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Article

Directions for Environmental Impact Assessment in Urban Economic Planning

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Abstract: This article substantiates that assessing environmental impact is one of the key strategic directions in urban economic planning, demonstrating how the growth of urbanization processes and economic activity leads to excessive use of natural resources and affects ecological balance. The study emphasizes the necessity of conducting environmental analysis in urban development plans and evaluating potential negative impacts in advance. It highlights the importance of considering factors such as air pollution, waste management, the condition of water resources, preservation of green areas, and transport ecology. The research also explores how sustainable urban economic development can be achieved through the use of environmentally friendly technologies, the introduction of renewable energy sources, and adherence to the principles of a "green economy." In addition, it underscores the significance of establishing environmental monitoring systems and involving the public in these processes. The relevance of this direction, its main evaluation criteria, and its practical importance are also discussed, which determines the need to strengthen an ecological approach in future urban planning policies.

Keywords: Cities, urban economy, planning, urban economic planning, environment, assessment, environmental impact assessment.

Introduction

It is well known that environmental impact assessment is considered a system for identifying, analyzing, and mitigating the effects of planned economic, social, or technological activities on ecological systems. In such cases, the main objectives of environmental impact assessment include the early identification of ecological risks, contributing to the development of a green economy, promoting the rational use of resources, and ensuring sustainable development. Assessing environmental impact plays an important role in the effective planning of urban economies. Modern urbanization processes and industrial development are significantly affecting ecological sustainability. Therefore, it is necessary to introduce environmental analysis and impact assessment tools into economic planning processes. In this regard, land use driven by residential construction, economic growth, and transportation has a substantial environmental impact on landscapes worldwide, particularly in urbanized areas.

Literature review. The assessment of environmental impact in urban economic planning is directly linked to environmental policy. In densely populated countries such as Germany, Belgium, the Netherlands, and the United Kingdom, environmental policy

plays a high-priority role in land development. As a result, various strategies and instruments aimed at preventing excessive land consumption are widely discussed [1]. However, these strategies and instruments often apply a general approach. In this context, it is necessary to identify specific sectors where reforms should be implemented in order to reduce land consumption. This approach is based on the assessment that land use can have harmful effects on soil functionality, water balance, and the quality of living environments in specific areas.

In order to plan urban economies, environmental impact assessment should be integrated into urban master planning processes, with special attention to sustainable urban growth. With the increasing need for sustainable practices in urban development, the integration of environmental impact assessment into master planning has become an important strategy for mitigating negative environmental consequences and enhancing the sustainability of urban ecosystems [2]. In this regard, it is proposed to explain the concepts, challenges, best practices, and advantages of integrating environmental impact assessment with urban master planning. It also examines global case studies to focus on effective integration strategies and to explore valuable insights. It emphasizes the importance of collaboration, stakeholder engagement, data-driven decision-making, and adaptive governance in achieving sustainable urban development goals.

The main object of environmental studies is the ecological system or ecosystem. It consists of a defined area in which living organisms and their habitats are integrated through the interaction of material, energy, and information flows [3]. Cities are considered centers of modern economic development. However, their economic activities often intensify environmental problems. Therefore, environmental impact assessment has become an important stage in urban economic planning today. This process serves to ensure environmental sustainability, increase economic efficiency, improve living conditions, and support social stability. The high population density in cities has a positive effect on the development of industrial sectors, while also negatively affecting the level of ecological safety of the natural environment [4].

In urban agglomerations, in order to establish and implement sustainable development principles, many countries and organizations develop various methods and tools for assessing the environmental impact of human economic activities. These tools are used at the stage of selecting economic development options to analyze the advantages and disadvantages of the considered investment projects, as well as to identify ways to reduce negative environmental impacts [5]. Environmental impact assessment in urban areas is an important tool in urban environmental policy, enabling decision-makers to identify and mitigate the potential environmental impacts of urban projects and policies. Although environmental impact assessment faces several challenges and limitations in urban settings, practitioners can use various strategies to address these issues and ensure that environmental impact assessment effectively promotes sustainable and environmentally conscious urban development [6].

Research methodology

In conducting this research, widely used methods in scientific research methodology were applied. The article employs methods such as logical reasoning, scientific abstraction, data grouping, analysis and synthesis, as well as induction and deduction in assessing environmental impact in urban economic planning.[7]

Analysis and results

Environmental impact assessment in urban development strategies should be considered a priority direction for the protection of air, water, and soil quality, waste management, and the preservation of green areas. During the environmental impact assessment process, factors such as the expansion of urban infrastructure, traffic flow, energy sources, and population density must be taken into account. The main objective is to ensure a balance between economic growth and environmental sustainability. At the

same time, the formation of a sustainable urban economy requires the use of the "green economy" approach, renewable energy sources, ecotourism, and environmental innovations. Government and local authorities should implement environmental monitoring systems, involve the public, and take environmental expertise into account in decision-making processes.[8]

Environmental factors in urban economies are essential for assessing environmental impact. In this regard, the main sectors of the urban economy—industry, transport, construction, energy, and services—affect the environment in the following ways:

1) Negative impacts:

- air pollution (CO_2 emissions and dust particles);

- depletion and contamination of water resources;

- increase in solid waste generation;

- greenhouse effect and urban heat island phenomenon.

2) Positive impacts (with proper planning):

- efficient use of resources;

- introduction of environmentally friendly technologies;

- improvement of environmental awareness among the population.[9]

In addition, environmental impact assessment in urban planning includes the following stages:

1) Preliminary assessment:

determining whether a project requires assessment;

defining the scope of environmental impact;

analyzing environmental indicators.

2) Analysis and evaluation:

studying the project's positive and negative environmental impacts.

3) Measures and recommendations:

developing ways to reduce or prevent negative impacts.

4) Decision-making and monitoring:

- approving or rejecting the project and conducting post-implementation monitoring.

- ecological-economic approach in the context of cities[10]

Discussion

In urban economic planning, environmental impact assessment becomes increasingly important as population density continues to grow. This is usually accompanied by challenges such as increased emissions of harmful gases from transport and the reduction of green spaces. However, modern cities are increasingly introducing solutions such as metro systems and "green building" standards to address these issues. European cities provide valuable experience in this regard. Amsterdam and Copenhagen are known for their well-developed cycling infrastructure, Paris has introduced low-emission zones restricting car traffic, while Berlin focuses on green buildings and zero-waste technologies. These examples demonstrate that environmental sustainability can be effectively integrated into urban development strategies.[11]

Based on these practices, the development of a sustainable urban economy is grounded in the following directions:

- development of green infrastructure (parks, green roofs, and green corridors);

- greening of transport systems (electric buses, metro systems, and bicycle lanes);

- strengthening environmental auditing and environmental impact assessment systems;

- compliance with environmental standards in urban construction;

- monitoring environmental quality through digital systems;

- ensuring public participation and involving citizens in environmental decision-making.[12]

In urban planning, a set of environmental and economic indicators is used to assess environmental impact. These indicators help determine the level of ecological pressure and support informed decision-making for sustainable development.

1) Total Environmental Load (TEL). This indicator measures the total amount of pollutants emitted into a specific city or district area.

$$TEL=\sum_{i=1}^{n}(Ci * Vi) \quad (1)$$

Here:

- C_i is the concentration of the i-th pollutant (mg/m³ or mg/L);

- V_i is the volume of the i-th pollutant (tons, m³, or L);

- n is the total number of pollutants.

2) Environmental-Economic Efficiency (EEE). This indicator reflects the economic and environmental outcome of investments made in environmental protection measures.[13]

$$EES = \frac{\Delta E+\Delta S}{I} \quad (2)$$

Here:

- ecological benefit (reduction of CO_2 emissions);

- economic benefit (reduction in healthcare costs);

- total investment amount allocated to the project.

3) Waste Density (WD). This indicator represents the ratio of waste generated in a city to the population size:

$$WD = \frac{W}{N} \quad (3)$$

Here:

- the amount of waste generated per year (tons);

- the population of the city.

4.) Energy Efficiency (EE). This indicator reflects the efficiency of energy use in urban infrastructure.

$$EE = \frac{Y}{E} \quad (4)$$

Here:

- gross domestic product (GDP) or the value of produced output;

- total energy consumption.

5) Air Pollution Index (API). This indicator is used to assess air quality. It is widely applied in the United States and European countries.

$$API = \max\left(\frac{Ci}{Si} * 100\right) \quad (5)$$

Here:

- the measured concentration of the i-th pollutant;

- the maximum permissible level (standard) for that pollutant.

6) Green Zone Coefficient (GZC).This indicator represents the ratio of the total area of green zones in a city to the total urban area:

$$GZC = \frac{Y}{Sh} \quad (6)$$

Here:

- green areas (land allocated to parks and tree-covered zones);

- total urban land area.

Based on these formulas and calculations, environmental impact assessment in urban economic planning is based on the following directions (Table 1):

Table 1. Directions of Environmental Impact Assessment in Urban Economic Planning.

Assessment of the Impact of Different Development Projects	Development of Sustainable Development Strategies	Decision-Making in Urban Policy	Ensuring Public Participation
The construction of new buildings, roads, infrastructure, industrial zones, and other facilities can have a significant impact on the environment.	Environmental impact assessment is used to evaluate the effects of different development strategies and plans on the environment.	Environmental impact assessment provides the necessary information for decision-making, taking into account environmental and social aspects.	Environmental impact assessment includes a consultation process with the public on urban development issues.

In addition, the foundation of environmental impact assessment in urban economic planning is based on the following directions:

- impact identification and assessment: identifying and analyzing potential environmental impacts such as air and water pollution, climate change, loss of biodiversity, and effects on public health.

- development of mitigation measures: implementing actions aimed at reducing negative environmental impacts. for example, the use of environmentally friendly technologies, urban landscaping, and the introduction of waste management systems.

- monitoring and evaluation of measures' effectiveness: assessing the effectiveness of mitigation actions and making necessary adjustments to development plans when required.[14]

Thus, environmental impact assessment plays a crucial role in urban economic planning. Through this process, environmental sustainability is ensured when developing urban infrastructure or implementing new projects. In this regard, we consider it necessary to implement the following projects in our country:

1)Transport infrastructure project (construction of a new metro line in Tashkent city): This requires implementing measures to eliminate dust and noise during construction, prevent the loss of green areas, reduce CO_2 emissions through decreased traffic congestion, carry out construction using environmentally safe methods, and transplant or plant new trees.

2) New industrial zone development project (industrial area creation project): This involves preventing the emission of harmful gases into the atmosphere, assessing impacts on nearby water bodies, considering potential effects on public health, installing air filtration and purification systems, and introducing wastewater treatment and recycling systems.

3) New residential development project (construction of housing estates on the outskirts of Samarkand city): This requires reducing pressure on natural resources (land and water), preventing the reduction of green areas, considering increased transport demand of the population, establishing "green area" quotas, and introducing energy-efficient technologies such as solar panels and thermal insulation.

4) Tourism zone development project (expansion of tourism infrastructure in Khiva city): This involves assessing impacts on the local natural landscape, preventing overexploitation of water resources, evaluating effects on local communities and wildlife, adopting an ecotourism-based approach, and implementing water-saving sanitation systems.

5) Green energy project (construction of a solar power plant in Jizzakh region): This includes ensuring the suitability of land use for other purposes (agricultural and ecological), integrating with power distribution networks, selecting technologies that minimize ecosystem impact even at higher capacity, and related measures.[15]

Conclusion

Environmental impact assessment in urban economic planning serves as a tool for ensuring ecological safety and is a necessary condition for competitive and sustainable economic development. It contributes to the formation of a rational resource-use culture, improves public health, and enhances the overall quality of urban living conditions. Therefore, every new project and initiative should be evaluated based on environmental criteria. As a result, environmental impact assessment becomes an important mechanism for ensuring sustainable urban development, enabling the consideration of environmental, social, and economic aspects in urban decision-making processes. Proper assessment of environmental impacts creates opportunities for the long-term and stable development of urban economies. This supports not only economic growth but also social and ecological sustainability. Environmental impact assessment allows for the analysis and evaluation of potential environmental, social, and economic effects of urban economic planning. It also helps to identify, assess, and reduce negative impacts, while enhancing the positive effects of urban development projects and strategies.

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