

Ministry of Education and Science of Ukraine
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The graduate thesis
to obtain the master's degree

The topic of the work: **Adaptation of modern
models of development and eco-management to
operational systems of territorial revitalization
projects**

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Kyiv 2024

The purpose of the master's research is to develop theoretical and methodological approaches, scientific and methodological foundations and practical recommendations for the revitalisation and environmentally sustainable socio-economic development of construction revitalisation areas.

Objectives:

- to summarise and reveal the prerequisites for ecological and economic development and revitalisation of building territorial systems based on the dialectical principles of environmental economics;
- to define the essence of the concept of 'industrial coal territory' as an object of sustainable development;
- to develop the concept of ecological and economic development of construction and revitalisation of post-industrial revitalisation territories;
- to analyse the ecological and economic state and propose an approach to the economic assessment of the consequences of man-made pollution of the BRT;
- to substantiate the ecological and economic policy of ensuring sustainable development in the context of targeted programming of the development and revitalisation of BRT;
- to propose a scientific and methodological approach to the economic assessment of environmentally oriented innovations in the BRT.

- The object **of research** is the system of organisational and economic support for the processes of revitalisation and environmentally sustainable socio-economic development of construction revitalisation territories.

- **The subject of the study** is the ecological and economic relations that arise between business entities, public administration and local self-government bodies regarding the formation of concepts and implementation of strategies for environmentally sustainable socio-economic development of construction revitalisation territories.

Territorial problems of industrial development and issues of environmental management have been considered in the scientific works of foreign scientists: A. Weber, I. Izard, A. Lösch, E. Marcusen, A. Marshall, J.G. von Thünen, J. Friedman, M. Friedman, J. Schumpeter, domestic and Russian scientists: O.M. Alimov, O.I. Amoshi, S.I. Bandur, B.V. Burkinsky, M.P. Butko, V.M. Heets, Z.V. Gerasymchuk, A.G. Granberg, G. Gruba, B.M. Danilishyn, M.I. Dolishnyi, S.I. Doroguntsov, O.I. Amosha, M.E. Basse, Z.S. Varnalia, L.M. Gorbach, A.G. Zabolotnyi, I.A. Karagodov, L.M. Kuzmenko, N.L. Nedodaeva, I.V. Petenko, V.L. Piliushenko, O.S. Povazhnyi, I.L. Syniakevych, etc.

Construction revitalisation sites are areas in industrialised regions that are often disturbed by industrial activities, including mining, which leads to landscape degradation, water and air pollution, and disruption of the hydrogeological balance. The classification of these territories is based on factors such as the intended use (industrial, recreational or residential areas), the degree of anthropogenic impact and the level of pollution. The lack of a unified methodology makes environmental and economic assessment difficult, so each region uses its own indicators. Identifying risks and assessing damages allows for more effective safety management, mitigation of negative impacts and increased resilience of these areas in the context of sustainable development.

Criteria for the classification of construction revitalization areas

Rating factor territories	Factorial characteristics are possible indicators
Location in territory plan	within the city limits outside the city limits
Target use of the site	production funds; infrastructure facilities; recreational facility; housing stock, etc.
The degree of land development	industrial building; undeveloped green area; abandoned plots of land, contaminated land; residential areas;
The direction of revitalization	constructional; recreational; commercial; social and cultural
Peculiarities of technogenic influence of mining production	damage by bulk soil; damage by excavation of the soil; atmospheric pollution; violation of the hydrogeological balance; - pollution by heavy metals, oil products, radiation, - the presence of biogas anomalies, sanitary and bacteriological contamination
Availability of indicators of industrial pollution of the territory	heavy metals and arsenic; 3,4 benz(a)pyrene; petroleum products; radiation; active biogas anomaly; sanitary and bacteriological pollution
Assessment of the security level	-potential for emergency prevention; - caused damage; - recovery potential

The assessment of the security level in the region is based on the risk concept with the following groups of indicators:

- Potential to prevent environmental emergencies.
- Assessment of the damage caused.
- Potential for recovery.

Risk assessment methods include risk mapping, emergency scenario development, simulation modelling and the 'idealised experiment' method.

Environmental safety management should take into account the forecasting of environmental and economic processes, using sustainable development scenarios and a comprehensive approach to assessing socio-economic development.

The formation of a sustainable development strategy for industrial areas involves the use of both formal (modelling) and informal methods (expert assessments).

The goal of managing construction revitalisation areas (CRAs) is to preserve environmental quality, determine economic losses from land degradation and pollution, and assess environmental risks to the sustainable development of ecosystems.

The influence of the destabilizing factor of the industrial coal territory on indicators of sustainable development (systematized by the author based on the results of studies of the peculiarities of the development of BRT)

Characteristics BRT	Components of sustainable development		
	Economical	Ecological	Social
Industrial building	Profitability production	zero waste possibility of recovery of resources	Mortality, employment, morbidity, life expectancy of the population
Undeveloped green area	Cost Natural capital	Recreational potential	Density population
Neglected plots of land	Cost of revitalization	Resource recovery potential and danger to the environment territory	Influence on the conditions of rest and restoration of working capacity
Residential estates	Housing and utility expenses, Profitability construction	Degree of anthropogenic pollution	The level of improvement
Contaminated lands	Cost of revitalization	Risk environmental disasters	Degree Activity community

Formation of the concept of environmentally sustainable socio-economic development and revitalization of construction revitalization areas
 Ecological component: It is often ignored in regional development, but it is critical for the quality of life and resource conservation.

Approaches to economics and ecology:

Neoclassical theory: Natural resources are a secondary element of production, internalization of costs is applied, but innovation in ecology is limited.

Environmental economics:

Focuses on strict state regulation in environmental management.

Principles of environmental policy:

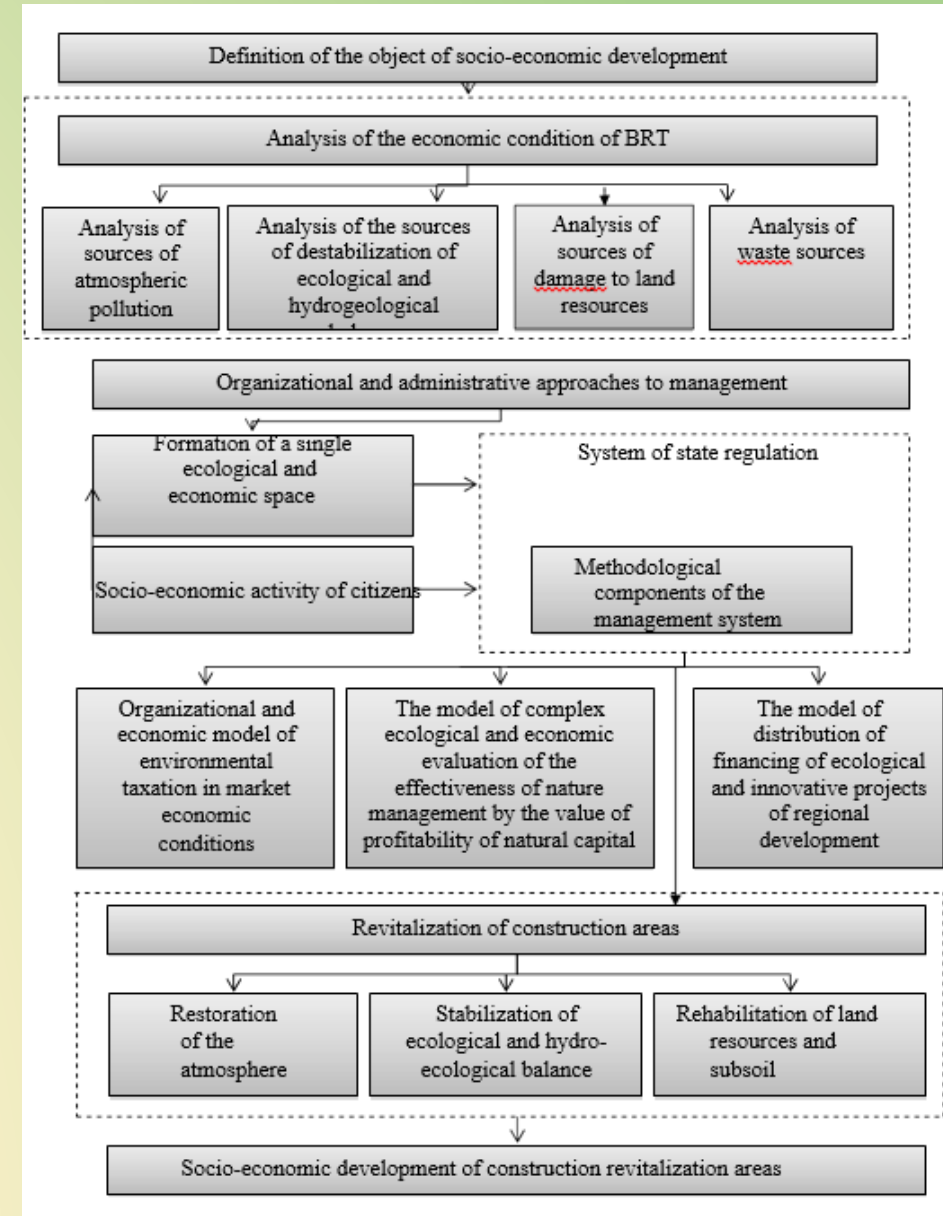
Precautionary measures, sustainable development, the polluter pays principle, and responsibility sharing.

Greening of territories:

Includes nature conservation methods and reduction of anthropogenic impact through technological changes and reclamation.

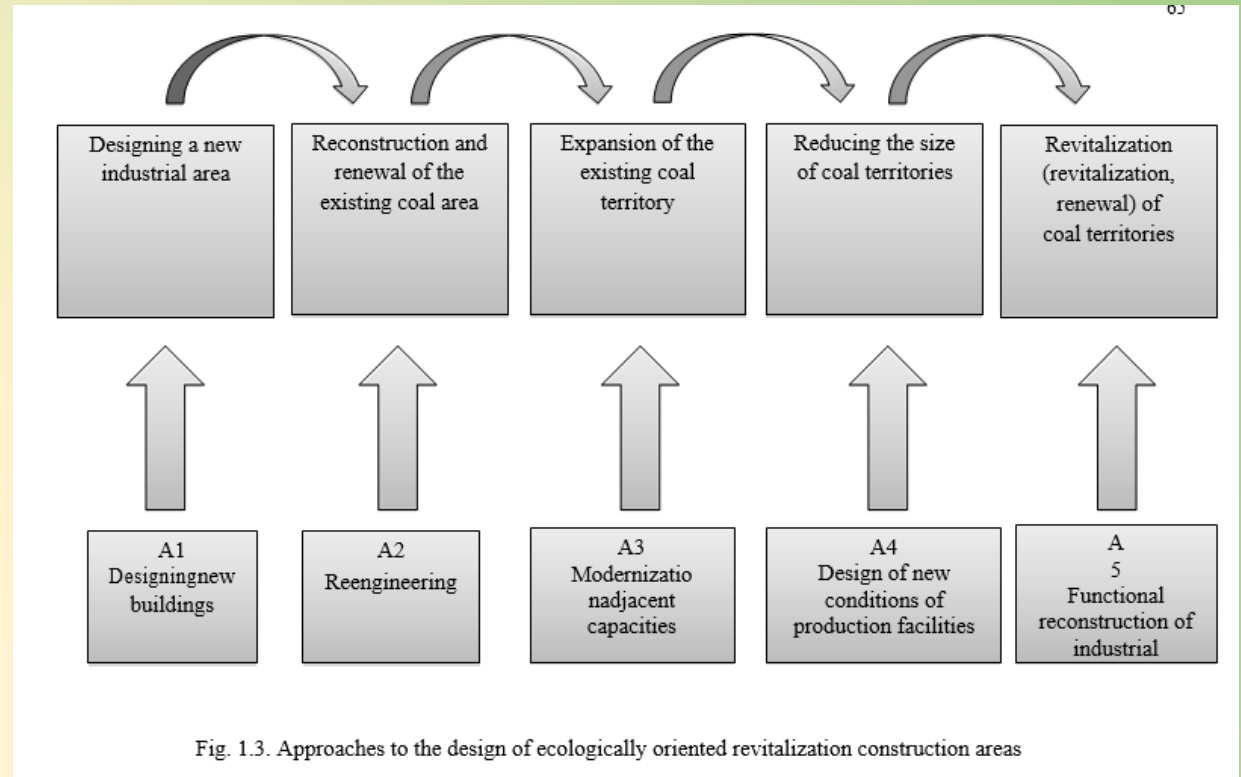
Balanced development: Must take into account the needs of present and future generations through effective management of natural resources.

These principles support environmentally responsible business and sustainable resource management.



Greening the socio-economic development of regions with a high technogenic load is a prerequisite for sustainable development. Industries that actively use natural resources worsen the environmental situation, complicating production activities. The transition to clean and low-waste technologies helps to reduce pollution, while the polluter pays principle ensures financial responsibility for the use of resources.

The process of greening involves the use of regulatory, economic, information and social tools. A systematic approach allows for the integration of environmental goals at all levels - from enterprises to regions - which contributes to efficient environmental management and improved quality of life.



Jack Welch, a well-known revitalization expert, developed a phased model for transforming industrial areas, which was applied at the General Electric plant. His approach was based on two key aspects: the capacity of each production unit and the efficiency of their integration in the revitalization process.

The research confirmed that the revitalization of construction sites should consist of the following stages:

1. Complete diagnostics of the territory,
2. Analysis and development of the concept,
3. Formation of a revitalization program,
4. Implementation of the program.

This approach promotes the gradual restoration and improvement of the efficiency of industrial zones.

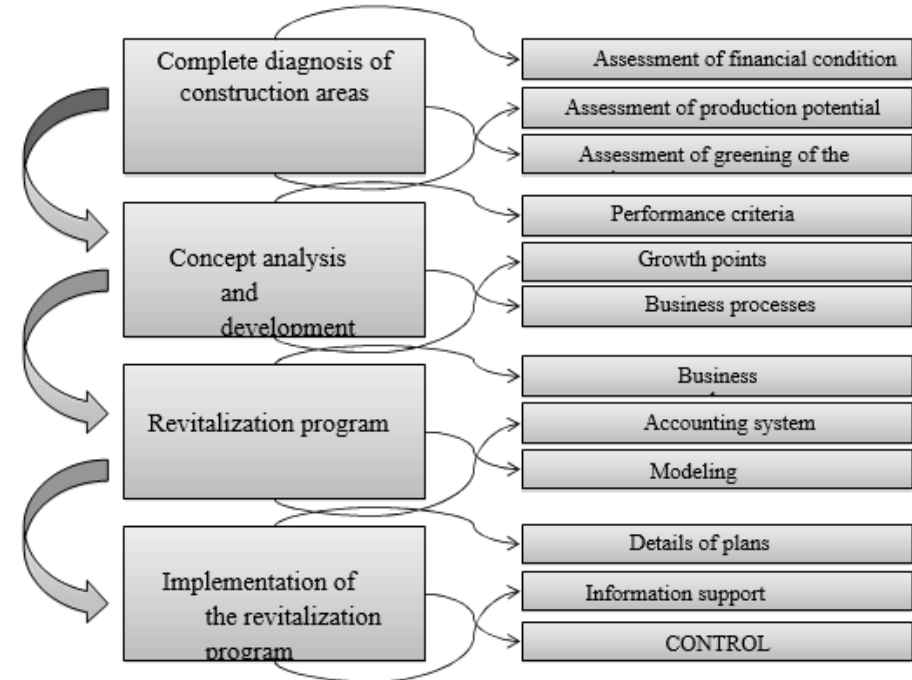


Fig. 1.5. Basic model of revitalization of revitalization building areas (author's development)

Indicators such as water utilization rates, open-loop cycles, and pollution levels help assess the environmental condition of territories and make informed management decisions. Financial indicators, such as the share of environmental costs and sanctions, also demonstrate the level of responsibility of enterprises in the field of environmental protection. The system allows for the analysis of environmental performance over time and by industry, supporting the development of effective strategies to reduce negative environmental impacts.

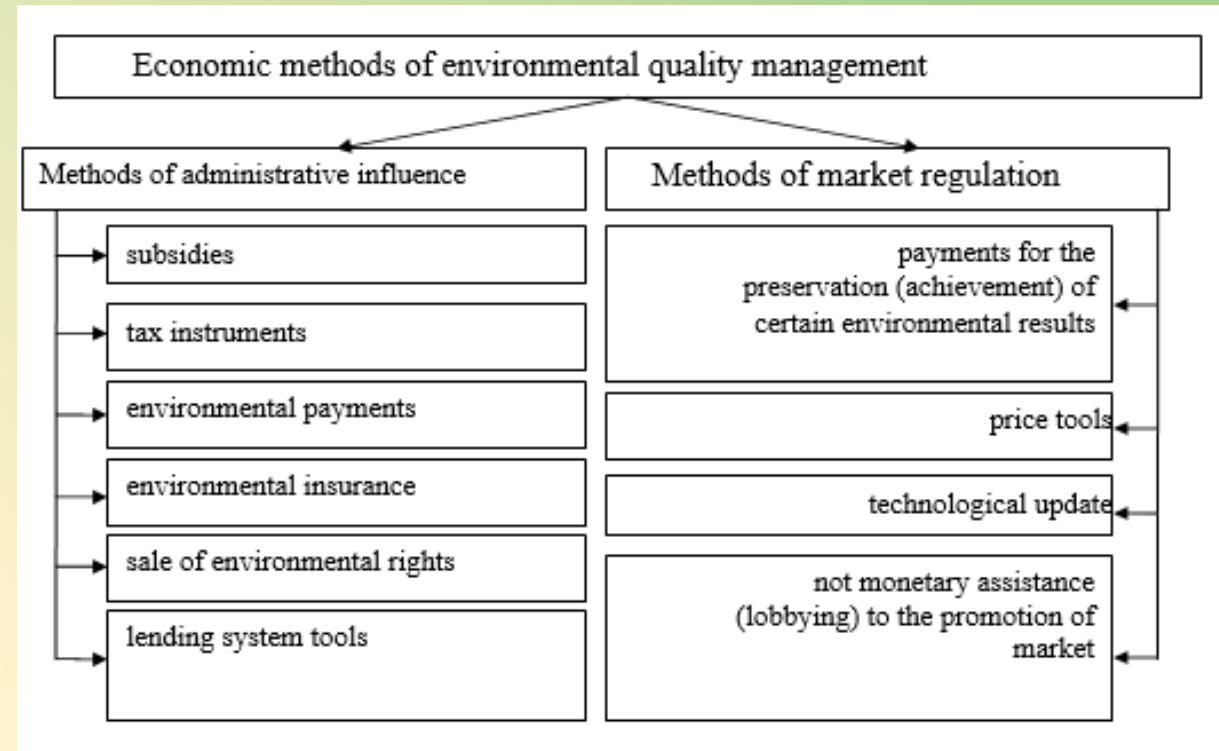
Indicators of the effectiveness of the use of financial instruments in the framework of nature protection activities and rationalization of nature use according to the data of 2013

Territory	Indicator of financing of industrial revitalization by enterprises in the volume of sold products, %	Indicator of the share of environmental sanctions in the volume of sold products, %	Indicator of ecological cost of production in the volume of sold products, %
Ukraine as a whole	0.48	0.005	0.5
Dnipropetrovsk	1.07	0.038	1.1
Donetsk	0.48	0.067	0.6
<u>Zakarpattia</u>	0.25	0.011	0.3
<u>Zaporizhzhia</u>	1.16	0.209	1.4
<u>Lviv</u>	1.15	0.330	1.5
Luhansk	1.04	0.127	1.2

In developed countries, various economic and organizational methods are used to manage environmental quality, including fines, subsidies, and other measures. The main instruments can be divided into administrative (subsidies, pollution taxes, preferential lending) and market-based (payments for environmental protection, sale of environmental quotas, environmental insurance).

To ensure effective environmental protection, pollution charges should be commensurate with environmental damage. However, experience shows that the polluter pays principle is not sufficient. A combination of administrative and market mechanisms is needed to reduce the negative impact of production on the environment.

Ukraine needs balanced economic reforms that support environmental entrepreneurship. This includes creating incentives for environmentally friendly industries, developing environmental standards, and controlling emissions. A systems approach helps to integrate economic, social and environmental aspects for effective environmental management.



The following economic mechanisms of environmental management were analyzed: Soft or catch-up:

- Liberal, with general restrictions, focused on eliminating existing environmental problems without significant impact on economic development.
- Incentive or developmental: Encourages environmentally balanced production and new technologies by providing market instruments.
- Rigid or suppressive: Uses harsh tax, credit, and administrative instruments to limit the development of certain industries and to encourage the conservation of natural resources.

The need for an organic combination of mechanisms: It is important to combine incentive and restrictive mechanisms for effective economic and environmental development in Ukraine.

Investment and innovation activities: Investment and innovation, in particular environmental technologies, are key drivers of economic growth.

Problems in Ukraine:

1. Low funding for environmental protection measures: There is insufficient budgetary funding for environmental programs, and environmental taxes are not always used for their implementation.
2. inefficient tax policy: The system of environmental taxes needs to be improved to encourage enterprises to reduce pollution.
3. Fines do not correspond to actual damages: Current fines for environmental violations are not sufficiently effective to prevent pollution.
4. Need for tax differentiation: Enterprises are not encouraged to adopt environmentally friendly production processes due to the lack of tax differentiation.
5. Insufficient support for environmental entrepreneurship: Limited privileges and subsidies for environmentally friendly enterprises reduce their motivation to innovate.
6. inefficient off-budget environmental funds: The system of extra-budgetary funds does not provide efficient financing of environmental initiatives.
- 7) Mismatch of environmental standards with real conditions: Enterprises often fail to meet environmental standards due to lack of effective control and motivation.

Reforms:

- A scientific justification for natural resource use fees should be developed. Increase the efficiency of the environmental tax and change the methods of its calculation. Support environmental funds and incentive systems for environmental initiatives.
- The “polluter pays” principle: Important for incentivizing companies to reduce pollution, and it is necessary that the pollution charge exceeds the costs of pollution reduction.
- Changes in the tax system are needed: It is important to increase the share of taxes related to environmental management to encourage the conservation of natural resources and reduce environmental damage. Thus, the main tasks are to improve the economic mechanisms of environmental management, change tax policy, and create a more efficient system of financing environmental activities.

The organizational principles of environmental safety (ES) on revitalized construction sites are based on a process-oriented approach aimed at minimizing risks to human health and the environment. This is achieved not only through technical solutions but also through management methods that ensure control at all levels of the enterprise.

International standards ISO 14000 support continuous improvement of environmental management, which enhances the reputation of companies and reduces costs. In Ukraine, environmental regulations are monitored by the State Committee for Standardization, ensuring compliance with the requirements for MPCs of harmful substances.

For revitalization projects, it is important to apply the best technologies to reduce environmental risks and improve conditions for the community.

The subject and purpose of international standards ISO 14001 and OHSAS 18001

Standard	ISO 14001	OHSAS 18000
<u>Namesystems management</u>	Environmental Management System (EMS)	<u>Systemindustrial safety management and labor protection</u>
Definition of the management system according to the standard	SEM is a part of a joint management system, which includes organizational structure, activity planning, division of responsibilities, procedures, processes and resources for development, implementation, evaluation of achieved results and improvement environmental policy	SMPBIOT is a part of the joint management system of the organization, which ensures the management of risks in the field of occupational health and safety related to the activities of the organization
The purpose of the system	Fulfillment of social and legislative requirements for the production of products and for any by-products: waste, sewage and emissions into the atmosphere	Prevention of accidents at work, prevention of health disorders caused by the working environment, provision of working conditions corresponding to the current norms and laws

Advantages of implementing SEM, SMPBIOT

(systematized by the author based on data [56])

Kinds of advantage	Advantage
Organizational	regular management; clear division of responsibility and authority between employees; coordinated interaction of processes and functions; ensuring compliance with legal requirements.
Economical	reduction of risks and related losses, including environmental payments and fines; control and optimization of resource use; increase in labor productivity; reducing the cost of eliminating non-conformities.
Reputations	advantages when participating in tenders, concluding contracts; simplification of obtaining various licenses and permits; more favorable terms of lending, insurance; increasing investment attractiveness; improvement of reputation in the eyes of consumers, suppliers, and partners.

Since environmental management systems (EMS) and industrial health and safety systems (IHS) have much in common, it is advisable for enterprises to create an integrated management system (IMS) that combines both of these systems into a single Environmental Management System (EMS). Such an integrated EMS allows to maintain the production and environment in conditions that meet the needs of people and the environment and contribute to the achievement of the enterprise's strategic goals.

The effective organization of the EMS is based on the principles of system and process approaches, complexity, strategic management, employee self-control, cost-effectiveness and the involvement of competent management. Establishing an EMS makes it possible to rationally integrate environmental safety functions into the overall enterprise management system, which contributes to both improving the quality of final products and managing environmental risks at all stages of the product life cycle.

In general, the implementation of a comprehensive EMS that combines elements of the EMS and the HSESMS allows an enterprise to reduce its environmental impact, increase its efficiency, make optimal use of resources, and create conditions for sustainable development and economic growth.

Advantages and disadvantages of enterprises implementing SUEB

Advantages of the enterprise that to environmental standards	Expenses of the enterprise in case plementation of environmental standardization
reduction of material costs due to recycling; reduction of energy intensity of production; absence of unforeseen expenses for payment of insurance policies; attracting qualified personnel; receiving more income from the sale of ecologically clean products; development of the "green" market, provision of environmental services; improving the image of the enterprise; better integration into domestic and international spaces.	lagging behind competitors in promising scientific and technical developments; anticipatory growth of material costs compared to competitors using zero-waste technologies; worse opportunities to attract investors; strict control by the authorities on the implementation of environmental standards; increase in fines for violation of standards requirements; loss of a part of consumers who want to buy environmentally friendly products; reduction of the image of the enterprise; unfavorable prospects for development.

The greening of revitalization areas in construction contributes to the creation of a sustainable socio-economic environment in the face of global environmental change and growing competition for resources.

The program-targeted method, which began to be actively used in Ukraine in 1994-1995, focuses budget expenditures on achieving long-term goals by linking funding to results. This increases the effectiveness of local budgets, especially in conditions of limited resources.

Strategic state planning based on the values of European integration requires the adaptation of management techniques to achieve national goals. Training of personnel, rotation of managers, and involvement of specialists from both the public and private sectors in the development of environmental strategies are important.

The main areas of greening industrial areas include equipment modernization, implementation of environmental standards, resource conservation, and waste management. The principles of greening include prevention, continuity, cost-effectiveness, comprehensiveness, and balance of interests.

This approach allows for the development of scientifically based requirements for environmental standards in industry, which will ensure social and economic sustainability and facilitate the integration of the national economy into the international space.

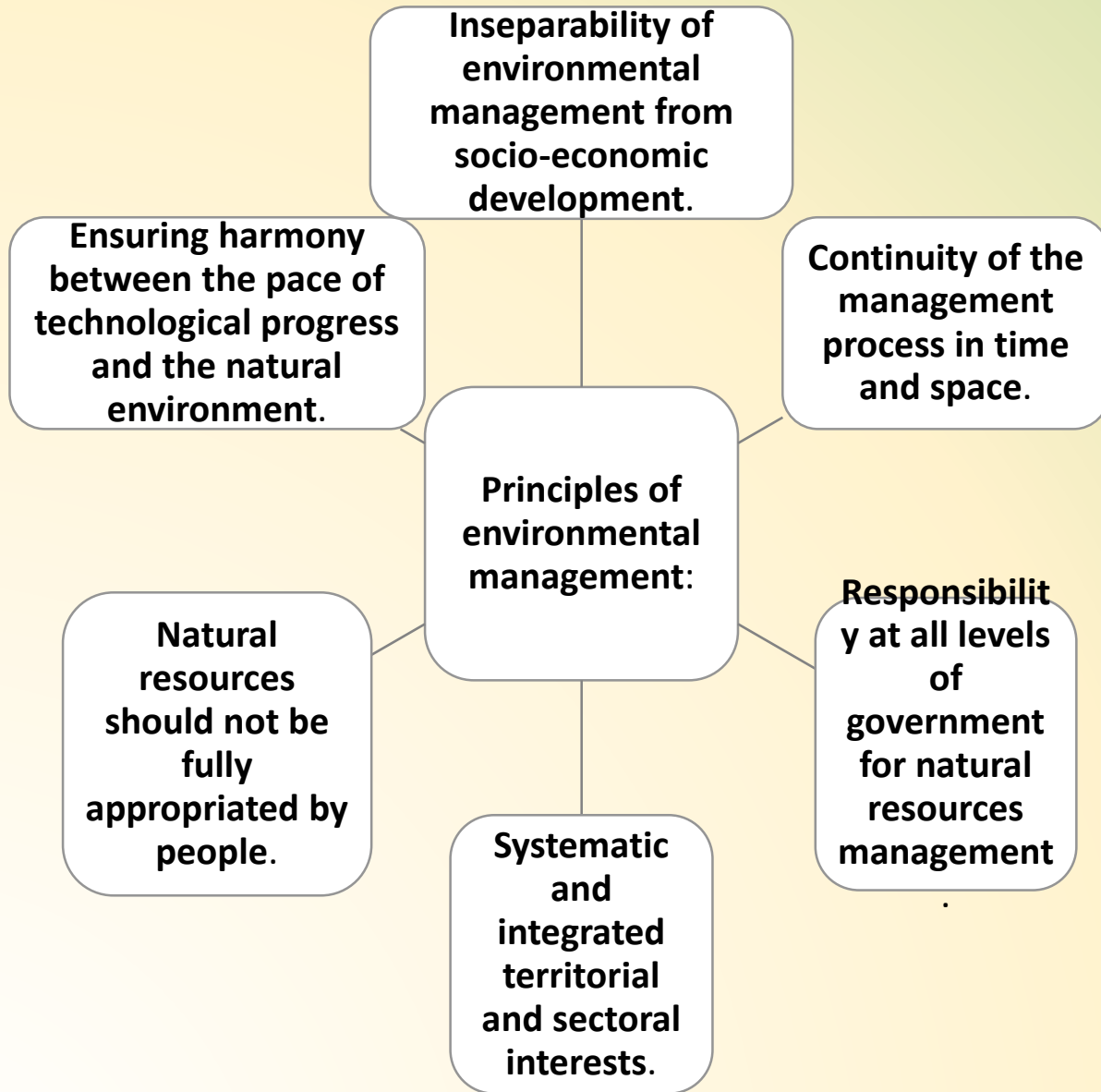
For the development of the coal industry in the BRT, it is important to use integral efficiency criteria, economic and mathematical models, and environmentally acceptable options that take into account the balance of environmental, economic, and social factors.

This can be done through three models:

1. incentive (support for environmentally friendly industries),
2. hard (restrictions on environmentally hazardous industries)
3. soft (liberal restrictions).

The objectives of environmental policy in the BRT include: prioritizing environmental safety, reducing man-made impacts, localizing and utilizing emissions, and eliminating the consequences of previous environmental impacts. This will ensure the conditions for sustainable development in three stages: overcoming the crisis, restructuring production, and improving the quality of life.

Regional management involves the targeted use of resources and the implementation of socio-economic programs focused on environmental standards and cross-sectoral integration. In general, environmental research and sustainable development planning in the BRT is an indicator of the social feasibility of environmental and innovative projects.



Environmental management as a component of socio-economic development. It is a process aimed at the rational use of natural resources and environmental protection.

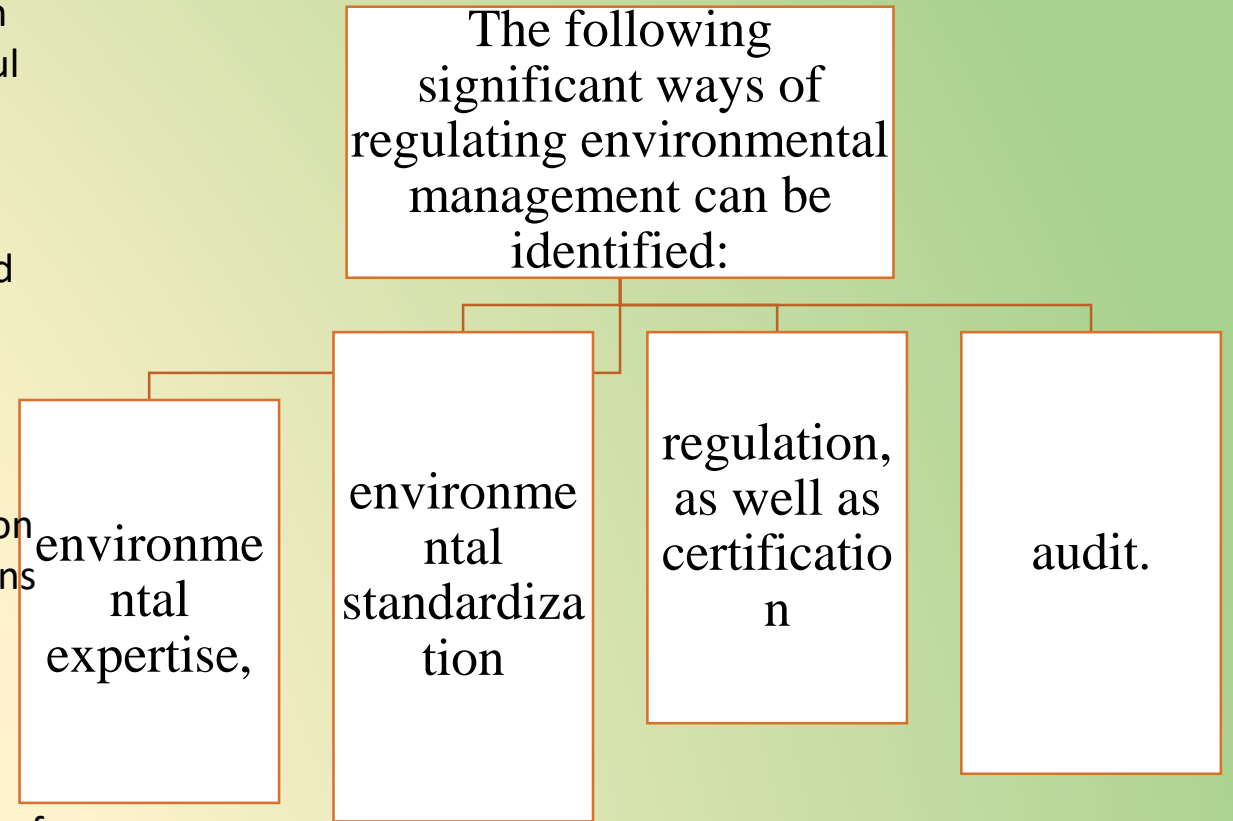
The **management mechanism** includes theoretical concepts, organisation of activities, information, methodological and legal support. Forecasting the consequences of activities that interact with the environment is an important step in ensuring sustainable development.

Environmental assessment: This is a process of assessing the environmental safety of certain territories and facilities, which allows to determine the possible negative impact of economic activity on the environment and human health. The goal is to prevent harmful effects and assess the level of environmental safety.

Environmental standardization and regulation: Establishment of mandatory rules and regulations for environmental protection and rational use of natural resources. This includes the definition of technical standards to reduce the negative impact on nature.

Environmental certification: This is a system of accounting for environmental parameters of business entities through the creation of environmental passports of enterprises. Such a passport contains information on man-made environmental impacts (emissions, discharges, waste generation) and opportunities to reduce these impacts.

Environmental audit: Assessment of the environmental condition of the territories, taking into account the impact of various factors (atmosphere, water resources, soil, technosphere). The goal is to determine compliance with environmental standards and ensure safety for the public and the environment. An environmental audit may include an analysis of the incidence of diseases and the state of ecosystems.



Methods of environmental protection can be divided into three main groups:

Organizational methods: These methods include legal and economic aspects aimed at preserving and restoring natural resources, as well as creating environmental information support for enterprises.

They include:

Legal regulation: Establishment of legal requirements for the conservation of natural resources and environmental protection, state and public control.

Economic measures: Utilization of natural resources with maximum effect, development of a system of economic assessments for rational use of natural resources, setting standards and limits for resource use and environmental impact.

Active (technological) methods: This is a set of technologies that directly affect the reduction of negative impacts on nature. They include:

Use of environmentally friendly technologies, treatment of emissions and wastewater, implementation of resource and energy-saving technologies.

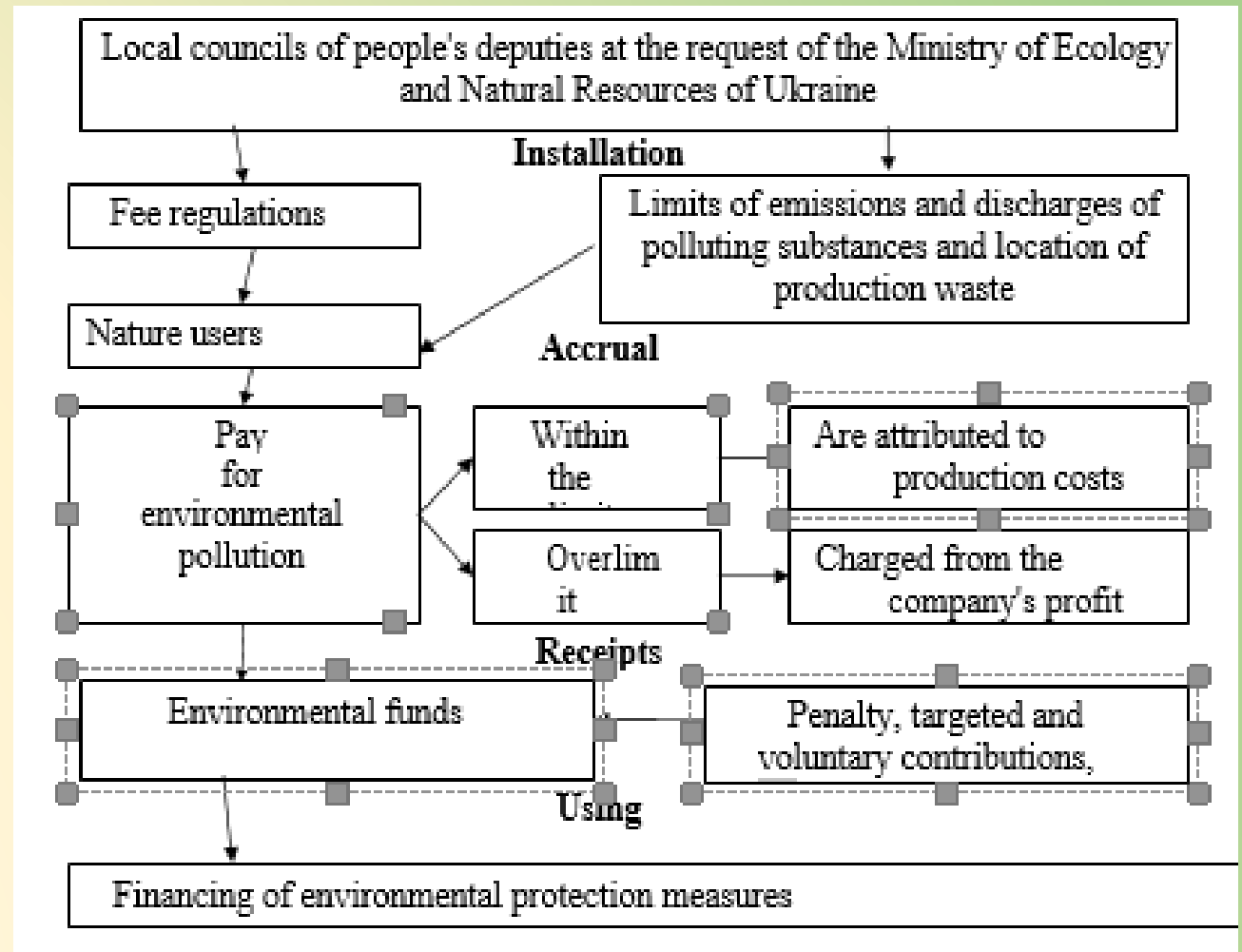
Installing a treatment system to reduce environmental pollution.

Passive (protective) methods: These methods aim to protect ecosystems from harmful impacts, often without interfering with technological processes. They include:

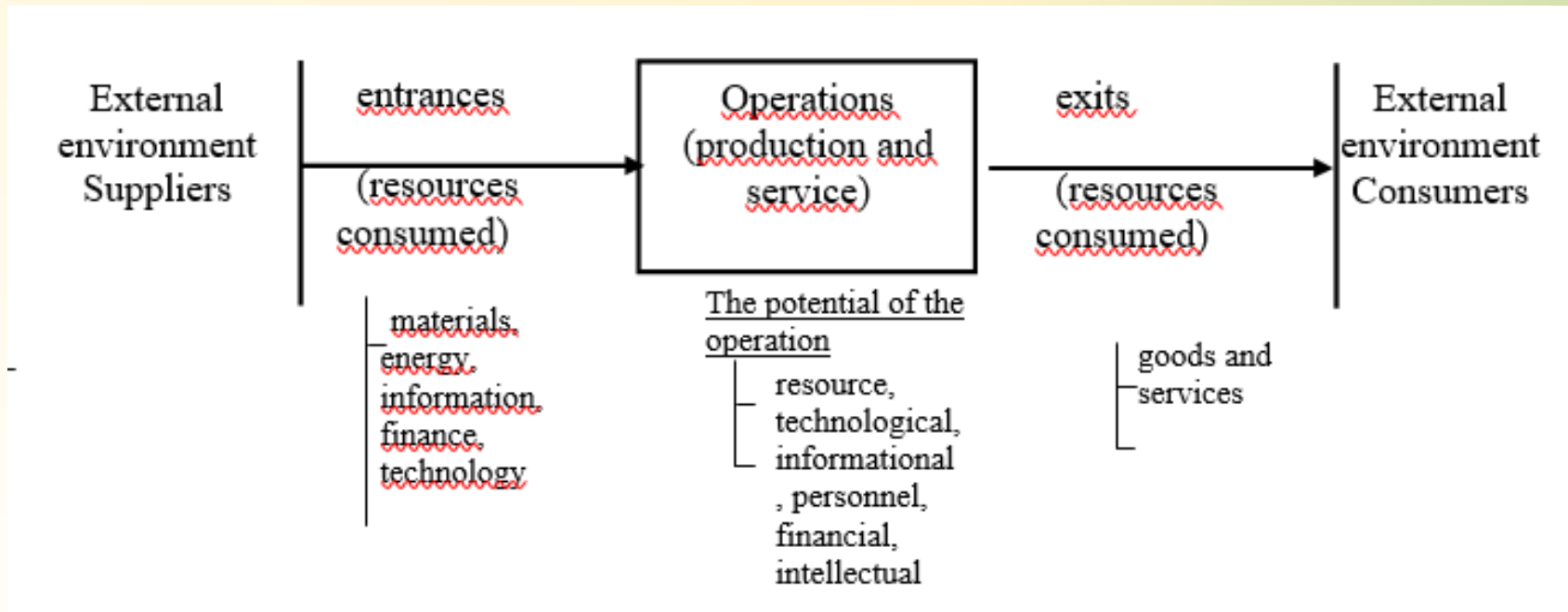
Creating natural or artificial barriers to protect areas from pollution or erosion.

Restoration of natural ecosystems and creation of protected areas.

In our opinion, active methods of combating biosphere pollution should be considered the most progressive, as they allow to minimize the mass and concentration of certain material emissions and the level of energy pollution. Active methods have a direct impact on the source of pollution, so their essence is to improve existing and develop new technological processes and equipment.



In the context of the current socio-economic development of construction areas, it is important to implement targeted environmental management based on scientific forecasting and assessment of environmental impacts. Management should ensure the efficient organization of the use of natural resources, taking into account their characteristics and qualities. The management system of construction revitalization areas should meet such requirements as flexibility and adaptability. It is based on the state's interest in the development of these territories, ensuring the achievement of strategic goals of administrative and economic development, as well as supporting civic engagement through openness and democratization of governance. This will allow the territories to be harmoniously integrated into the political, economic and organizational structure of the state.



Generalized scheme of interaction of the production process (service) with the external environment

The strategic goal of economic development should be a significant improvement in the quality of life of the population through the efficient use of resource potential and the improvement of the environmental situation. However, in order to achieve this goal, two key areas need to be implemented:

1. Ensuring the unity of reproductive macroeconomic processes: The state should create conditions for stable economic development in its territories, focusing on harmonizing economic and environmental processes to achieve sustainable development. This implies integration of different economic and environmental sectors within the territories.

2. stimulate economic interest of the territories: It is important to promote active socio-economic activity at the local level, including support for investments in sustainable development and innovative approaches to natural resource management. At the same time, this should be interconnected with environmental requirements.

For the successful implementation of these strategies, it is important to take into account the management of environmental and economic development:

- The intersection of resource and environmental cycles in inter-territorial processes.
- Clear definition of the role, functions and powers of state regulatory bodies in the field of natural resources management and environmental protection.

Such integration will allow for effective management of natural resources, sustainable economic growth, and improved environmental quality, which in turn will have a positive impact on the living standards of citizens.

Thank you for your attention!