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## **RESEARCH OF MEASURES FOR THE DEVELOPMENT OF "GREEN INNOVATIONS" IN THE DIGITAL ECONOMY**

*The article discusses the directions of development "green" innovations, the main approaches to defining the concept of "green" innovations are systematized, current trends in innovative development in the context of "green" innovations are considered, and the features of financing "green" innovations are studied.*

**Keywords:** green innovation, digital transformation, green finance, green development

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## **ИССЛЕДОВАНИЕ МЕР РАЗВИТИЯ «ЗЕЛЕННЫХ» ИННОВАЦИЙ В УСЛОВИЯХ ЦИФРОВОЙ ЭКОНОМИКИ**

*В статье рассмотрены направления развития «зеленых» инноваций, систематизированы основные подходы к определению этого понятия, рассмотрены современные тенденции инновационного развития и изучены особенности финансирования «зелёных» инноваций.*

**Ключевые слова:** зеленые инновации, цифровая трансформация, зеленое финансирование, зеленое развитие

As global environmental problems worsen and the technological revolution deepens, the digital industry has become an important force in promoting sustainable economic and social development. The development of digital technologies has changed traditional ways of resource allocation and energy consumption, providing a new way to realize green transformation and low-carbon development of the economy and society. The digital industry not only plays an important role in industrial transformation and innovation, but also performs well in environmental management [1].

Green innovation is a form of innovation that minimizes damage to the environment and ensures the most efficient use of natural resources. Reducing energy consumption, recycling waste, pollution control, resource sustainability and green product design are all factors that improve economic competitiveness and economic and environmental performance.

Depending on the form of implementation and possible consequences, modern scientific literature divides green innovations into three types:

- innovations that reduce environmental impact by reusing and recycling products;
- innovations that solve environmental problems by reducing the use of harmful components;
- innovations that develop environmentally friendly products and use efficient green processes by using fewer resources or energy.

By integrating **environmental sustainability** into the economic and social fabric, green innovation enables sustainable production and consumption. In this regard, green technology financing is a dynamic field marked by a variety of strategies being implemented around the world to promote sustainable development. Green finance, distinguished by regional policies and financial products

such as green bonds and green loans, is a key factor supporting projects aimed at reducing carbon emissions and transforming industries.

Green bonds are bonds created to finance projects that provide positive environmental benefits. Most green bonds are bonds that direct bond proceeds to specific projects designed to achieve those benefits, but are financially backed by the entire balance sheet of the bond issuer.

Green bonds give investors the opportunity to contribute to environmentally beneficial initiatives by directly financing projects that promote renewable energy, energy efficiency and other green technologies. They are typically asset-linked and backed by the issuer's balance sheet, ensuring that the investment contributes to a sustainable economy.

From the point of view of risks and the procedure for generating income, “green” bonds are also similar to any other bonds. However, there are some differences, which are as follows:

- proceeds from the placement of bonds should be directed strictly to the implementation of “green” projects;
- the issuer must provide the investor with information about its proposed projects and objectives related to environmental sustainability, and how it will monitor and manage potential environmental and social risks;
- net proceeds from the placement of “green” bonds must be accumulated by the issuer in a separate account or in a separate portfolio; the issuer must annually provide up-to-date information on the use of funds [2].

The concept of state “green bonds” of the Republic of Belarus has been approved and is aimed at implementing projects related to achieving sustainable development goals, including activities in the following priority areas: sustainable environmental management and biodiversity; increasing energy efficiency and energy saving; sustainable water management; environmentally friendly transport; pollution prevention and control, waste management [3].

OJSC "Belarusian Currency and Stock Exchange" is a platform for placement and sale of "green" bonds in its trading system

Green loans are term loans that can be used to finance a range of environmental and sustainable projects, covering areas such as energy efficiency, waste and water management, clean transport, sustainable agriculture and greenhouse gas emission reduction. Green loans can be structured as bilateral loans or syndicated loans. The distinctive feature of a green loan is that its proceeds are used exclusively to finance a pre-approved environmental or sustainable development project.

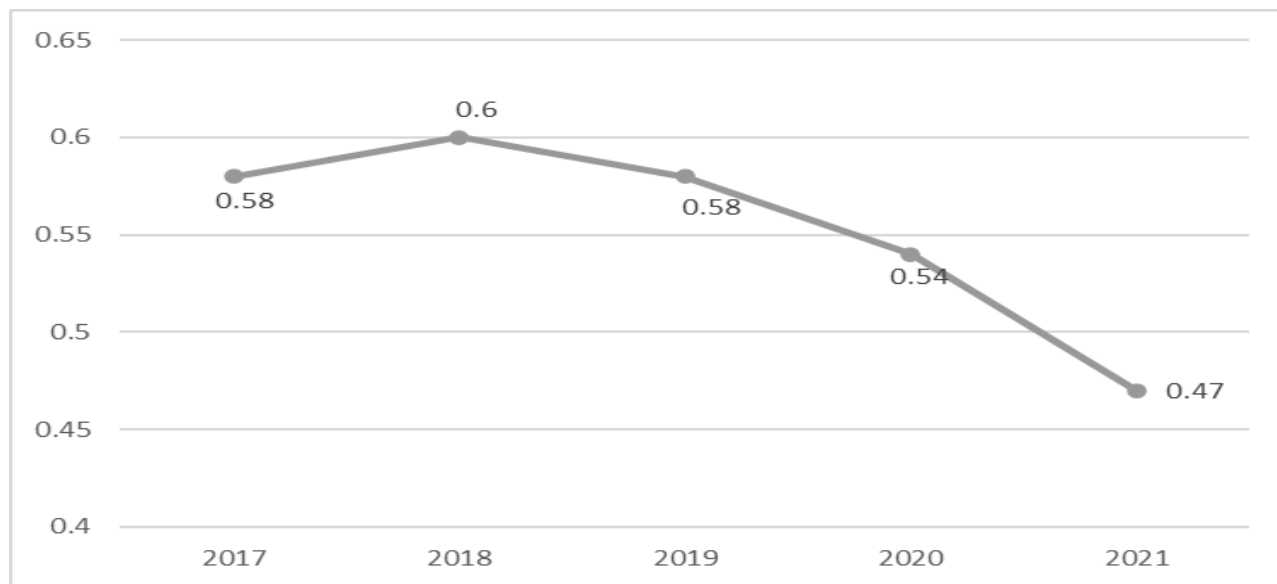
Green lending guarantees the use of funds for eligible environmental projects, including clearly defined financial documents outlining the expected environmental benefits, which must be assessed and presented by the borrower [4].

In Belarus, financing of green technologies is at the starting position, which is reflected in the work of the following financial structures:

- OJSC Belinvestbank offers residents of the Republic of Belarus support for environmental business, i.e. for “green”, the project provides a line of credit or a one-time loan;
- Priorbank OJSC provides an electronic loan for the purchase of “green” goods from partners;
- BPS-Sberbank became one of the first in Belarus to offer, “Green lending” to the market. Below standard rates apply to projects related to reducing human impact on the environment;
- BTA Bank CJSC offers a loan for the purchase of an electric car “Electrocar” through a network of auto partners;
- Alfa-Bank's leasing company A-Leasing offers a separate electric car-leasing product for individuals, legal entities and individual entrepreneurs with the exclusive Eco-Drive service.

However, green technology projects are often subject to a high degree of uncertainty, which can be associated with technological innovation, regulatory changes and market volatility. For example, investors may face the risk of technology obsolescence as new, more efficient solutions outpace current investments.

In addition, market risks, such as fluctuations in commodity prices, may affect the cost of materials for green technology projects. Hedging strategies and careful market analysis are vital tools for anticipating and managing this financial uncertainty.



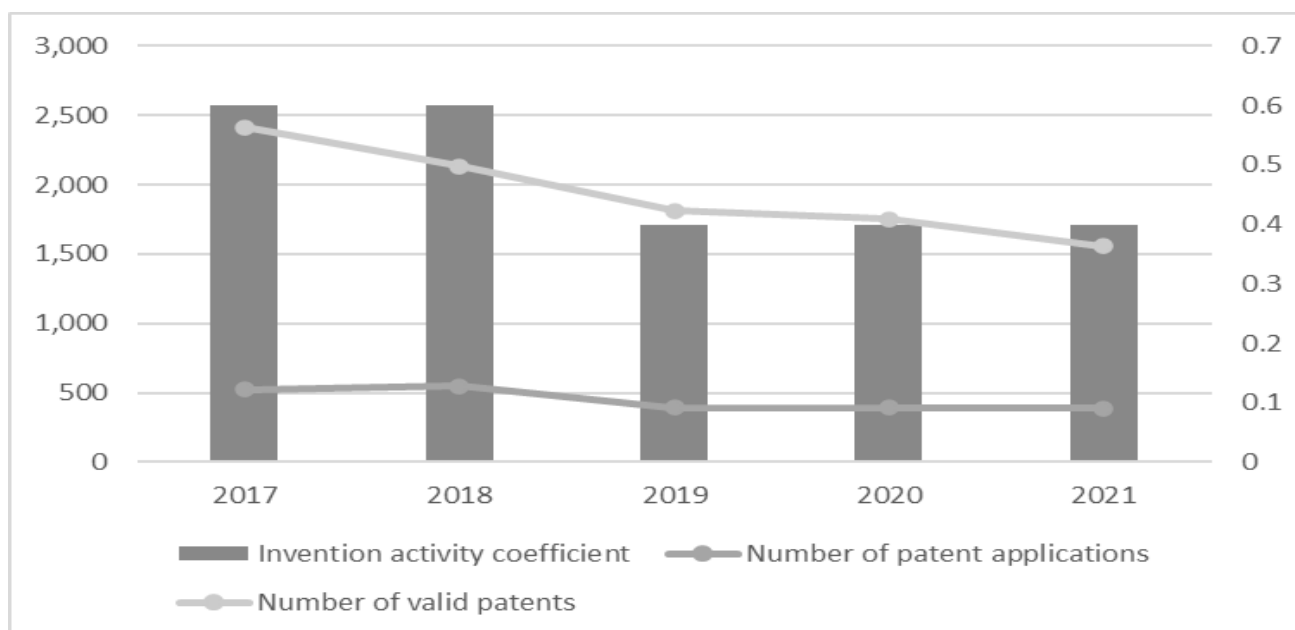
*Fig. 1. Expenditures of Belarus on R&D, as a percentage of GDP*

Source: [5]

The level of investment in innovation can indicate a region's attitude towards green technological innovation. In particular, the ratio of research and development expenditures to GDP was chosen to measure investment in innovation (Figure 1).

The number of patent applications and the number of patents issued can clearly reflect the level of innovation output of a country, and the selection of the number of patent applications, the number of patents issued, and the inventive activity rate (the number of domestic patent applications per 10,000 inventions) can measure the technological innovation output status.

A green innovation support environment is a social environment that provides living space and innovative conditions for green innovation activities. Analysis of the data presented in Figure 2 shows that the indicators of the cost of innovation (the amount of funding for innovation costs, own funds, the republican budget), the number of scientists and the scientific capacity of GDP by sources of research funding reflect the level of government support. The number of researchers per million inhabitants reflects the investment in human resources in scientific research and the level of development of a country, as well as the importance that the country attaches to scientific research. The number of researchers per million inhabitants reflects the level of investment and human resource development in scientific research in a country, as well as the level of attention paid to scientific research. In Belarus, the share of own funds in the cost of innovation by funding sources is very high – 50-66 %.



*Fig. 2. Indicators of technological innovation production*

Source: [5]

Analysis of the above indicators shows that the country has made some progress in developing green innovation over the past years, but there are still some problems: lack of green and innovative talents; insufficient commitment to green innovation; imperfect environment for supporting green innovation.

The environment is the basis for the development of green innovation, and in Belarus, there are a number of problems with the supporting environment for green innovation. The system of financial support for green innovation is not yet ideal. Channels for technology transfer and promotion of green innovation are not sufficiently developed, which increases the complexity of the transformation of scientific and technological achievements and affects the improvement of the green innovation potential of enterprises [6].

To solve these problems, it is advisable to focus on the following areas:

1. Provide digital support and develop green digital talents in terms of increasing investment in education, strengthen the training of talents in the fields of green economy and digital economy, and formulate policies related to the protection of talents to protect the rights and interests of talents.

2. Promote technological innovation and accelerate digital applications by increasing investment in digital technology research and development, making full use of the role of the digital economy in optimizing resource allocation and promoting industrial transformation and upgrading; support innovative research projects and encourage the development of high and new technologies [7]. Support innovation and the application of digital technologies in areas such as energy conservation and emissions reduction, clean energy and environmental monitoring.

3. Promote the coordinated development of the digital economy and green industrial transformation, and promote the digital transformation of industries. Leverage digital technology to enhance the efficiency of corporate green technology innovation, optimize industrial structure, promote green upgrading of traditional industries, and promote the development of circular economy and green industries; strengthen green policy support and institutional guarantees for green development, optimize the market development environment and provide favorable conditions for corporate green transformation.

4. Harmonization of regulation and national standards in the field of green economy in accordance with international practice. In addition, in the current conditions, the current position is to increase green literacy and popularize responsible consumption. The formation of a regulatory environment for the development of a system of green finance and green banking will accelerate the processes of forming an effective green finance institution [8].

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