Assessment of the level of environmental innovation in industrial production and information and communication sphere

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Abstract. The article analyzes environmental innovations in industrial production and information and communication activities. Because of the analysis of the indicators, it was revealed that technological innovations in all considered areas of activity do not exceed 10%, and environmental innovations in industrial production reach 16%, in the information and communication sphere, they do not exceed 3-4%. The study found that such a situation indicates that not all enterprises have adopted a sustainable development policy and ensure the preservation of the environment for future generations. The analyzed indicators for the control of environmental pollution by various enterprises that use the tools of the information and communication sector in this matter are carried out only on a part of enterprises. At the end of the study, measures were proposed to enhance innovation in the field of ecology in all spheres of activity and industries.

1. Introduction

In recent decades, issues of ensuring sustainable development are gaining more and more interest, since achieving a balance between production, society and the environment is a modern need for industrial production and humanity. Today, there is an increase in the consumption of various resources and goods, which requires production complexes to increase the capacity and volumes of consumed raw materials and, therefore, increase the volume of negative impact on the environment. The production of goods and services consists not only in the consumption of natural resources, but also in the volume of environmental pollution, for example, the amount of emissions of pollutants into the atmosphere, the formation of municipal solid waste, the discharge of wastewater, and more [1-2].

Pursuing a policy in the field of innovative development is a relevant trend for all areas of activity, for example, as a result of the introduction of innovative technologies, the amount of consumed resources is reduced, operating costs are reduced, the quality of products increases, the volume of negative impact on the environment is reduced, technological processes are optimized and other. However, almost all innovative technologies have a positive effect on the environmental component,
but, in all areas of activity and industries, environmental innovations are introduced, which are aimed at preserving the environment and reducing the negative impact of various factors on the natural system [3-5].

The present study, in the opinion of the authors of the work, is devoted to the analysis of environmental innovations in industrial production and the information and communication sphere of activity, as well as the use of information and communication technologies as a tool in matters of environmental pollution control. Of course, in order to achieve qualitative changes in environmental conservation issues, it is advisable to propose a set of mechanisms that ensure the technical and technological development of the spheres of activity and industries.

2. Materials and methods
The purpose of this study is to assess environmental innovation in industrial production and information and communication activities. The following tasks were set in the work:

- Analyze the level of environmental development of industrial production and information and communication companies;
- Propose measures aimed at achieving environmental safety at industrial enterprises.

In the study, scientific methods and approaches were used, and information posted in open sources was used as an information base, which ultimately made it possible to reveal the goal and objectives of the study.

3. Results
The policy in the field of innovative development in the Russian Federation began about 10 years, which consisted in the transition to qualitatively new technologies in order to achieve a balance of production and consumption in all areas of activity. Implementation of innovative development requires large expenditures from industrial organizations, the availability of the necessary research and design centers, technological capabilities for introducing innovative products into the production process, and much more [6-7]. Because the policy in the field of innovative development in the state has existed for a sufficiently long period, it is advisable to present indicators that implement technological innovation (figure 1) [8].

![Figure 1](image_url)

**Figure 1.** The share of organizations implementing technological innovations in the total number of organizations, as a percentage.
The figure shows that the share of organizations that carry out technological innovations in industrial production and in the information and telecommunications sphere is decreasing every year, while it should be noted that only 10% of organizations carry out technological innovations, which indicates the absence of breakthrough technologies in innovation sphere.

Technological innovations affect all areas of industrial production and make it possible to ensure a high-quality transition of the industry to a new path of development, and environmental innovations are aimed at preserving the environment, reducing the volume of wastewater discharges, the formation of industrial waste, etc., in this connection, it seems it is necessary to consider the volume of environmental innovation (figure 2)[8].

![Figure 2](image_url)

**Figure 2.** The share of organizations carrying out environmental innovations in the total number of organizations that have had ready-made innovations over the past three years, as a percentage.

The figure shows that the volume of environmental innovations is significantly higher than technological innovations in industrial production, and in information and telecommunications activities, the indicators do not exceed 3-4%, which indicates the absence of a policy in the field of environmental innovations in information and telecommunications activities. It should be noted that industrial production has a constant impact on the environment, and the information and telecommunications sector practically does not affect the natural system. It is also worth noting that there are no breakthrough technologies in the field of environmental safety and rational nature management in industrial production.

Further, it seems interesting to consider the areas of activity that use various tools of the information and telecommunications sector as control over environmental pollution (figure 3) [8].

The figure shows that control over environmental pollution occurs in some areas of activity only by a quarter, and in some it does not exceed 10% of the indicators for pollutant emissions. Undoubtedly, such a situation indicates that in Russia there is practically no full control over environmental pollution in all spheres of activity.

In order to solve this problem, in our opinion, it is necessary to use modern information, communication and digital technologies, which will allow full monitoring of the work of industrial enterprises and ensuring timely response due to the occurrence of exceeding the maximum permissible concentrations in the atmosphere, volumes of emissions of solid household waste and sewage into water bodies.
4. Discussion

In the opinion of researchers, the provision of environmental safety and rational use of natural resources cannot be imagined without transforming the types of activities, individual technological processes and accepted norms for the consumption of natural resources. In this regard, environmental innovations should be aimed not only at capturing pollutants emitted into the atmosphere and purifying wastewater, but at preventing the occurrence of these pollutants that appear as a result of the operation of industrial facilities. Undoubtedly, such a situation in foreign countries is resolved through the transition to qualitatively new technologies and equipment, and a complete rejection of the use of already operated, but environmentally dirty industries. In the Russian Federation, this practice cannot be carried out, since not all enterprises and industries have the necessary capital and operating costs for the complete elimination of existing capacities and the commissioning of new production complexes[9].

In our opinion, the achievement of sustainable development, namely, environmental safety and rational use of natural resources, is possible through the implementation of the following measures aimed at transforming production, reducing the use of natural resources and reducing the amount of pollutant formation [10-13]:

- transition to green energy and green technologies in industrial production;
- search, development and implementation of innovative technologies in the production complex;
- refusal to use equipment outside the park resource;
- reduction of the share of equipment working on the combustion of fossil fuels, the use of water resources and generating large volumes of solid waste;
- elimination of wasteful production capacities, including excess consumption of energy, natural resources, material resources and others;
- construction and commissioning of facilities that meet international requirements in the field of environmental safety and rational nature management.

These requirements must be applied to all industrial production and enterprises that consume fuel and energy resources, and there are excessively high volumes of emissions of pollutants into the atmosphere, the formation of solid waste and waste water discharge. It should also be noted that such requirements should be imposed by the state, monitored by relevant government departments, and at the regional level, programs should be developed to pursue policies in the field of modernization and innovative development of spheres of activity and industries.
5. Conclusion

Within the framework of this study, an assessment of environmental innovations in industrial production and information and communication activities was carried out. The analyzed indicators show that approximately 10% of companies carry out technological innovations, while in the industrial complex the share of the company introducing environmental innovations does not exceed 16%, and in the information and communication sphere - 4%. The studied indicators on the level of control over the volumes of pollutant emissions indicate that in this direction the proper policy and control over the spheres of activity and industries are not being implemented. At the end of the study, measures were proposed that would increase the level of environmental innovation in all areas of activity and industries.

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