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TECHNICAL AND ECONOMIC DIRECTIONS OF EFFECTIVE MANAGEMENT OF ECOLOGICAL RECONSTRUCTION OF PRODUCTION IN THE REGIONS OF AZERBAIJAN

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Abstract. The article studies the technical and economic concept of effective management of ecological restructuring of production in the regions of Azerbaijan. During the research, a comprehensive approach was taken to the problem and the most important principles of ecological restructuring of production were analyzed - the intensity, nature, methods of using natural resources, timely prevention of negative consequences, preservation of their scientific and aesthetic values, etc. During the analysis, the technical and economic directions of effective management of ecological restructuring of production against the background of sustainable development of regions in the country are determined. At its main stage, an improved open model of production was developed due to the improvement of technological methods in order to save natural resources and a grouping of specialized treatment facilities according to the degree of sustainability of reducing harmful emissions.

The conducted analyses show that one of the main goals of ecological restructuring of production is the creation of new technology. Taking serious measures to determine the absolute effectiveness of environmental protection measures requires the creation of treatment facilities. The article develops proposals and recommendations in this direction.

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1. Introduction

In the concept of modern economic-geographical research, the fundamental analysis factors of globalized economic-ecological processes based on scientific-practical foundations have a special political-economic position. As a result of the study, it was determined that the technical-economic apparatus and sustainable analysis of the typological structure of the management system of regional conceptual development and ecological restructuring of production have not been sufficiently reflected in scientific research. In this regard, the requirements of the conceptual direction of the modern era require, in addition to taking into account traditional research, to bring sustainable development forms to the fore. In our opinion, only a complex and systematic approach to the study of the principles of ecological restructuring of production in the form of sustainable development can yield great results.

Ecological restructuring of production is the main form of implementation of social production and metabolism under the influence of the environment, carried out against the background of sustainable development (Özal, 2019). It reflects the forms of production relations in the process of sustainable development of the economic-ecological functional structure of the country. As can be seen, ecological restructuring of production consists of a set of types of human activity, covers a fairly wide system of economic measures that have a complex impact on the environment and is directly related to industry, agriculture, and non-production sectors.

2. Material and method

The material of the study is the territorial-structural analysis of the ecological restructuring of production in Azerbaijan, the technical and economic directions of its effective management. The regions located within the territory for the economic and social development of Azerbaijan are rich in various natural resources. These resources have been rapidly mastered since the 19th century. The nature of the use of mineral raw materials, which form the basis of the development of the country's modern economy, has led to the deterioration of not only the general potential and regional ecological situation, but

also the health of the population. In this regard, when determining the management of the ecological restructuring of production within the economic-ecological system of Azerbaijan, during the study, their economic-ecological usefulness, production funds, capital investment, technical structures in recent years have been taken into account, and their differences and ratios between individual regions have been taken into account (M. Kh. Mammadov, 2014).

Modern and traditional research methods were used during the study. Factors that shape the ecological restructuring of production - natural resource potential, production traditions of the population, the initial level of economic development, and complex development paths of the territorial-production structure were taken into account.

Methodologically, sustainable development of regions has a constructive position in the territorial organization of integrated and field structures of various levels. In the course of the analysis of the ecological restructuring of production - the analysis was carried out using system-structural, mathematical-statistical, geographical information system, monitoring organization realities, other methods, as well as on the basis of various methodological materials and standards.

3. Problem statement and research results

The purpose of effective management of ecological restructuring of production is to meet the needs of the population, to further increase the efficiency of social production, to have a complex impact on the environment, and its main tasks are as follows:

Meeting the growing demand of society for natural resources;

- increasing the productivity of the natural environment, ecological reconstruction of production, its effective management;
- constantly increasing the efficiency of the use of natural resources, creating conditions for their reproduction;
- efficient and economical use of non-renewable resources.

Scientific and technological progress has repeatedly expanded the scale of modern production, significantly complicating its relationship with the environment. It requires not only the active participation of man in expanding the reproduction of natural resources, but also creates the necessary conditions for their more effective use in the interests of society, ecological restructuring of production, complex reconstruction of the environment (M. Kh. Mammadov, 2016). The two directions of the use of natural resources - management of ecological restructuring of production and reproduction of natural resources - are closely interconnected, replace each other - in the ecological restructuring of production, qualitative changes, and quantitative changes in reproduction are noticeable.

The activity of ecological reconstruction of production in society and the expansion of the reproduction of natural resources today can no longer be applied outside of environmental and nature protection issues. In fact, elements of environmental protection have already been included in the directions of ecological reconstruction of production and reproduction of natural resources. Because, the activity of ecological reconstruction of production is inseparable from solving the problems of environmental protection. Its results can create the necessary conditions for taking measures to maintain ecological balance. For example, the creation and operation of the Jeyranbatan reservoir makes the issues of protecting the waters here from industrial, agricultural, domestic and other pollutants very relevant, considering that, on the one hand, the value of the Jeyranbatan reservoir's self-purification ability is very low compared to rivers, and on the other hand, as a large reservoir, it is one of the important sources of water supply for the cities of Baku and Sumgayit.

In modern times, ecological reconstruction of production includes the reproduction of natural resources, as well as measures closely related to the protection of the living environment and natural resources, for example, the purification of wastewater and polluted air, land reclamation, and ways to eliminate sources of contamination of water and air basins. These measures cannot be equated with nature protection in particular. The purification of polluted water is already the elimination of the consequences of the negative impact that has already occurred after this protection.

On the other hand, the nature of the recycling activity is actively influenced by environmental protection issues. The effect of nature protection is closely intertwined with recycling. For example, 100 hectares of forested area in a water protection zone preserves 80.3 thousand liters of clean water. Another example is that during the burning of one ton of firewood, an average of 1.83 tons of carbon dioxide is absorbed during the photosynthesis process, 1.23 tons of oxygen are released, and 30 tons of oxygen are released from 1 hectare of pine forest per year (Bityukova, 2017).

Studies show that it is completely impossible to achieve complete protection from pollution.

Because for the existence of nature itself, pollution to a certain extent is also necessary in the environment. It is optimal pollution, it ensures the development of life, and through it the environment itself is purified. Radioactive substances such as uranium, radium, thorium, etc. found in groundwater on the Absheron Peninsula were formed naturally and artificially. The level of radioactive pollution has increased significantly due to the development of oil production and other sectors of the economy here. This has led to a disruption of the balance of natural pollution. In areas where oil product waste accumulates excessively, radioactive substances accumulate in the soil and groundwater, and radon gas is released. When radon is in high concentration, it creates conditions for the development of cancer. However, the Boyuk Shor Lake, which is fed by oil waste water, was used by the discontinued Baku Iodine Plant to obtain iodine. These layer waters are rich in radionuclides - radium-226, thorium-228 and potassium-40. Undoubtedly, all this waste poses an ecological threat to the environment. In addition, several sanatoriums on the Absheron Peninsula use radon-rich groundwater for treatment.

It should be noted that environmental protection is carried out in a variety of ways. However, in a number of literature sources, one can find environmental protection methods such as active, passive, direct, and cross-cutting, which are concepts used by various researchers.

In our opinion, the impact of measures to protect the natural environment is most likely related to the solution of the problem, the most complex approach. In modern times, along with other national economic complexes, complex environmental protection also exists objectively. It combines organizations, departments, and enterprises engaged in nature protection activities.

It has been established that the solution of environmental protection issues can be carried out only on the basis of organizing scientifically substantiated monitoring of the environment. It is mainly used in solving issues related to the ecological restructuring of production and the reproduction of natural resources (Ivanova, 2021). It is known that monitoring is a developed system of observation and control over the modern state of the environment carried out on various scales. There is an idea of conducting it in several stages.

In practice, bioecological-sanitary-hygienic monitoring is widespread. Its main task is observations of the natural environment from the point of view of population health. Then there is geosystem, or geoecological, that is, natural-economic monitoring. Its content is observation of changes occurring in the geosystem as a result of anthropogenic impact, as well as ecological reconstruction of production in the natural-technogenic system (R. M. Mammadov, 2019).

The analysis of the obtained data shows that a new electronic operational information base has been created from the data obtained within the framework of monitoring work carried out in the activity zones of oil and gas production departments on the Absheron Peninsula. The ecological database reflects the land areas contaminated with oil and other wastes and submerged in strata waters on the Absheron Peninsula and the depth of their contamination with precise coordinates. All this allows for more effective research and the results obtained make it possible to manage economic and environmental problems.

According to scientific sources, the protection of nature and the development of the means of production cannot be opposed. In the development of production, the means of production require the mandatory consideration of ecological principles and factors (Nuriyev, 2017). Therefore, the ecological reconstruction of production areas is meaningless without the reconstruction of all its links. This process is inextricably linked with scientific progress, it is its mandatory requirement.

One of the main goals of socio-economic development of regions in our country is the ecological reconstruction of society as a whole, including production. Ecological reconstruction of production is a multi-stage process of combining the advantages of a market economy with the use of the most important directions of the achievements of scientific and technical progress. Its main stage is the restructuring of technological methods in order to save natural resources, the creation of only improved open models of production and the reduction of harmful emissions, the creation of specialized treatment plants (M. Kh. Mammadov, 2014).

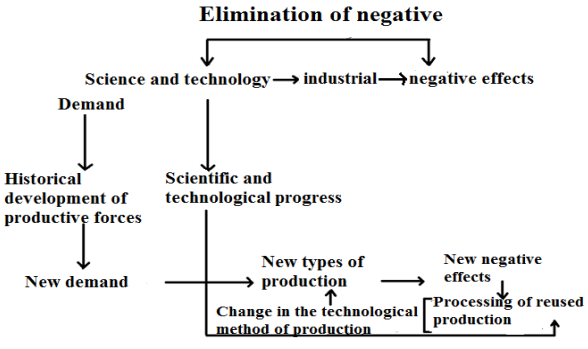


Fig. 1. The interaction of scientific and technological progress and production
Source: Prepared by the author

Ecological restructuring of production, the application of low-waste and closed technology in its further development involves the organization of the use of waste from one enterprise by another, as well as the utilization of the required waste. At the highest stage of the restructuring of production is a complex system of waste-free production - an industrial analogue of the ecosystem. Natural assimilation, or special plants for the processing of materials suitable for economic use, all industrial and household waste, and then their completion with the maximum expansion of production relations between territorial-production complexes based on a closed system of "natural-technogenic complexes" (M. Kh. Mammadov, 2020).

It is necessary to note the experience gained in the implementation of a complex waste-free system of elements in the studies, the closed technological system, the organization of direct use of production waste at enterprises, and the full processing of semi-finished products with the application of a closed technological system. Thus, in the former Soviet period, conditions were created in our country for the production of sulfuric acid, alcohol, and styrene from the waste of the Sumgait synthetic rubber plant in connection with the transition to a closed technological process, which ensured an additional annual increase in the efficiency of enterprises.

Analysis of the obtained data shows that if in the 70s of the 20th century, the water consumption in the Baku oil refineries according to the project reached 8 m^3per 1 ton of product, then in the mid-80s of the same century, the water demand was reduced by 10 times. Currently, the ecologically reconstructed Baku oil refineries, the water consumption does not exceed 0.06 m^3.

Now, the capacity of water circulation and reuse systems has been increased in a number of production facilities, and non-flowing water use systems have been developed and developed at the facilities. In fact, not even 1 m^3 of wastewater is discharged at the chemical facilities of Sumgayit, that is, water use has a closed cycle. As a result, a 35-40% reduction in water collection from water bodies has been achieved at the facilities, while at the same time increasing production by 25-30% (R. M. Mammadov, 2019).

Ecological reconstruction of modern production is not only a matter of low-energy or waste-free technology, but also of the corresponding reconstruction of the entire planning system and private enterprises. At present, the solution of environmental problems within the framework of the production system is primarily associated with the improvement of two directions, which are:

1) the economical, comprehensive use of natural resources, primarily mineral raw materials, water;

2) the limitation or elimination of negative impact on the environment in the production process.

In recent years, along with the traditional directions of efficient use of natural resources, the directions of nature protection in production systems have also shown themselves at a high level. However, the work carried out formally does not immediately yield noticeable profits, but first of all aims to protect the resources necessary for human life and standard conditions of modern production - clean air, water, soil, prevent the depletion of water, forest, fish, etc. resources. This often leads to a direct effect in the direction of nature use that is not noticeable.

Due to the development of modern production and the growth rate of production funds, specialized funds for eliminating the negative impact of the economy have increased in recent years. In addition, at the beginning of the 21st century, the specific weight of expenditures allocated to environmental protection in the total volume of investment has been steadily increasing all over the world (Bityukova, 2017). For example, in Western countries, especially in the United States, the specific weight of investments allocated to environmental protection is quite significant in a number of industrial sectors: 20-25% in ferrous metallurgy, 25% in the pulp and paper industry, 20% in non-ferrous metallurgy, as well as in the production of building materials, oil refining, chemical industry, electric power, in Japan, the share of environmental protection expenditures in the volume of investment expenditures of industrial sectors is most significant in the oil refining industry, thermal power engineering, and mining industries.

In recent years, the share of environmental costs in capital investment and operating costs in industrial production in Azerbaijan has been steadily increasing. This has increased from 30.8 thousand manats in 1991 to 387 million manats in 2019 (State Statistical Committee of the Republic of Azerbaijan, 2020). There has also been a steady increase in funds allocated to fixed capital for the efficient use of natural resources and environmental protection. While 9.2 thousand manats were spent on these purposes in 1991, this amount has reached 350 million manats in recent years. It is characteristic that the expenses incurred on environmental protection, compared to the average expenses incurred on all areas of material

production, fall most heavily on the share of the more rapidly developing oil industry, energy, chemical, and petrochemical industries. It should also be taken into account that the excess in the chemical and petroleum industry is 2.8 times, and in the power industry 2.3 times (Socio-economic development of the regions, 2016).

According to a rough estimate, capital expenditures for environmental protection in the thermal and electric power sector amount to 13.5 manats per 1000 kv. In the Ganja non-ferrous metallurgy complex, capital investments in water and air purification amount to 6-8% of total capital expenditures. In a number of other areas of the processing industry, up to 20-25% of the purification investment is planned.

One of the most important criteria for the application of new technology is its ecological reconstruction compared to previously applied technology, especially in terms of reducing harmful emissions per unit of production. However, the degree of ecological purity of a new technical model cannot be viewed in the abstract, outside the areas where it is regionally or locally distributed.

In this regard, a comprehensive assessment of the volume of pollution is one of the most important stages in the solution of the adopted methods for achieving maximum efficiency of environmental costs, or rather, the costs of implementing environmentally friendly equipment. This will allow the use of new equipment in the national economy, in the territorial-production complexes of the regions, and its service throughout the entire projected period. In this regard, many indicators have been used to achieve the effectiveness of environmental costs.

$$\mathbf{Q_{yt} \leq Q_{çk} \cdot X_{ts} \cdot P_{om}}$$

Here $\mathbf{Q_{yt}}$ −the expected volume of pollution when using a new technique; $\mathbf{Q_{çk}}$ - the mass of pollution resulting from the use of one technique or a single technological process per year; $\mathbf{X_{ts}}$ −the number of existing techniques used in the country's economy per year; $\mathbf{P_{om}}$- the predicted average service life of new techniques. In our country, when eliminating possible deterioration of the ecological situation of production, the following conditions should be expected. That is, when replacing an old technology with a new technology, the deterioration with the new technology should be smaller than the deterioration with the old technology $\mathbf{(Q_{new\ tec.} < Q_{old\ tec.})}$. In exceptional cases, the deterioration with the new technology may be equal to the deterioration with the old technology $\mathbf{(Q_{new\ tec.} = Q_{old\ tec.})}$.. If these requirements are not met, the existing models will need to be progressively improved.

Thus, one of the main goals of ecological restructuring of production is the creation of new technology. It should also be noted that the allocation of costs and their application is not an easy task. In this regard, it is proposed to either allocate a new model in the composition of a technological circle with a special ecological purpose, or to solve existing new models, taking a conditional share of the problem as a whole, corresponding to the urgency of ecological problems.

The determination of the absolute effectiveness of environmental protection measures, the application of ecologically reconstructed equipment and the disclosure of the sequence of capital invested in environmental protection in various sectors of the economy. All this leads to the necessity of including in economic calculations of losses or negative effective indicators, the results of economic activity.

4. Consecuence

The principles of the methodology of the economic-ecological approach to the territorial organization of the means of production, which affects the socio-economic development of Azerbaijan, are based on the concept of the mutual influence of society and the natural environment. For the effective management of the processes of ecological reconstruction of production, the economic-ecological problems of society can be solved only as a result of the correct implementation of economic policy:

- The economic-ecological approach involves the analysis of various phenomena and processes aimed at clarifying the objectively existing economic-ecological systems, the set of elements that make them up, and their mutual relationships. A complex approach to solving economic-ecological problems determines the impact of measures to achieve the most efficient use of natural resources;

- Environmental protection cannot be opposed to the development of the means of production, and without ecological reconstruction of social production, production cannot develop in the future. Ecological reconstruction of production is understood as the process of sequential implementation of technologies, management systems and other decisions that allow increasing the efficiency of the use of natural resources in connection with improving the quality of the environment.

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AZƏRBAYCANIN REGİONLARINDA İSTEHSALIN EKOLOJİ CƏHƏTDƏN YENİDƏN QURULMASININ EFFEKTLİ İDARƏ EDİLMƏSİNİN TEXNİKİ-İQTİSADİ İSTİQAMƏTLƏRİ

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Xülasə: Məqalədə Azərbaycanın regionlarında istehsalın ekoloji cəhətdən qurulmasının effektli idarə edilməsinin texniki-iqtisadi konsepsiyası tədqiq edilir. Tədqiqat zamanı problemə kompleks yanaşılmış və istehsalın ekoloji cəhətdən yenidən qurulmasının ən mühüm prinsipləri - təbii resursların istifadəsinin intensivliyi, xarakteri, üsulları, mənfi nəticələrinin vaxtında qarşısının alınması, onların elmi və estetik dəyərlərinin saxlanılması və s təhlil edilir. Təhlil zamanı, ölkədə regionların dayanıqlı inkişafı fonunda istehsalın ekoloji cəhətdən yenidən qurulmasının effektli idarə edilməsinin texniki-iqtisadi istiqamətləri müəyyən edilir. Onun başlıca pilləsində təbii resurslara qənaət məqsədilə texnoloji üsulların təkmilləşdirilməsi hesabına istehsalın yaxşılaşdırılmış açıq modeli və zərərli tullantıların azaldılmasının dayanıqlıq dərəcəsinə görə ixtisaslaşdırılmış təmizləyici qurğuların qruplaşdırılması aparılmışdır.

Aparılan təhlillər göstərir ki, istehsalın ekoloji cəhətdən yenidən qurulmasının əsas məqsədlərindən biri, yeni texnologiyanın yaradılmasıdır. Ətraf mühitin mühafizəsi tədbirlərinin mütləq effektivliyinin müəyyənləşdirilməsi üçün ciddi tədbirlərin görülməsi, təmizləyici qurğuların yaradılmasını tələb edir. Məqalədə bu istiqamətdə təkliflər və tövsiyyələr işlənilmişdir.

Açar sözlər: *istehsalən ekoloji cəhətdən yenidən qurulması, dayanıqlı inkişafı, təbii resursların idarə edilməsi, təmizləyici qurğular, texniki-iqtisadi istiqamət*

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