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Oksana LYASHENKO

Doctor of Economics, Professor,
Professor of the Department of Economics and Trade,
Lesya Ukrainka Volyn National University,
Lutsk, Ukraine

 <https://orcid.org/0000-0001-5489-815X>
liashenko.oksana@vnu.edu.ua


Svitlana BORTNIK

Ph.D. in Economics, Associate Professor,
Associate Professor of the Department of Economics and Trade,
Lesya Ukrainka Volyn National University,
Lutsk, Ukraine

 <https://orcid.org/0000-0003-2687-7866>
bortnik.svetlana@vnu.edu.ua

Roman CHORNYI

Doctor of Economic Sciences, Full Professor,
Director of the Novovolynsk Educational and
Research Institute of Economics and Management,
Novovolynsk, Ukraine

 <https://orcid.org/0000-0001-8614-9495>
roman.nv79@gmail.com


Oleksandr TKACHUK

Student,
Lesya Ukrainka Volyn National University,
Lutsk, Ukraine

 <https://orcid.org/0009-0000-7732-2110>
olektkacuk55@gmail.com

Bohdan OMELCHUK

Postgraduate,
Lesya Ukrainka Volyn National University,
Lutsk, Ukraine

 <https://orcid.org/0009-0007-9161-4217>
naukoviy@icloud.com



ASSESSMENT OF THE EFFECTIVENESS OF ENVIRONMENTAL AND ECONOMIC PROJECTS

Abstract. *Modern society is currently facing urgent environmental and economic challenges. The escalating issues of climate change, environmental pollution, and the depletion of natural resources are now global problems that demand immediate solutions. In this context, environmental and economic projects are emerging as a crucial part of a sustainable development strategy that integrates economic growth with environmental protection.*

The implementation of such projects has a multifaceted positive impact. For instance, the cleanup of contaminated areas in cities like New York and London has significantly improved air and water quality. Similarly, introducing emission-reduction technologies in countries like Sweden and Denmark has reduced carbon emissions drastically. These are just a few examples of how environmental and economic projects can make a tangible difference. Secondly, environmental and economic projects improve energy efficiency, which is especially important in the context of rising energy prices. These can include projects to insulate buildings, modernize production, and introduce renewable energy sources. Thirdly, such projects help improve the population's living conditions by creating more comfortable and safe living conditions.

Implementation of environmental and economic projects can provide long-term economic benefits. It helps to reduce the cost of energy, water, and other resources, which is especially important for businesses and the public sector. For example, projects to implement energy-saving technologies can significantly reduce electricity costs, and projects to rationalize the use of water resources can help save water and reduce water supply costs.

However, to achieve maximum efficiency, it is essential to properly assess environmental and economic projects, considering both environmental and economic aspects. Performance assessment allows determining a project's impact on the economy, society, and the environment. It is an essential tool for making investment decisions and scaling up such initiatives. It helps identify the most effective approaches and practices that contribute to achieving sustainable development goals and economic stability.

Implementing environmental and economic projects also contributes to the formation of a positive image of enterprises and regions, increasing their competitiveness in the international market. Companies that actively implement environmental initiatives attract investment, expand their sales markets, and strengthen their reputation.

Therefore, the study on assessing the effectiveness of environmental and economic projects is of utmost importance. It allows for a comprehensive assessment



of the environmental and economic benefits of such initiatives, identification of key success factors, and development of recommendations to enhance their implementation. This work is crucial in our collective efforts toward sustainability and economic stability.

Keywords: *efficiency, efficiency assessment, environmental project, economic project, project efficiency.*

Relevance of the research topic. The growing environmental and economic challenges of modern society drive it. In the context of growing global environmental problems, such as climate change, environmental pollution, and depletion of natural resources, the need to implement environmental and economic projects is becoming an integral part of the sustainable development strategy. Implementing such projects allows for balancing economic growth with environmental protection and preserving natural resources for future generations.

Environmental and economic projects help reduce environmental risks, increase energy efficiency, and improve living conditions. Their implementation can provide long-term economic benefits, mainly by reducing the cost of energy, water, and other resources, which is especially important in light of current economic challenges. However, to achieve maximum results, it is essential to properly assess the effectiveness of such projects, considering both environmental and economic aspects.

Assessment of the effectiveness of environmental and economic projects helps to determine their impact on the economy, society, and the environment. It is an essential tool for making decisions on further investments and scaling up such initiatives. It helps to identify the most effective approaches and practices that contribute to achieving the goals of sustainable development and economic stability.

In the context of global trends, such as the green economy and circular economy, the efficiency of implementing environmental and economic projects is of particular importance. It helps not only to reduce the negative impact on the environment but also to create new economic opportunities, particularly in the areas of renewable energy, eco-friendly agribusiness, and waste management. In addition, implementing such projects contributes to a positive image of enterprises and regions, increasing their competitiveness in the international market.

That is why the study on assessing the effectiveness of environmental and economic projects is very relevant. It allows us to comprehensively assess the environmental and economic benefits of such initiatives, identify critical success factors, and develop recommendations for improving the efficiency of their implementation.

The study's purpose is to analyze methodological approaches and tools for a comprehensive assessment of the effectiveness of environmental and economic



projects, with the aim of improving their efficiency and promoting sustainable development.

Outline the essence of the economic and environmental effect of the project; describe ways to assess the effectiveness of the environmental and economic project; propose criteria for assessing the effectiveness of environmental and economic projects; describe the possible risks of the environmental and economic project; identify the benefits of achieving synergies in the implementation of environmental and economic projects.

Analysis of previous research. The following scientists have worked on the problem of evaluating the effectiveness of environmental and economic projects: Stepaniuk G. S., Kushlyk O. Yu, Nikitina A., Vergelska V. [5], Gvadin N., Tulchenko V. [6], Frolenkova N., Tymeychuk O., Rokochynskyi A. [7], Tarasenko D. [8], and others. However, the works of scientists do not pay enough attention to the practical aspects of assessing the project's synergistic environmental and economic effect and a detailed analysis of the methods of integrated environmental impact assessment in the modern economy.

Presentation of the main material. Modern economic systems face numerous challenges related to conserving natural resources and reducing negative environmental impact. Under these conditions, environmental and economic projects are essential for sustainable development.

The functioning of the ecological and economic system is determined by the mutual combination of environmental and economic components into a single integrated complex, where their relations are interdependent. The basis of this interaction is the key contradiction between society's environmental and economic interests, which is the need to ensure their harmony since they are inherently contradictory [9].

If economic interests are prioritized, society may face a sharp deterioration in the environmental situation, up to and including environmental disasters, which will make it impossible to continue living in certain areas. If environmental interests are prioritized, it becomes virtually impossible to establish production enterprises with a sufficient level of profitability to remain competitive in the market. This, in turn, has a negative impact on the economic opportunities of the region and impedes the provision of an adequate standard of living for its population.

Improving the population's quality and standard of living, preserving the environment, developing environmentally efficient technologies, and strengthening the country's socio-economic situation is possible only if an effective mechanism for investing in the environmental sector is created. In this context, the issue of investment efficiency in environmental protection becomes particularly relevant and needs to be addressed quickly.



The economic effect, which is beautiful to private entrepreneurs, is in the following aspects.

- increased sales volumes due to more rational use of natural resources;
- reduction of production costs through the introduction of resource-, material- and energy-saving technologies;
- increase in operating profit through the utilization of raw materials, fuel and energy, and other material resources;
- Increasing labor productivity by reducing the number of employees through the introduction of new eco-technologies or improving working conditions;
- improving the company's image through environmentally friendly technologies and materials, which, in turn, contributes to the expansion of sales markets [10].

In turn, the environmental effect, according to Lipych L. and Hlubitska T., is "limiting the negative impact on the environment and improving its condition and is manifested in reducing the amount of pollution entering the environment and the level of its pollution (concentration of harmful substances in the ground, water, atmosphere, noise, radiation, etc.), increasing the quantity and improving the quality of usable land and water resources, and improving the air quality [11].

That is why it is especially important to conduct an assessment that considers the cost-effectiveness of expenditures when developing environmental and economic projects. For this purpose, the criteria presented in Fig. 1 are.

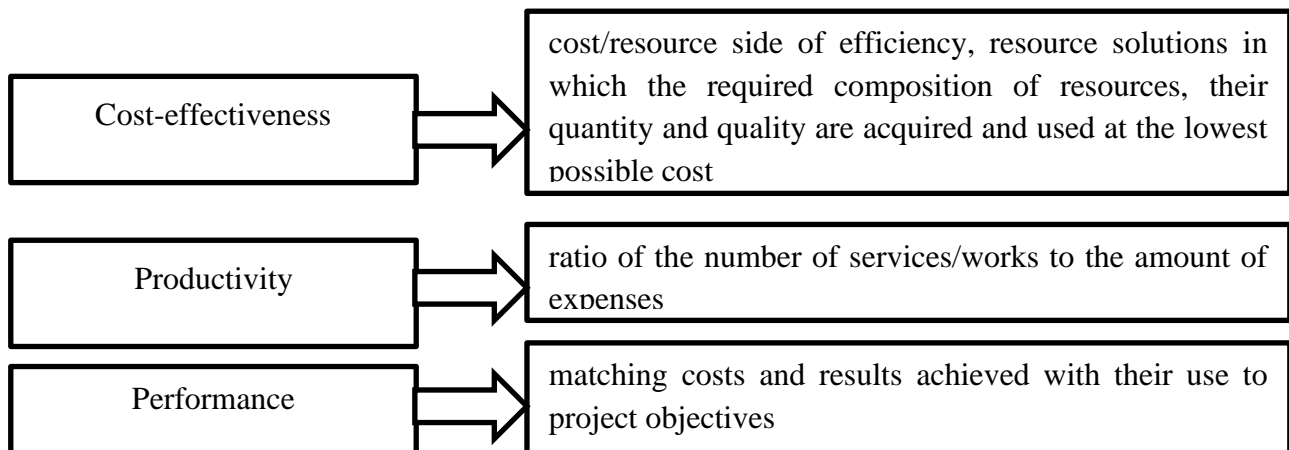


Fig. 1. Evaluation criteria that consider the effectiveness of expenditures [12]

At the same time, an environmental-economic project can be viewed as a set of economic relations aimed at achieving specific goals in the socio-economic and environmental spheres, subject to certain evaluation principles, such as

- efficiency: Among various options of environmental programs, the one that provides the highest result is chosen;



- Consistency: At each stage of project development and implementation, effectiveness is assessed, taking into account various aspects to form a comprehensive assessment;

- Consideration of externalities: All possible side effects should be taken into account, even if they are assessed based on expert opinions;

- total funding: Each program activity should be financially supported, as lack of funds can make its implementation and evaluation difficult or impossible;

- comprehensive approach: Environmental programs should cover a wide range of environmental problems, taking into account the interests of other administrative units;

- time factor: results from the implementation of environmental programs may not appear immediately, so they should be evaluated for their long-term impact;

Consideration of regional peculiarities: Local environmental projects should be given preference, as they more accurately consider the specifics of the region's natural and climatic conditions [12].

The economic feasibility of environmental projects involves comparing the economic benefits of implementing environmental protection measures with the costs required for their implementation. When assessing economic efficiency, it is important to choose options implemented in the same area and ensure the same (standard) level of environmental quality [13].

Assessing the effectiveness of an environmental and economic project is essential for determining its impact on the economy and the environment, justifying the feasibility of investments, and ensuring sustainable development.

Dragan I. V. believes that the assessment of the effectiveness of an environmental and economic project can be carried out within the framework of the following three approaches:

1) the resource approach, which involves comparing the economic result with the environmental and economic cost of production resources used in the production process;

2) the cost approach involves comparing the economic result with the current costs that directly affect its receipt;

3) The resource-cost approach compromises the previous methods. It takes into account both the assessment of available resources and current costs. However, its application requires special care due to the possibility of double counting and the significant impact of certain industries' specifics (in particular, asset intensity, capital intensity, labor intensity, etc.) [13].

Makeiev O. Y. and Makeieva D. O. propose to evaluate the effectiveness of an environmental and economic project using a method based on the criteria of NPV, IRR, and PI [14].

This approach is based on the conditional comparative indicator EI (Effect of Investment), considered PV - the mathematical difference between the planned costs



and the number of cash flows generated in specific project implementation periods and discounted to the moment of investment. This indicator is not suitable for direct evaluation of a single-cost project. However, it can be effectively used to compare several alternative projects, allowing one to choose the most cost-effective one to minimize investment costs. In general, the formula for this indicator is as follows:

$$EI = I_0 + \sum_{t=1}^n \frac{I_t}{(1+r)^t} - \sum_{t=1}^n \frac{ICF_t}{(1+r)^t}, \quad (1)$$

where: I_0 – the initial value of the project investment or its first tranche;

I_t – the amount of costs at the next stage of project implementation, discounted at the time of the project start;

ICF_t – the amount of the estimated incoming cash flow generated at the next stage of the project;

r – discount rate, %;

t – number of the project implementation stage [14].

When justifying the effectiveness of environmental and economic projects, the following issues should be addressed:

1) to determine the means of assessing the environmental impact expressed in economic indicators of investments that significantly affect the environment of the planned environmental projects;

2) the choice of an economic indicator for assessing environmental impact should be made, considering the absence of a generally accepted methodology for a comprehensive assessment of this impact. In this context, the rate of profitability of an enterprise can be considered an appropriate indicator since it at least does not decrease as a result of environmental investments;

3) To determine the discount rate for environmental finance and the financial and economic impacts of environmental investments at the same level. It is assumed that environmental impacts expressed in physical terms can and should be discounted. However, the discount rate should be significantly lower than used for the overall investment assessment. This is because the environmental impacts of investments need a clear economic value. However, the economic impacts of environmental investments and their valuation should follow the same principles as traditional investments [15].

We propose to evaluate the effectiveness of environmental and economic projects based on the following criteria:

- cost-benefit analysis, including return on investment;
- assessment of the project's impact on the environment, including pollution reduction and conservation of natural resources
- studying the impact of the project on the quality of life, job creation and social justice;



- assessment of the use of innovative technologies and their impact on productivity and cost reduction;
- analysis of the financial stability of the project, including the ability to generate revenues in the long term;
- Assessment of the project implementation timeframe and its compliance with the planned timeline;

In our opinion, using these components in the complex will allow us to most accurately assess the feasibility of implementation or the effectiveness of an already implemented environmental and economic project.

Also, when evaluating an environmental and economic project, it is essential to take into account possible risks, which may include

- predicting irreversible and dangerous changes in the environment;
- prevention of damage to natural capital that cannot be recovered;
- limiting the use of renewable resources to the extent of their natural growth, and if this condition cannot be met, including compensatory measures for natural recovery in the project with appropriate cost adjustments;
- when using non-renewable natural resources, creation of investment funds for the future at the expense of project revenues [16].

When implementing environmental and economic projects, it is also essential to take into account the presence of a synergistic effect, which is determined for the supply-production-consumption chain and calculated using the formula [17]:

$$CEE = E_{I\pi} + E_{IB} + E_{IC}, \quad (2)$$

Where: SEE - synergistic environmental and economic effect from the implementation of environmental innovation measures (EIMs) aimed at reducing the negative impact on the environment, generalized at all stages of the environmental and economic cycle “supply - production-consumption”;

E_{Iπ} - economic effect from the implementation of environmental innovation measures (IM) aimed at reducing the negative impact on the environment at the “supply” stage of the ecological and economic cycle;

E_{IB} - economic effect obtained from the implementation of environmental innovation measures (EIM) aimed at reducing the negative impact on the environment during the “production” stage of the ecological and economic cycle;

E_{IC} - the economic effect achieved through implementing environmental innovation measures (EIM) aimed at reducing the negative impact on the environment during the “consumption” stage of the ecological and economic cycle.

Achieving a synergistic effect in implementing environmental and economic projects benefits both the enterprise and the environment significantly.

For an enterprise, such benefits include reduced costs for raw materials and energy, increased competitiveness due to improved image, and increased financial



performance due to reduced costs and increased production efficiency. In addition, such enterprises become more attractive to investors, which can help attract additional financial resources and reduce the risks associated with environmental issues.

For the environment, this means improving air and water quality, preserving natural resources, maintaining biodiversity, promoting sustainable development, and reducing the risks of environmental disasters. Thus, the synergistic effect not only improves the economic performance of enterprises but also contributes to the preservation of the environment.

Conclusions. The paper outlines the essence of the economic and environmental effect of project implementation; describes the ways to assess the effectiveness of an environmental and economic project; proposes criteria for assessing the effectiveness of environmental and economic projects; describes the possible risks of an environmental and economic project; and identifies the benefits of achieving a synergistic effect in the implementation of environmental and economic projects.

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Оксана Миколаївна ЛЯШЕНКО

доктор економічних наук, професор,
професор кафедри економіки і торгівлі,
Волинський національний університет імені Лесі Українки,
м. Луцьк, Україна

 <https://orcid.org/0000-0001-5489-815X>
liashenko.oksana@vnu.edu.ua


Світлана Миколаївна БОРТНІК

кандидат економічних наук, доцент,
доцент кафедри економіки і торгівлі,
Волинський національний університет імені Лесі Українки,
м. Луцьк, Україна

 <https://orcid.org/0000-0003-2687-7866>
bortnik.svetlana@vnu.edu.ua


Роман Степанович ЧОРНИЙ

доктор економічних наук, професор,
директор Нововолинського навчально-наукового
інституту економіки та менеджменту,
Західноукраїнський національний університет,
м. Нововолинськ, Україна


 <https://orcid.org/0000-0001-8614-9495>
roman.nv79@gmail.com

Олександр Олегович ТКАЧУК

здобувач вищої освіти,
Волинський національний університет імені Лесі Українки,
м. Луцьк, Україна

 <https://orcid.org/0009-0000-7732-2110>
olektkacuk55@gmail.com



Богдан Володимирович ОМЕЛЬЧУК
здобувач третього (освітньо-наукового) рівня вищої освіти,
Волинський національний університет імені Лесі Українки,
м. Луцьк, Україна
 <https://orcid.org/0009-0007-9161-4217>
naukoviy@icloud.com

ОЦІНКА ЕФЕКТИВНОСТІ РЕАЛІЗАЦІЇ ЕКОЛОГО-ЕКОНОМІЧНИХ ПРОЄКТІВ

***Анотація.** Сучасне суспільство опинилося на перехресті екологічних та економічних викликів. Зміна клімату, забруднення навколишнього середовища, виснаження природних ресурсів – ці проблеми набувають глобального масштабу та вимагають негайних рішень. У цьому контексті еколого-економічні проекти постають як невід’ємна частина стратегії сталого розвитку, що дозволяє інтегрувати економічне зростання з охороною довкілля.*

Впровадження таких проектів має багатогранний позитивний вплив. По-перше, вони сприяють зниженню рівня екологічних ризиків, мінімізуючи негативний вплив людської діяльності на природу. Це може включати в себе проекти з очищення забруднених територій, впровадження технологій зменшення викидів, захист біорізноманіття тощо. По-друге, еколого-економічні проекти підвищують енергоефективність, що є особливо актуальним в умовах зростання цін на енергоресурси. Це можуть бути проекти з утеплення будівель, модернізації виробництва, впровадження відновлюваних джерел енергії. По-третє, такі проекти сприяють покращенню умов життя населення, створюючи комфортніші та безпечніші умови для проживання.

Реалізація еколого-економічних проектів може забезпечити довгострокову економічну вигоду. Зокрема, вона дозволяє знизити витрати на енергію, воду та інші ресурси, що є особливо важливим для бізнесу та державного сектору. Наприклад, проекти з впровадження енергозберігаючих технологій можуть значно зменшити витрати на електроенергію, а проекти з раціонального використання водних ресурсів допоможуть зекономити воду та знизити витрати на водопостачання.

Однак, щоб досягти максимальної ефективності, важливо правильно оцінювати еколого-економічні проекти, враховуючи як екологічні, так і економічні аспекти. Оцінка ефективності дозволяє визначити вплив проекту на економіку, суспільство та довкілля. Вона є важливим інструментом для прийняття рішень щодо інвестицій та масштабування подібних ініціатив. За її



допомогою можна ідентифікувати найбільш ефективні підходи та практики, що сприяють досягненню цілей сталого розвитку та економічної стабільності.

Реалізація еколого-економічних проектів також сприяє формуванню позитивного іміджу підприємств та регіонів, підвищуючи їх конкурентоспроможність на міжнародному ринку. Компанії, які активно впроваджують екологічні ініціативи, приваблюють інвестиції, розширюють ринки збуту та зміцнюють свою репутацію.

Саме тому дослідження, присвячене оцінці ефективності реалізації еколого-економічних проектів, є надзвичайно актуальним. Воно дозволяє комплексно оцінити екологічні та економічні переваги таких ініціатив, визначити ключові фактори успіху та розробити рекомендації для підвищення ефективності їх впровадження.

Ключові слова: ефективність, оцінка ефективності, екологічний проект, економічний проект, проектна ефективність.