumer goods and services is growing, as well as the production of equipment and eco-

technologies for the "green" economy. In developed countries, more and more attention is paid to the quality of life, an indicator of which is the growing demand for "environmental" goods and services. Most companies have begun to build their capacity in the field of "green" technologies. Liberalization of trade in environmental goods and services is defined in the OECD Interim Report on the Green Growth Strategy (OECD, 2010).

According to other expert estimates, world trade in environmental goods is estimated at $ 1 trillion. (€ 938 billion) annually(DW, 2016).

Greening of the economy by sectors is presented in Figure 4. According to Figure 4, the highest % of market capitalization is characteristic of the following sectors of the economy: renewable energy, energy saving technologies, clean water, sustainable forestry and fisheries, plastic and solid waste processing, environmental infrastructure, etc. . Thus, these sectors form the basis of the global "green" economy.

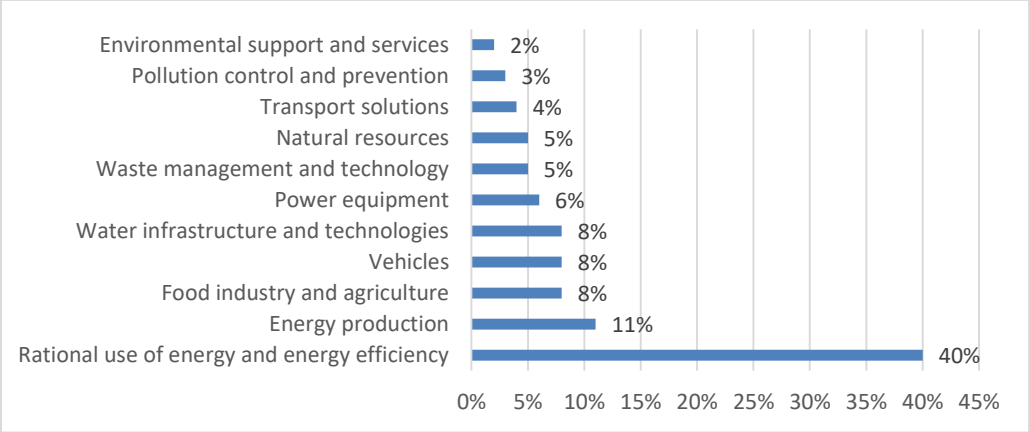

Figure 4. Greening of the economy by sector, % of market capitalization

The largest percentage of greening is in the energy sector - more than half. High levels of greening are characteristic of the food industry, agriculture and water management, transport. The "green" economy has spread to enterprises of different sizes, nature and location.

4.2. Description System for Assessing the Greening of the Economy

An effective tool for the development of environmental entrepreneurship are environmental taxes. Eurostat data on environmental taxes are presented in Fig. 5a and 5b.

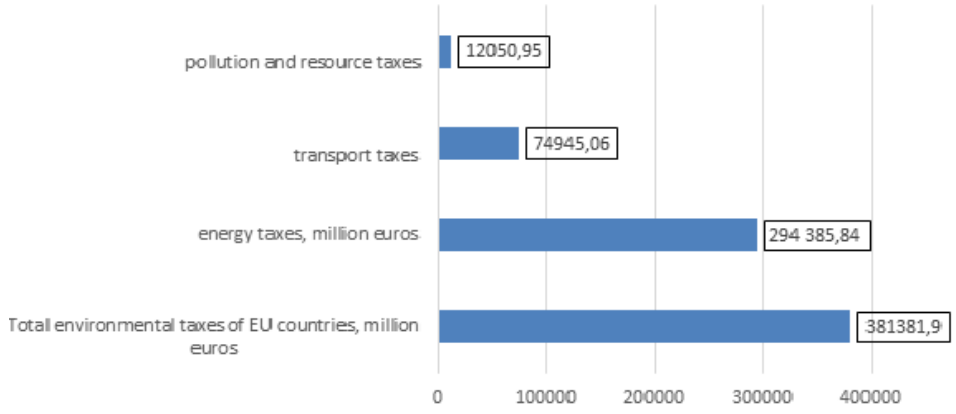

Figure 5a. Environmental taxes in EU countries in 2018, million euros

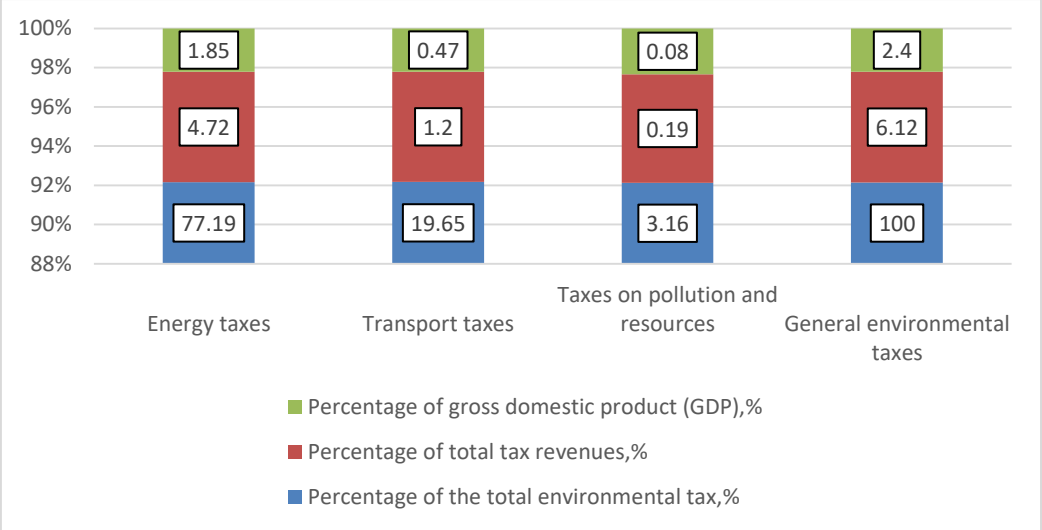

Figure 5 b. Environmental taxes in the budget of EU countries in 2018,%

Environmental taxes of EU member states are classified into the following categories: taxes on energy, transport, pollution and resources. According to statistics, in 2018 the receipt of environmental tax from EU countries-28 amounted to 381.38 billion euros. The total amount of environmental taxes amounted to 2.4% of the gross domestic product (GDP) of the EU countries and 6.12% of the total tax revenues of the EU countries.

The dynamics of the environmental tax of Ukraine for the period 2015-2019 is presented in Figure 6.

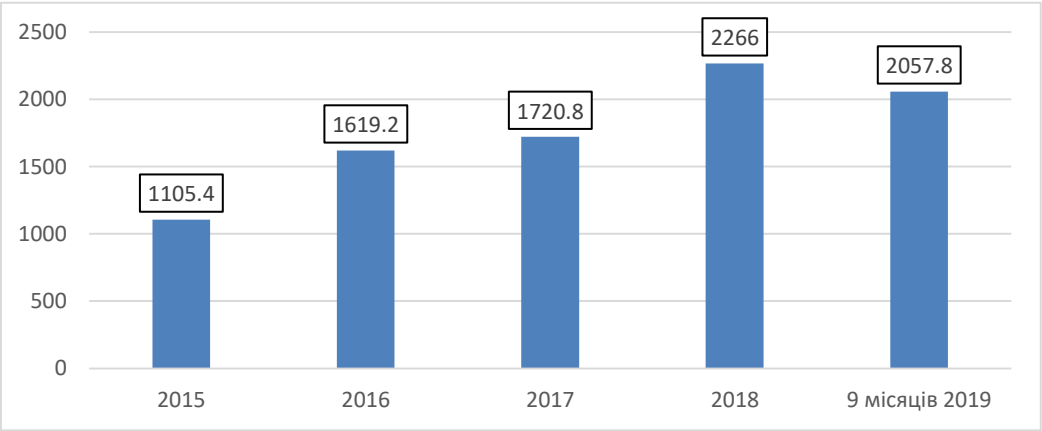

Figure 6. Dynamics Environmental Tax of Ukraine, 2015-2019, UAH million

According to Figure 6, Ukraine's environmental tax revenues have been growing in recent years. This indicates an increase in the cost of environmental protection, ie the greening of the economy, including business activities.

4.3. Investments for the Development of Environmental Entrepreneurship

"Green" investments are the assets of enterprises whose activity is in the field of renewable energy or in the areas of greening activities and production of environmental products and services, as well as compliance with socially responsible investment. Social Responsible Investment SRI, Ecology, Social and Governance (ESG); Sustainable Investment (SI) - these approaches take into account the non-financial aspects of investment.

For the development of socially responsible and ecological investment in the investment strategies and in the investment process, the purpose of the transition to the account of social, environmental, ethical and managerial factors is determined. For example, Principles Responsible Investment (PRI), developed and adopted by institutional investors to minimize long-term investment risks by incorporating ESG - factors into investment strategies. According to available data, PRI unites more than 2370 participants (PRI, 2019). In world practice, ESG criteria are increasingly introduced into investment strategies (Figure 7).

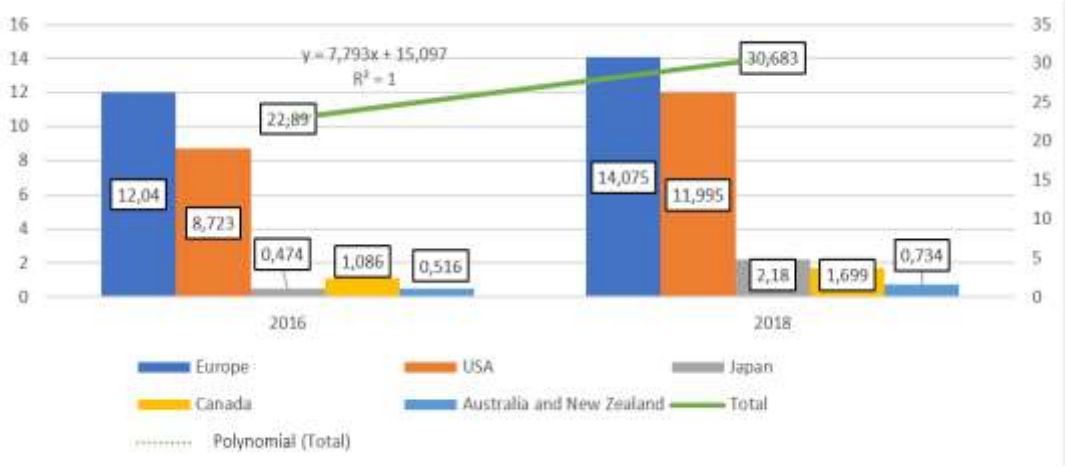

Figure 7. Dynamics of "green" investments (global distribution of sustainable investment assets) in the greening of the economy, $ trillion.

According to the presented data, as of the beginning of 2018, the assets of sustainable investment in the global dimension amounted to $ 30.7 trillion, which is 34% more than in 2016.

Europe accounts for the largest share - almost half of global sustainable investment assets. However, their share in 2018 in total decreased from 53% to 46% compared to 2016. The highest growth rates of "green" investments are observed in Japan - the growth was more than 4 times in 2016-2018.

To finance environmental entrepreneurship, a financial instrument is used - credit lines. The loan is provided through private sector financial intermediaries. Banks provide loans to certain target groups, including low-income households or small and medium-sized enterprises. Such a financial instrument is used quite widely and often, especially by development banks. It promotes the development of both environmental entrepreneurship and the financial system. At present, the total volume of issued loans reached almost $ 60 billion in 2018, which is 30% more than in 2017. (Figure 8).

The most developed market for "green" loans is typical for countries that account for more than 40% of the world's volume: the United States, Great Britain, Spain, India. According to statistics, about 75% of outstanding green loans are directed to the renewable energy and electricity generation sectors. The average maturity is 15 years.

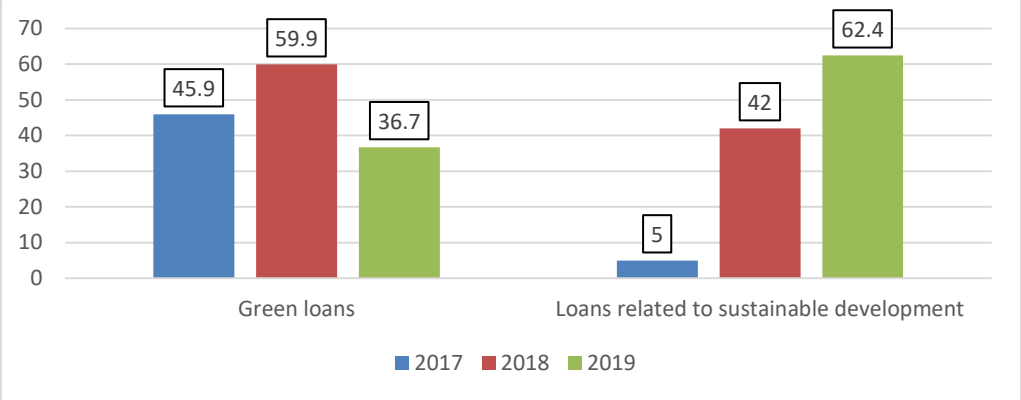

Figure 8. Dynamics of the world market of "green" loans, $ billion (Institute of International Finance, 2019)

There is another tool for financing environmental entrepreneurship - grants. This tool provides for raising funds for long-term project financing. The Global Ecological Facility (GEF) is the world's largest sponsor of environmental projects. GEF has provided more than $ 19.2 billion in grant aid, co-financed more than 4,700 projects in 170 countries and an additional $ 101.4 billion. Funded 23,991 projects in 128 countries (GEF, 2019).

4.4. Innovative Activity of Enterprises in the Development of Ecological Entrepreneurship

For Ukraine, the transition to "green" growth means a radical restructuring of the economy, the transition to high-tech production. At the heart of environmental entrepreneurship is the creation and implementation of eco-innovation (Prokopenko 2011).

The dynamics of "green" growth in technology and innovation is tracked:

- by the level of expenditure on scientific and scientific-technical research (Figure 9a);
- in innovative activity of enterprises, ie introduction of innovations (including low-waste, resource-saving and waste-free technologies) (Figure 9b);
- in development of technologies related to “green” growth (in the areas of waste management, alternative energy sources and energy efficiency measures) (Figure 9c).

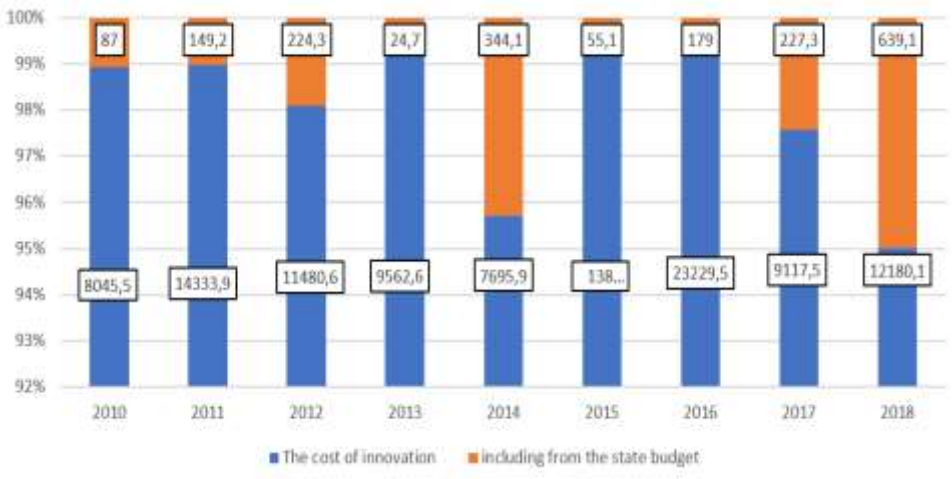

Figure 9a. Financing of innovative activity of industrial enterprises of Ukraine, UAH million (State Statistics Service of Ukraine)

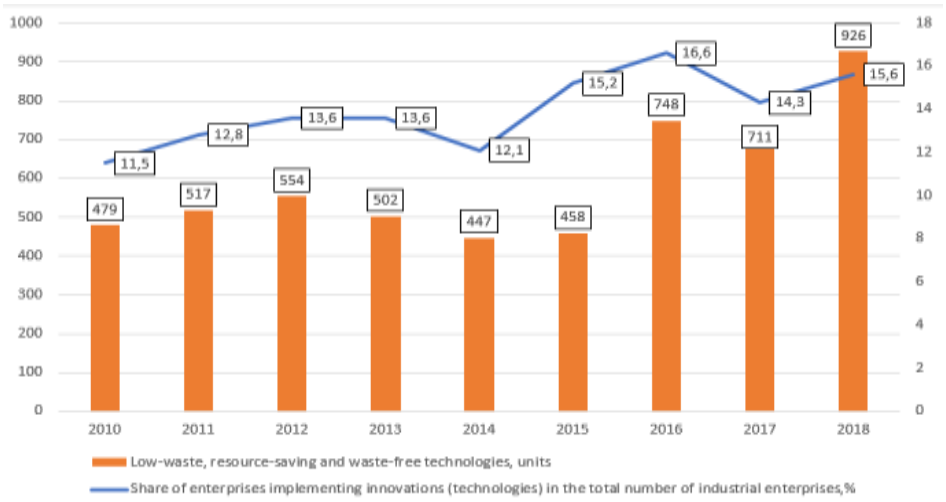

Figure 9b. Dynamics of innovation activity of industrial enterprises in relation to introduction of ecological innovations (State Statistics Service of Ukraine)

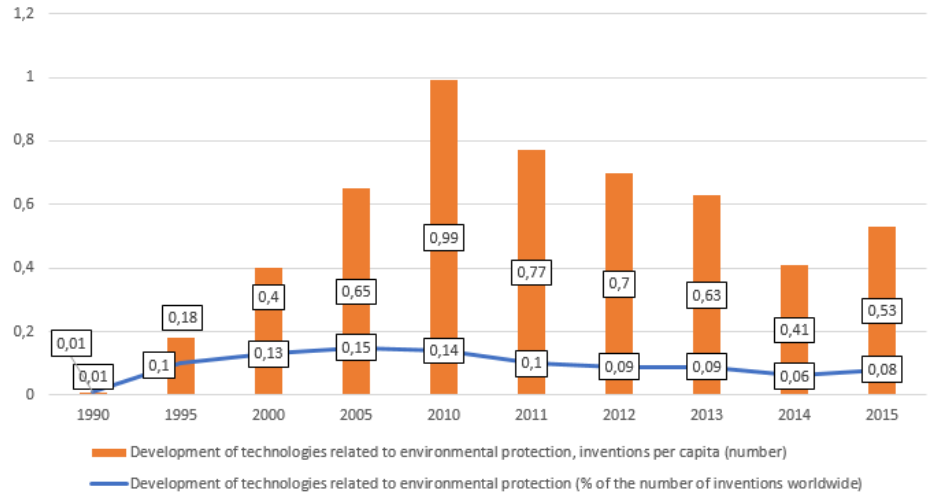

Figure 9c. Dynamics of innovative developments in areas important for the "green" growth of environmental entrepreneurship (State Statistics Service of Ukraine)

As the data show, the innovation and investment component of economic growth cannot be provided in Ukraine. The share of total funding for research and development in GDP in 2018 was only 0.47% (including at the expense of the state budget - 0.17%), while a similar figure for the EU-28 (in 2017) averaged 2.06%. Industrial enterprises have very low innovation activity. Innovative developments in areas important for "green" growth are characterized by very low performance. Such results indicate a low level of enterprise motivation for innovation, including due to funding problems.

Therefore, the development of environmental entrepreneurship should be ensured by appropriate tools and mechanisms, subject to the dominant interest of the state and the introduction of appropriate management tools.

4.5. Mechanisms of Organizational and Economic Support for the Development of Environmental Entrepreneurship

The institutional structure of society and the economy has a significant influence on the development of ecological entrepreneurship. There are three main components in the

composition of institutions: formal rules, informal restrictions, coercive mechanisms that ensure compliance with the rules.

One of the so-called mechanisms of smart management, which belongs to the group of "fair play mechanisms" or "unmanipulated management" in the allocation of financial resources, was chosen to analyze public management of environmental entrepreneurship based on the theory of active systems.

Suppose a governing body has a centralized fund R (resource), which he must distribute between n associations, enterprises, organizations for the modernization of the greening of the scientific and production-technological base, the provision of environmental measures or the increase of the scientific and technical level and quality of priority products for the state, etc. To simplify the calculations, assume that the use of the subject i resources in the amount x_i will give the Center an effect that can be provided as an effect function:

$$\Phi_i = 2\sqrt{x_i r_i} - x_i, \tag{1}$$

where - r_i – the size of the required resource, at which the effect is maximum.

With regard to the financial resource, the selected type of effect function can be interpreted as preferential (interest-free) lending to environmental entrepreneurs with repayment of the loan after the final task.

The distribution deficit situation is of interest for the practice of distribution $\sum_i r_i > R$, when the amount of optimal for the subjects of environmental entrepreneurship resources (r_i), exceeds the centralized fund.

Of course, if the Center knew exactly the dependencies $\Phi_i(x_i, r_i)$, ie the optimal size of the resource (r_i) for all subjects of ecological business, he would easily determine the optimal distribution of the centralized fund, solving the problem of mathematical programming:

$$\sum_i \left(2\sqrt{r_i x_i} - x_i\right) \to \max, \sum_i x_i = R, \tag{2}$$

where - R – the size of the centralized fund.

From here $x_i^0 = \left(\frac{r_i}{\sum r_i}\right) R$, ie if the optimal values r_i resource are known, the funds must be distributed in direct proportion to this optimal value.

But the fact is that the information about the optimal needs r_i the Center does not have. The center receives applications directly from environmental entrepreneurs S_i for a resource from the central fund. Let's take into account if the Center for "optimal decision" applies the procedure of distribution of funds in direct proportion to the applications S_i, then the subjects of environmental entrepreneurship will begin to operate on the principle of "ask more - get more" and will overestimate their demands. That is why in order to obtain reliable inquiries, it is expedient to use the “fair play mechanism” as one of the methods of optimizing management decisions adopted in the theory of active management. Suppose the Center sets a flexible interest rate on a loan. Taking into account the interest on the loan, the target function of the effect will look like this:

$$2\sqrt{r_i x_i} - (1+\lambda)x_i, \tag{3}$$

where - λ – interest rate on the loan.

The maximum of this function is reached at the point v_i determined

$$v_i = \frac{r_i}{(1+\lambda)^2}, \quad i = 1,2,...,n, \tag{4}$$

where - v_i - the most favorable size of the required resource.

If the Center uses a “fair play mechanism” for resource allocation, it must provide each environmental business entity with the most advantageous amount of resources, ie - v_i. Note that the value - v_i can be managed by changing the interest rate on the loan λ. This can be used to take into account the limitations of centralized resource resources, identified λ provided:

$$\sum_i v_i = \sum_i \frac{r_i}{(1+\lambda)^2} = R, \tag{5}$$

Thus, we get the following "fair play mechanism" for the distribution of the centralized fund:

$$x_i = \frac{s_i}{S}, \quad \lambda = \sqrt{\frac{S}{R}} - 1, \tag{6}$$

where - $S = \sum_i s_i$.

The only difference from the procedure of directly proportional distribution of financial resources is only the definition and establishment of a flexible rate λ interest on the loan, which depends on the amount of requests for funding from the centralized fund. In short, the “fair play mechanism” in this example is built by introducing flexible interest rates on a flexible management credit.

There are three conditional areas of the ratio of the size of the centralized resource fund R and requests S from objects for resource allocation: $R > S$ - unlikely situation, $R = S$ - possible situation and $R < S$ - the most probable situation. At $R \geq S$ loans are provided "on demand" even without a loan rate or below its minimum value. At $R < S$ the interest rate is gradually rising. This, on the one hand, disciplines the subjects of environmental entrepreneurship receiving loans, forces them to form their requests in accordance with real needs, so as not to fall into a situation of inability to repay the loan in the future and the prospect of bankruptcy, and on the other - due to growth λ borrowers will be forced to reconsider their requests until they are rejected. In turn, this leads to a reduction in the total amount of requests and, accordingly, to a reduction in the interest rate, which facilitates the allocation of loans only to those consumers who really need loans, in addition to their actual needs, stimulating a reduction in the risk of their return at a fixed rate.

Thus, the "fair play mechanism" is implemented during the allocation of limited financial resources. We can speaking, the above mechanism is a "fair play mechanism" only if the request S_i individual object "has little effect" on the bid λ, as a result of which the subjects of ecological entrepreneurship recipients of resources do not take into account this influence

when forming inquiries. In the theory of active systems, this assumption is called the "weak influence hypothesis." This condition is met if there are enough objects and there is no monopoly object with value r_i much larger than other objects. In the case of environmental entrepreneurship priorities, resource allocation can be planned in two stages. At the first stage, a mechanism of direct proportional distribution according to requests can be applied to the subjects of ecological entrepreneurship of monopolists, at the second stage - the balances of the resource can be distributed according to the “fair play mechanism”. “Fair play mechanism” can be built without setting flexible interest rates on the loan, based on other flexible standards. For example, it is possible to enter the standard of efficiency of use of the allocated centralized means with system of penalties (premiums) in case of deviation of the received effect from normative. If we denote the efficiency standard through ξ, and the coefficient of the fine (premium) - through α, then the objective function of the object can be written as follows:

$$2\sqrt{r_i x_i} - x_i - \alpha\left[\xi x_i - 2\sqrt{r_i x_i}\right], \qquad (7)$$

As flexible parameters in this case it is possible to use the standard of efficiency ξ and the coefficient of fine (premium) α.

In practice, this means that to obtain a profitable (in the sense of the value of the objective function $\Phi_i(x_i, r_i)$) the decision the problem, the object must to convey true information to the Center $S_i = r_i$, because the set $x_i[s(i)]$ does not depend on information i -tn object.

The basis of organizational and economic support for the development of environmental entrepreneurship is the institutional environment: state institutions and the legal framework; financial and credit institutions; business community; external institutes and foundations with environmental initiatives; scientific and educational institutions; innovation and industrial clusters (Figure 10).

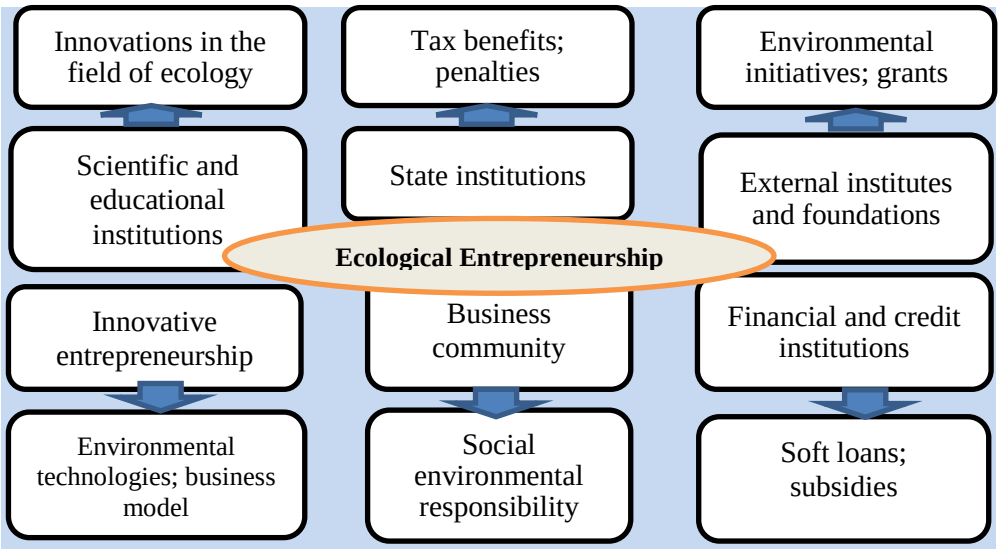

Figure 10. The structure, main participants and tools of the environment of environmental entrepreneurship

Therefore, it is important for Ukraine to create conditions that will support the transition of enterprises to environmental entrepreneurship.

The main measures to ensure the development of environmental entrepreneurship are:

- tax benefits, subsidies;
- soft loans, support programs;
- grants and consulting services;
- supply chain management and "green" public procurement.

Tools for organizational and economic support for the development of environmental entrepreneurship are presented in table 1.

Table 1. Tools for organizational and economic support for the development of environmental entrepreneurship

Organizational arrangements	Instrument
Regulatory requirements for environmental entrepreneurship. Regulatory incentives to go of beyond requirements and the full acceptance principles of ecological entrepreneurship.	General mandatory rules for facilities with low environmental risk. Regulatory incentives for certification of environmental management systems. Sectoral approach to compliance: sectoral strategies, inspection campaigns, partnerships with environmental trade associations, etc.
Recommendations and guidelines for greening of small and medium enterprises.	Formation of the "regulatory guard" service. Informing about best practices and opportunities to join environmental entrepreneurship via the Internet. Environmental audit, etc.
The education of the entrepreneurs, the formation of value environmentally of friendly activities, the formation of domestic demand for greenery products and services	Simplified environmental management systems Sectoral environmental certification Ecological labeling of products Environmental awards "Green" public procurement
Allocation of funds for implementation of the "green" investment in environmental entrepreneurship	Tax benefits (accelerated depreciation, reduced tax rate (property or corporate)) Loans on concessional terms Subsidies (grants) for consulting services

Environmental entrepreneurship becomes a mechanism for resolving a set of environmental, economic and social problems of society. The development of ecological entrepreneurship is the basis of the transition to a "green" economy, more efficient use of natural resources, reduction of anthropogenic pressure on nature, the introduction of a "green" value chain. This area is a priority for public administration. On the basis of the advanced world experience the basic tools of organizational and economic maintenance of development of ecological business are allocated. Research has shown that Ukraine has a high potential in this direction of economic transformation.

5. CONCLUSION

In this study the main aspects and organizational and economic tools of ecological entrepreneurship development are considered. It is established that there are two approaches to the definition of environmental entrepreneurship: environmental modernization and society's response to emerging market failures in this area. The criteria of ecological entrepreneurship are highlighted. The analysis of systems of estimation of greening is carried out, systems are presentedassessment of the introduction of greening the economy, considered global ratings to assess the development of "green" economy on the example of best international practices. Global trends are considered, the main patterns of leaders in the processes of building a sustainable economy are highlighted. As world experience shows, the

tools to stimulate environmental entrepreneurship are environmental taxes, "green"investments, instruments of stimulating influence on ecological business.

Since the basis of ecological entrepreneurship is ecological innovations, the indicator of readiness of enterprises for the process of greening is innovation activity. The analysis showed low innovation activity of industrial enterprises of Ukraine. The world experience was considered, on the basis of which the main shortcomings and problems concerning the development of ecological entrepreneurship in Ukraine were revealed. During the simulation, the method of dynamic games withimplementation of the "fair play mechanism". At the heart of the organizational and economic mechanism to ensure the development of environmental entrepreneurship is a mandatory condition for the formation of the ecological environment. The main organizational measures and tools for the development of environmental entrepreneurship are considered.

The mechanisms for the formation of value-oriented management of the development of "green" business –it is the direction of further research.

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