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RESEARCH ON THE ADVERSE ENVIRONMENTAL IMPACT OF THE MINING INDUSTRY

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ABSTRACT

This paper examines the complex issue of assessing environmental damage from mining and metallurgy industries. It outlines methodologies for determining economic losses due to pollution, emphasizing factors such as impact magnitude, susceptibility of objects, and current conditions. Three main calculation methods are discussed: investigating technological impacts, regression analysis, and the control area method. Sustainable resource management necessitates a deep understanding of pollutants' properties and specialized analytical tools. Environmental pollution arises from production processes and accumulated emissions, affected by geological and meteorological factors. The comprehensive processing of technogenic raw materials (TMX) is crucial for reducing pollution and diversifying products. Effective resource management requires integrating technical, economic, and ecological indicators, alongside modern technology and conservation measures. However, outdated infrastructure and management practices pose challenges. Harmonizing management mechanisms with legislative frameworks and resource strategies is essential. Ultimately, addressing environmental concerns while maximizing resource utilization relies on cohesive technical, technological, and ecological systems driven by scientific and technical progress.

Keywords: emission, geological and meteorological factors, regression analysis.

Assessing the damage to the environment from the technological impacts of the mining and metallurgy industries is considered a complex issue. The methodology for determining the economic losses caused by environmental pollution requires considering three main groups of factors:

a) the magnitude of the impact;
b) the object's susceptibility to the impact;
c) the current situation.

The determination of the economic loss caused by environmental pollution involves taking into account three groups of factors:

The first group of factors includes the concentration, toxicity, and harmfulness of the harmful substances released into the environment, as well as factors that exacerbate the impact on the environment (such as air quality, wind direction, and the chemical composition of emissions).

The second group of factors includes objects such as facilities, populations, residential areas, land, water sources, vegetation, wildlife, resorts, and recreation areas.

The third group consists of factors related to the current situation, including the volume of investments, the areas exposed to damage, and the products produced from mining and metallurgy activities.

Three main methods are primarily used to calculate the damaging effects on the environment:

a) the method of investigating the consequences of technological impacts;

b) regression analysis or empirical dependencies method;

c) the control area method.

The first method focuses on the exploitation of natural resources in contaminated areas. The second method is based on regression analysis and allows estimating environmental pollution using empirical relationships.

The control area method aims to determine the actual damage to the environment in a specific area. However, the application of this method is subject to certain difficulties, as it requires collecting and analyzing a considerable amount of information.

In general, sustainable use of natural resources should be based on complex scientific research. Determining the damage caused by the exploitation of mineral resources requires a deep understanding of the polluting properties of technological emissions.

For this purpose, it is necessary to assess the initial and repeat emissions from mining and metallurgy industries from both technological and ecological perspectives.

It should be noted that special tools and analytical methods are used to determine the quality indicators of initial raw materials, concentrates, and emissions.

Tool methods determine the quantity of emissions through individual tests conducted by various institutions. The analytical method determines the volume of emissions based on spatial and temporal indicators.

Environmental pollution in the mining and metallurgy industry originates from two main sources:

a) directly from the production technological processes;

b) from technological emissions accumulated around facilities and landfills over many years.

It should be noted that the quantity, composition, and structure of emissions depend not only on the mineralogical and physicochemical nature of the deposit but also on the geographical and meteorological conditions.

Thus, the complex utilization of primary materials and emissions from mining and metallurgy industry facilities in the Republic of Azerbaijan can address three major issues:

- increasing the share of local raw materials in production processes;
- eliminating factors that pollute the environment;
- increasing the variety of products produced with minimal financial and material costs.

the complex processing of TMX (technogenic raw materials) in the mining and metallurgy industries can be shown as in the figure 1:

As the diagram shows, the complex processing of TMX (technogenic raw materials) should be carried out using modern technology, emphasizing the importance of nature conservation measures.

The rational use of TMX not only has significant technical and technological importance but also has significant socio-economic and environmental importance. In this context, the complex processing of emissions requires the formation of a system of technical, economic, and ecological indicators. In our opinion, the following indicators can be included in this system (Figure 2).

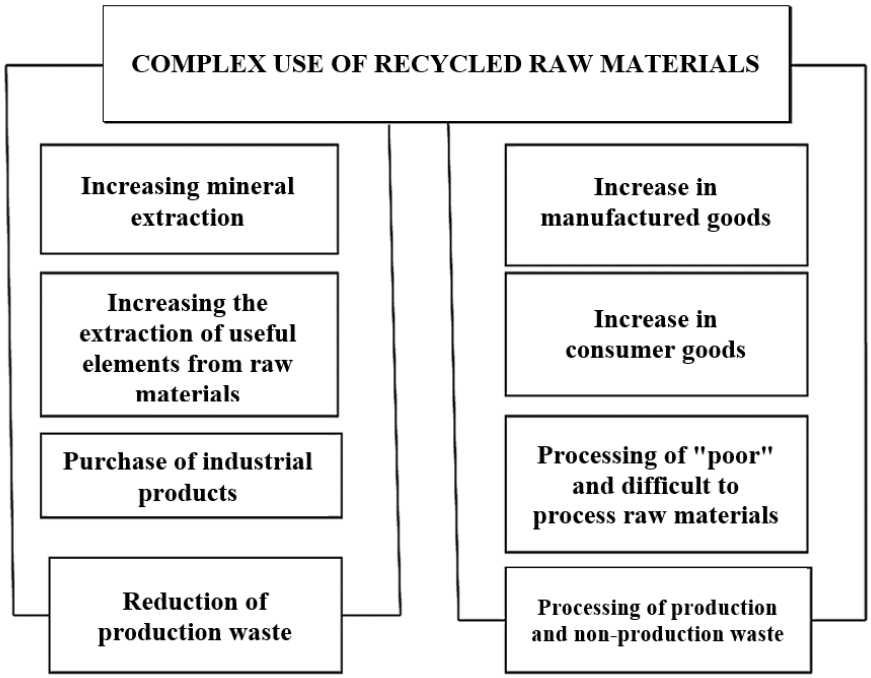

Figure 1. Scheme of complex use of recycled mineral raw materials

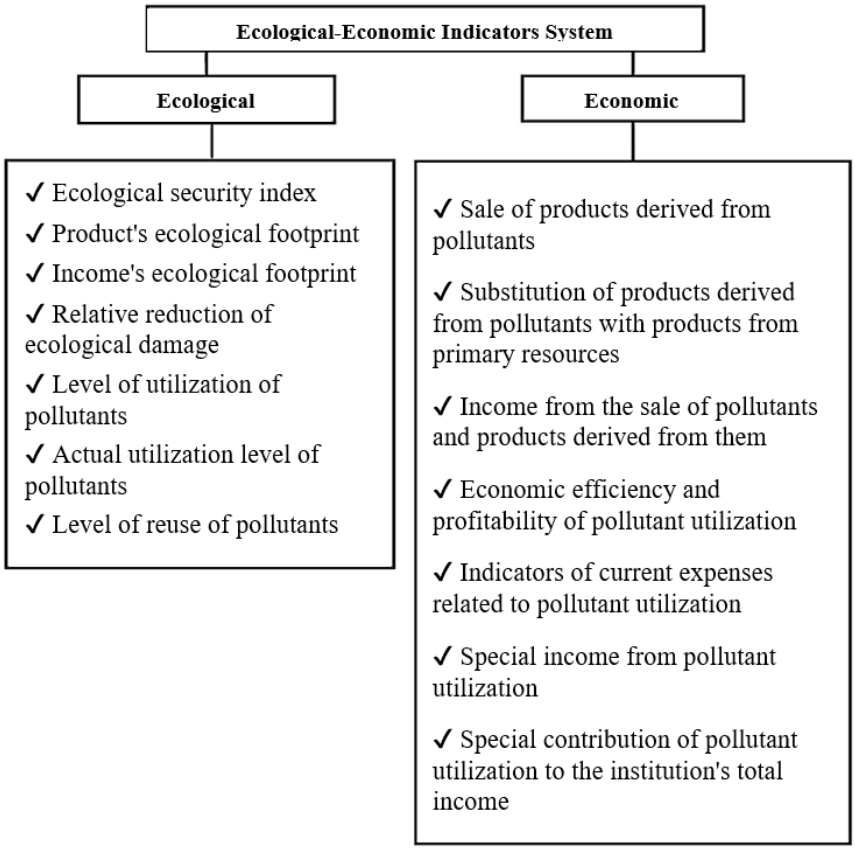

Figure 2. Technical, economic and ecological indicators of complex processing of TXM

It is clear that there is a close relationship between the rational use of emissions and the technical equipment and processing technology of facilities. Unfortunately, in our country, the main assets of mining enterprises are mostly morally obsolete or completely worn out. And old technical and technological processing methods significantly increase the amount of emissions in production processes.

The application of modern management methods in the field of processing TMX is also one of the main issues. Here, two main mechanisms of activity should interact: ensuring legislation and a system for the rational use of natural resources.

The structure of the management mechanism for the comprehensive utilization of natural resources is presented in Figure 3.

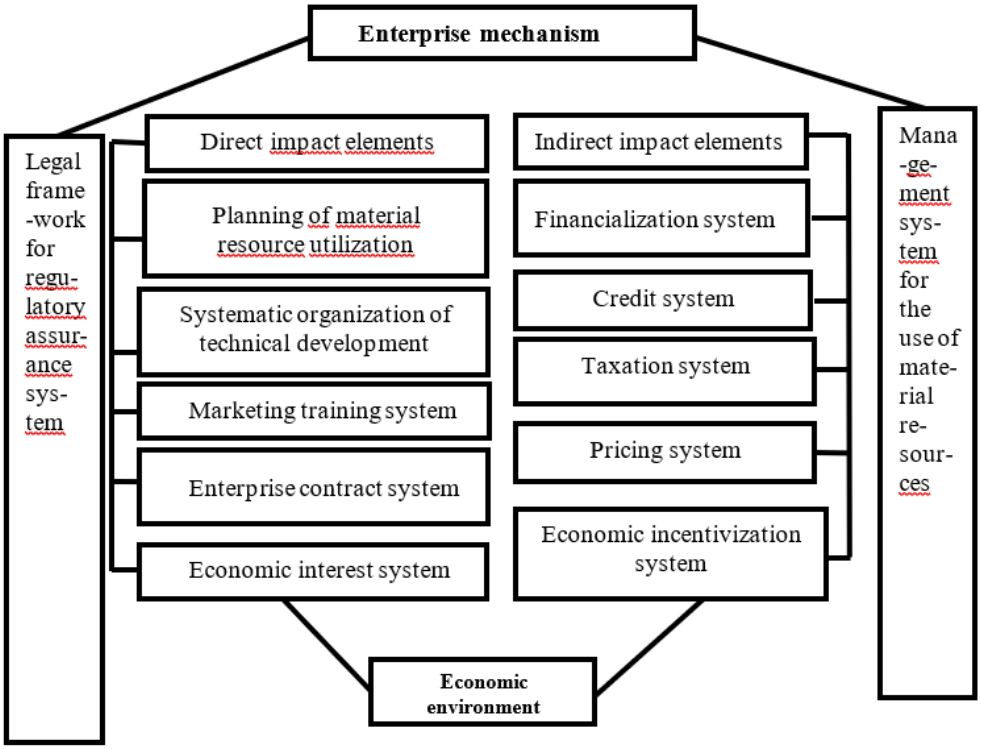

Figure 3. Management mechanism of complex use of natural resources.

Thus, the reprocessing of primary materials and emissions and the protection of the environment are interrelated technical, technological, and ecological systems. These systems, which play a crucial role in various aspects of economic activity, can only develop based on the achievements of scientific and technical progress.

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ƏTRAF MÜHİTƏ DAĞ-MƏDƏN SƏNAYƏSİNİN MƏNFİ TƏSİRİNİN TƏDQİQATI

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XÜLASƏ
Bu məqalə dağ-mədən və metallurgiya sənayelərindən ətraf mühitə dəymiş ziyanın qiymətləndirilməsini araşdırır. Çirklənmə ilə bağlı iqtisadi itkilərin müəyyən edilməsi metodologiyalarını təsvir edir, təsirin miqyası, obyektlərin həssaslığı və mövcud şərait kimi amilləri vurğulayır. Üç əsas hesablama metodu müzakirə olunur: texnoloji təsirlərin tədqiqi, reqressiya təhlili və nəzarət sahəsi. Davamlı resursların idarə edilməsi çirkləndiricilərin xassələrinin və xüsusi analitik vasitələrin dərindən başa düşülməsini tələb edir. Ətraf mühitin çirklənməsi geoloji və meteoroloji amillərin təsirinə məruz qalan istehsal prosesləri və yığılmış emissiyalar nəticəsində yaranır. Texnogen xammalın (TMX) hərtərəfli emalı çirklənmənin azaldılması və məhsulların şaxələndirilməsi üçün çox vacibdir. Effektiv resursların idarə edilməsi müasir texnologiya və mühafizə tədbirləri ilə yanaşı, texniki, iqtisadi və ekoloji göstəricilərin inteqrasiyasını tələb edir. Bununla belə, köhnəlmiş infrastruktur və idarəetmə təcrübələri problemlər yaradır. İdarəetmə mexanizmlərinin qanunvericilik bazaları və resurs strategiyaları ilə uyğunlaşdırılması vacibdir. Nəticə etibarı ilə resursdan maksimum istifadə etməklə ekoloji problemlərin həlli elmi-texniki tərəqqi ilə idarə olunan vahid texniki, texnoloji və ekoloji sistemlərə əsaslanır.
Açar sözlər: emissiya, geoloji və meteoroloji amillər, reqressiya təhlili

ИССЛЕДОВАНИЕ НЕБЛАГОПРИЯТНОГО ВОЗДЕЙСТВИЯ ГОРНОЙ ПРОМЫШЛЕННОСТИ НА ОКРУЖАЮЩУЮ СРЕДУ

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АБСТРАКТ
В данной статье рассматривается сложный вопрос оценки экологического ущерба на горнодобывающую и металлургическую промышленность. В нем излагаются методологии определения экономических потерь из-за загрязнения с упором на такие факторы, как

масштаб воздействия, восприимчивость объектов и текущие условия. Обсуждаются три основных метода расчета: исследование технологического воздействия, регрессионный анализ и метод контрольной зоны. Устойчивое управление ресурсами требует глубокого исследования свойств загрязнителей и специализированных аналитических инструментов. Загрязнение окружающей среды возникает в результате производственных процессов и накопленных выбросов под воздействием геологических и метеорологических факторов. Комплексная переработка техногенного сырья имеет решающее значение для снижения загрязнения и диверсификации продукции. Эффективное управление ресурсами требует интеграции технических, экономических и экологических показателей наряду с современными технологиями и мерами по сохранению. Однако устаревшая инфраструктура и методы управления создают проблемы. Важное значение имеет гармонизация механизмов управления с законодательной базой и стратегиями использования ресурсов. В конечном счете, решение экологических проблем при максимальном использовании ресурсов зависит от сплоченных технических, технологических и экологических систем, движимых научно-техническим прогрессом.
Ключевые слова: выбросы, геологические и метеорологические факторы, регрессионный анализ