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THEORETICAL FOUNDATIONS OF ECOLOGICAL ECONOMICS

Igor Onyshchenko, PhD in economics.
Research and Training Center for Information Technologies and Systems of NAS and MES of Ukraine
Eleonora Onyshchenko, PhD in economics.
Institute of personnel training state employment service of Ukraine

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Introduction. In modern conditions, complications of interaction processes of economic activities and environment while degradation of environmental indicators is one of the main problems of economic development. There is a need for a balanced ecological and economic system. In this regard, research and development of new approaches to the formation of economy structures considering environmental factors are important. Reducing the share of polluting economic activities and development of environmentally friendly ones are in line with international strategies for sustainable development.

The fundamental contradiction between economy and ecology exists only if the economy is equated to the desire to maintain a modern structure of production and employment, which for the production and economic interests are often neglected activities for the protection of the environment. [1]

The purpose of the study, which is to establish the main provisions of environmental economics and consideration of proposals for consideration of environmental damage in economic reporting, results in solving these problems: To show the basic principles of ecological economics, provide description of each of them and offer an approach to include environmental component in economic indexes.

Related research and publications. Since economists started to include environmental factors in the economic models, there was considerable step towards building models of environmentally balanced economic system. Significant contribution was made by such scholars as G. Hoffman, A.F. Balatskyy, R. Rayatskas, G.A. Uholnytskyy, V. Gurman, V. Leontiev, M. Olyenyev, D. Ford, A. Ryumin and others. It should be mentioned the work of Ukrainian scientists in this area V. Glushkov, Y. Ermolieva, A. Bakaeva, I. Liashenko, V. Heyets, V. Hryhorkiva, N. Shor etc. Analysis of the predecessors in the field of ecological economics revealed shortcomings in the practice of economic calculations and propose an approach to consideration of these environmental component in economic indexes.

Problem statement. Ecological economics as part of the doctrine of the national economy is based on the analysis of external influences. Its appearance obliged achievements those sections of the economy, which are exploring criteria for improving the well-being of society or the optimal conditions for the well-being.

Definition 1. Environmental Economics – an interdisciplinary discipline that studies the interdependence between social and economic systems and natural ecosystems to solve current problems of humanity and building a sustainable future [2].

The focus of ecological economics is such basic problems:

A. sustainability as maintaining life support systems;
B. evaluation of natural resources and natural capital;
C. macroeconomic accounting of ecological-economic system;
D. ecological-economic modeling at the local, regional and global levels.

Sustainable development involves improving the quality of life of the world's population without increasing the scale of natural resources to a level that exceeds the capacity of the Earth as an

ecological system. Efforts to form a sustainable way of life provide an integrated approach to activities in three key areas (Fig. 1):

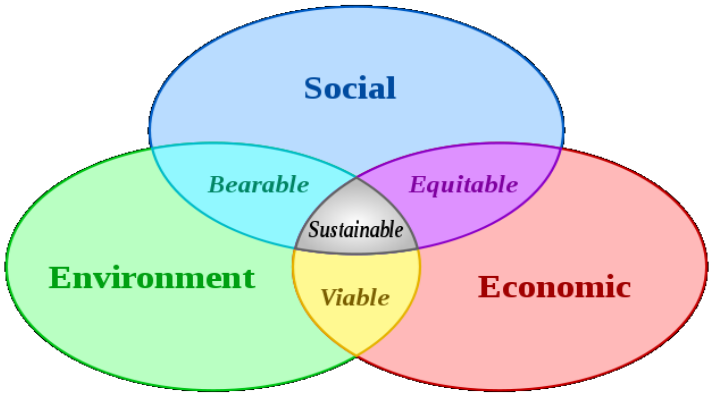

Fig. 1. Sustainable development

Following issues of environmental economics is to evaluate ecosystem services. To achieve sustainability in economic accounting should include environmental services and natural resources as commodities. To do this, find out their value, which can be compared with the cost of labor created products and services.

Modern national accounts do not include data on cost of goods and services related to natural resources. This introduces some distortion in the existing indicators. For example performance anomaly – reflecting the fact that environmental destruction has no effect on GDP and its reproduction leads to an increase in GDP. Existing indicators of national accounting cannot install or operate an economy efficiently, or by ecological debt future generations.

Development of adequate environmental and economic indicators for macroeconomic accounting is crucial to the concept of sustainable development and is one of the priority research areas in environmental economics.

The task of economics is to show the environmental problems with the models develop a general economic mechanisms of action, and analyzing costs and profits, to offer the response, for example, in the form of economic-policy instruments. It should seek to harmonize the various environmental goals, as well as the set of environmental and other socio-political and economic-political goals and objectives.

Main results. One of the areas of environmental economics is a comprehensive, multidisciplinary approach to quantitative ecological and economic modeling. For example, Leontief-Ford model allows balancing the resource consumption, production and emissions of harmful substances into the environment. Based on the ecological-economic «input-output» model we can also carry out prediction of the environment, or the volume of production in an ecologically balanced economy.

To date, there is a situation when the costs of some entities are partly shifted to others. This occurs, for example, when the value of free goods such as air and clean water is not included in the calculation of production costs in the goods making. Because of this production of goods society as a whole burdened with costs that are not paid by manufacturers, which have caused the damage. Thus, these costs are not included in the price and avoid the market mechanism, as the increasing demand associated with the depletion of resources, cannot be reduced due to the simultaneous rise in prices. The dilemma of this environmental problem actually exists because of the natural resources are treated as free resources, although they are limited in the meantime.

The growing shortage of some resources has a negative impact not only on consumption, but also in production. If you do not have enough good quality of the environment as a factor of production, the costs of expensive activity of cleaning it up can quickly exceed the profit from the apparent rejection of the use of preventive environmental activity.

These so-called negative results from the external influences come if a person or a group burdens the damage that cannot be refunded by the polluter. This effect is therefore called external because that human welfare is often due not only to the voluntary market relations (internal), but also actions that do not depend on the market (external).

External effects can occur from the production and consumption in the form of environmental pollution. Analysis of the results of the external effects of production shows that it is generally negative while pollution of air, water, soil, noise causes harmful to the environment.

It is obvious that environmental losses must be paid or reimbursed. In [3], it was considered the mathematical aspect of building models of the economy taking into account environmental factors by means of aggregation. Simulation results allow obtaining the following equality:

$$py_1 = r_1 x_1 + r_2 x_2 + q y_2, \quad (1)$$

where p – prices of goods; y_1 – volume of gross output (innatural form); y_2 – emission of harmful substances; q –price of harmful substances recycling; r_1 and r_2 – value added in production and disposal of harmful substances respectively; x_1 and x_2 – volume of gross national product of industry production and disposal of harmful substances respectively.

That is, the cost of the final product of material production in an environmentally balanced system should include not only production costs and the costs of recycling pollution, but also include the cost of environmental damage caused by pollution not recycled. If the production costs and the costs of activities to protect the environment traditionally are included in the cost of production, the last component - the value of pollution not recycled usually remains unpaid. And it is the external losses that were mentioned above not paid by the manufacturer.

Scandinavian countries, known for high levels of ecological culture, already apply a policy of additional taxes on polluting the environment good. Although these taxes are charged based on the environmental policies of the government of the country, and is not an objective pay for pollution equation (1) allow ground the real rate of ecological taxes and prices in ecological economy. This approach allows bringing people to responsibility for environmental pollution, to form a high ecological culture and adjust the environmental situation in the country by means of economic mechanisms.

In recent years, working on recycling pollution, governments of different countries assume fiscal measures to stimulate people to buy more environmentally friendly products. For example they stimulate people to buy cars with smaller engine capacity, and therefore less harmful for environment. So in France, one gram of automobile emissions in the range from 201 to 350 grams of CO_2 per kilometer costs 2 euros, from 350 grams and above – 4 euros. And when you make a technical passport for engine of 420 hp and emission above 339 grams of CO2 per km. besides normal rate 800 euros you need to pay «environmental fee» 584 euros.

In Spain, the owners of vehicles pay the tax directly at the automobile sales centre while purchasing the car and this tax directly related to the volume of engine emissions. The government encourages the sale of environmentally-friendly vehicles. So if car emissions less than 120 g CO2 per km, the tax not paid. The maximum amount of environmental tax on new car is 15% of baseline value.

In Israel, the total tax, including VAT paid when purchasing the car reaches 117% of your car. The only country, where ecological tax when buying a car is higher than in Israel is Denmark. Wanting to limit the use of transport in favor of environmentally-friendly vehicles, the government of Denmark raised the tax on the purchase of motor vehicles to 175%.

All economic costs associated with the need to maintain an adequate quality of the environment can be divided into preventive costs - prepayment, economic damage and costs of liquidation, and the neutralization of compensation already committed environmental violations – after payment.

US economists claim that the total national cost of guaranteeing the preservation of habitat quality and well-being of natural objects, may be 8–10% of GDP. Most raise the question of reasonable value of investments in the protection of the environment, bearing in mind that such investment does not explicitly lead to higher material standards of living. Unfortunately, this opinion is widespread. It is rooted in the concept of the old wasteful economic practices and is based on profound underestimation of the environmental condition of the economy. From the standpoint of eco-border reasonable cost is exactly where the volume of investments guarantees the stabilization of the quality of the environment and the basic processes of the biosphere. If society does not deem these costs reasonable, in the near future, scientists predict, they will amount to 40–50% of GNP.

Conclusions. We can conclude that including of external effects like pollution in economic parameters in general and in the market price of goods and services in particular is an objective necessity of the mankind development. By means of aggregation and ecological-economic modeling

was obtained equation to account ecological factors in the value of the gross product. This approach is already used by governments in economic policy. Countries that care about the environment have assumed fiscal measures to stimulate sales of environmentally friendly products. Otherwise, the transition to an ecologically balanced economy is impossible.

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Onyshchenko Igor, PhD in economics. Senior researcher at International Research and Training Center for Information Technologies and Systems of NAS and MES of Ukraine. **Onyshchenko Eleonora**, PhD in economics. Associate professor at Institute of personnel training state employment service of Ukraine. **Theoretical foundations of ecological economics.** The article deals with the basic provisions of environmental economics and an approach to considering environmental damage in economic calculations. Using ecologic-economic modeling it was shown that environmental damage is not fully considered and it needs to review the current practice of economic calculations.

Keywords: environmental economics, sustainable development, ecological-economic modeling, environmental losses.

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Онищенко Игорь Михайлович, кандидат экономических наук, старший научный сотрудник Международного научно-учебного центра информационных технологий и систем НАН и МОН Украины. **Онищенко Элеонора Константиновна**, кандидат экономических наук, доцент Института подготовки кадров государственной службы занятости Украины. **Теоретические основы экологической экономики.** Рассмотрены основные аспекты теории экологической экономики и способы учета экологических потерь в экономических расчетах. С использованием эколого-экономического моделирования показано, что сейчас экологические потери не полностью включаются в расчеты, и предложено пересмотреть практику экономических расчетов с учетом экологических показателей.

Ключевые слова: экологическая экономика, устойчивое развитие, эколого-экономическое моделирование, экологические потери.

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Онищенко Ігор Михайлович, кандидат економічних наук, старший науковий співробітник Міжнародного науково-навчального центру інформаційних технологій і систем НАН та МОН України. **Онищенко Елеонора Костянтинівна**, кандидат економічних наук, доцент Інституту підготовки кадрів державної служби зайнятості України. **Теоретичні основи екологічної економіки.** Розглянуто основні аспекти теорії екологічної економіки та теорії сталого розвитку. Показано місце цієї теорії в системі наук економіки, екології й соціології. Зазначено, що основною метою статті є пошук шляхів зниження негативних впливів на навколишнє середовище за допомогою математично обгунтованих економічних рішень та побудови еколого-економічних індексів добробуту аналогічних ВВП. З використанням методів еколого-економічного моделювання показано, що екологічні втрати не повністю враховуються в економічних розрахунках, і запропоновано переглянути практику економічних розрахунків із врахуванням екологічних показників.

Ключові слова: екологічна економіка, сталий розвиток, еколого-економічне моделювання, екологічні втрати.