

Mechanisms of development of the material and technical base of the reclamation complex of the Russian Federation

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Abstract. The material and technical base is the basis of the industry's production processes and requires modernization and renewal. The purpose of the study is to analyze and improve the mechanisms of development of the material and technological base of reclamation complexes based on an innovative approach. The paper defines the patterns and principles of improving the material and technical base of reclamation facilities. An algorithm for planning modernization, replenishment and replacement of the material and technical base, as well as criteria for evaluating efficiency, is proposed.

1 Introduction

Agricultural production on the territory of the Russian Federation is carried out in difficult natural and climatic conditions. There is a lack of precipitation on 80% of the territory.

By 2022, the country's land reclamation fund amounted to 9.45 million hectares: 4.67 million hectares of irrigated land and 4.7 million hectares of drained land. At the same time, 2320.60 thousand hectares of reclaimed land were not used. Including irrigated, for example, 791.0 thousand hectares, of which 116.6 thousand hectares, due to salinization and waterlogging. 2963.35 thousand hectares were not watered, of which 1912.9 thousand hectares due to a malfunction of the irrigation network [1-4].

The machine and technological support of the reclamation complex also requires modernization and updating. According to the list of state property, 2,768 units of engineering equipment are required for repair and maintenance work, which is 50% of the required amount. Moreover, it is known that the degree of wear is more than 75%, and since 2003, a centralized planned update has not been carried out [1-3]. With the existing level and composition of the fleet of equipment on hydro-reclamation systems, the normative level of technical condition cannot be ensured.

The need for the introduction of innovative technologies and the growing interaction between business and the scientific environment in order to introduce innovative technologies and products, modernize equipment and replicate technological breakthroughs is clearly visible.

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The research of many scientists is aimed at improving the infrastructure of the agro-industrial complex, the problems of material and technical security [5-10], etc.

Despite a significant amount of theory, developments and recommendations, there is no comprehensive approach justifying the direction of innovative development of the material and technological base of the enterprises of the reclamation industry and the complex as a whole.

The purpose of this study is to analyze and improve the mechanisms of development of the material and technological base of reclamation complexes based on an innovative approach.

2 Materials and methods

The material and technical base of the reclamation complex includes fixed assets, including buildings, structures, technical means, working capital and land resources. All elements of the material and technical base influence each other and are integrated within various organizational structures, Fig. 1.

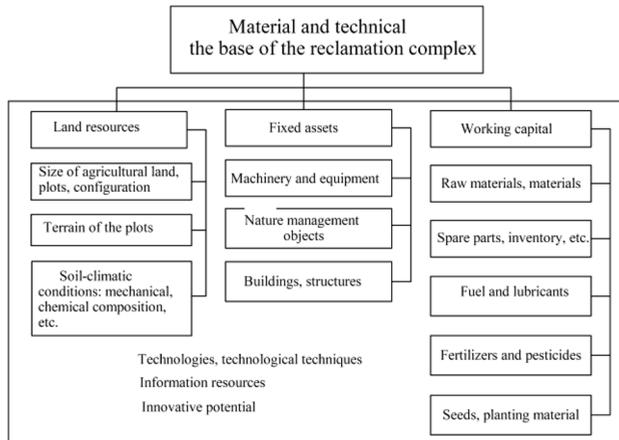


Fig. 1. The structure of the material and technical base of the reclamation complex.

Generalizing the interaction of elements are information resources, applied technologies and innovative potential.

Among the main factors influencing the need for replacement, modernization and acquisition of the material and technical base of the reclamation complex, the main ones should be identified: natural, technical and technological, organizational and economic and external political economic, Fig. 2.

The most important factors influencing the formation and development of the material and technical base of the reclamation complex are natural.

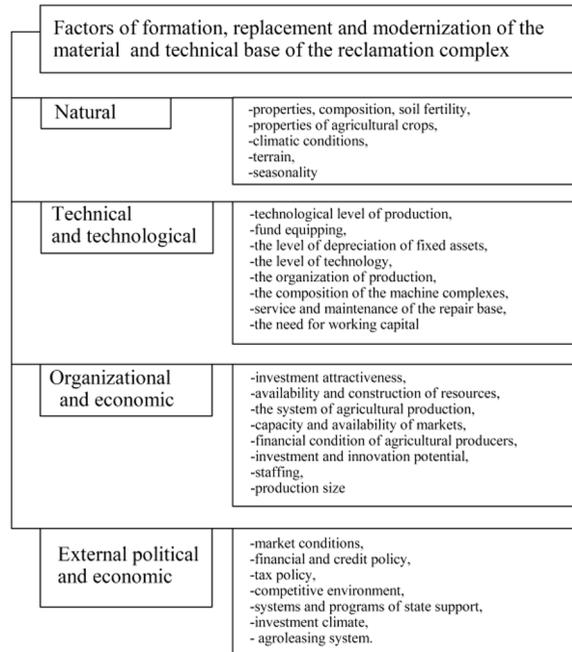


Fig. 2. Factors of formation and development of the material and technical base of the reclamation complex

Significant differences in soil properties, differences in fertility, climatic conditions, etc. require the use of various technologies and technical means, and, accordingly, the cost of producing a unit of production. For example, to obtain the same yield on soils of different fertility, different equipment with production funds is required.

3 The results of the study

It is necessary to divide the principles of improving the material and technical base of the reclamation complex into two main categories:

- technical and technological,
- infrastructure.

Technical and technological category:

- technical modernization of machines and mechanisms.
- formation of efficient fleets of cars;
- introduction of resource-saving technologies;
- application of digital systems in land reclamation;
- automation and robotization of technical means and technologies;
- Glonass systems;
- precision farming technologies, etc.

The infrastructure category includes:

- creation of service services;
- technological audit services;
- funds and organizations to stimulate innovative development and increase demand;
- information support for the introduction of new technologies and technical means, etc.

The main constraining factors of progressive, innovative development are: the lack of mechanisms and means of innovation management, imperfection of incentive systems for high-tech technologies and demand for innovative products.

Modernization, replenishment and innovative renewal of the material and technical base of the reclamation complex are impossible without determining the sources of financing and financial and economic regulatory instruments and mechanisms (Fig. 3)

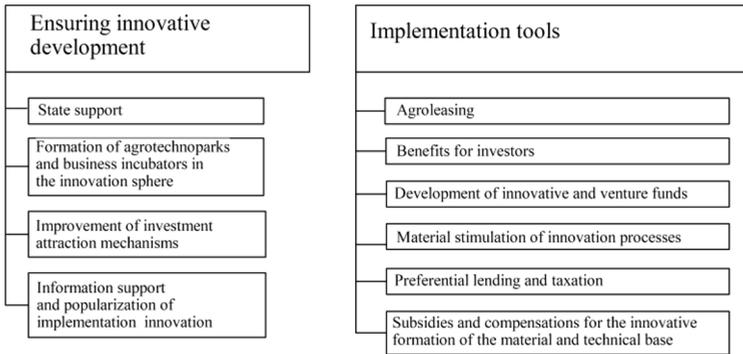


Fig. 3. Institutional instruments for implementing innovation policy

There is no need to talk about the importance of the system of state support for innovation and investment activities and regulatory instruments.

State support at the present stage is implemented, in particular, in the State Program for the effective involvement in the turnover of agricultural land and the development of the reclamation complex of the Russian Federation for 2022-2031.

The development strategy focuses on the implementation of the principles of sustainable development, restoration and modernization of the reclamation complex by increasing the technical level, improving the technical condition in accordance with modern achievements of scientific and technological development and environmental safety.

Agrotechnoparks, technology transfer centers, business incubators, agricultural consulting services, etc. act as instruments for implementing innovation policy.

To plan, modernize, update and replace the material and technical base of the reclamation complex, an algorithm was developed, shown in Fig. 4, where the determination of the need for agricultural machinery can be performed using a regulatory approach.

The effectiveness of updating and replacing the material and technical base of the reclamation complex can be assessed by a system of indicators that can be divided into: technical and technological, production and economic, ecological and economic.

Technical and technological indicators:

- the degree of development of innovative technologies;
- improving the technical and technological level;
- increase in the volume of fixed and circulating funds;
- optimization of the structure of the material and technical base.

They include an assessment of the technical condition and operability of machines and equipment, their compliance with modern requirements, the availability and application of new technological solutions. Effective updating and replacement of the material and technical base should contribute to improving productivity and quality of work.

Production and economic indicators:

- energy equipment;
- technical armament;
- profitability of production;
- increase in capital investments in investments;
- share of innovation costs;
- increase in labor productivity;
- reducing the cost of production.

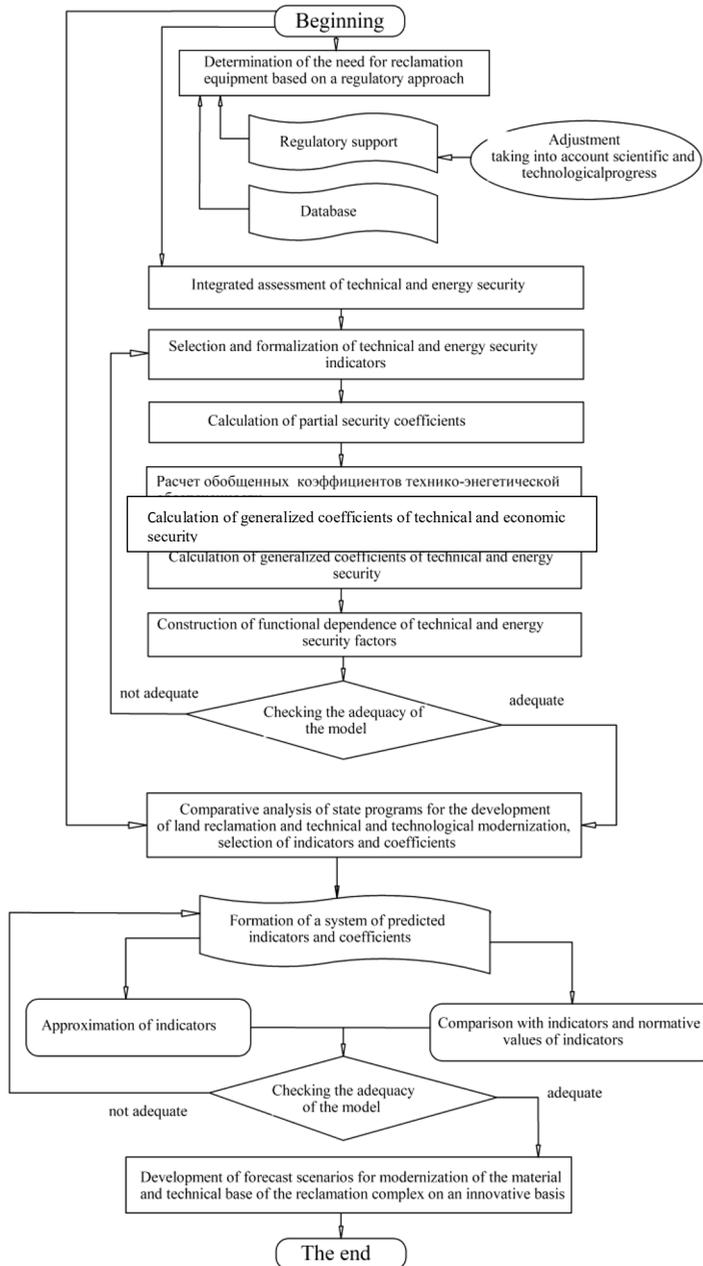


Fig. 4. Flowchart for planning modernization, renewal and replacement of the material and technical base of the reclamation complex

They include an assessment of the costs of updating and replacing the material and technical base, the expected economic efficiency, as well as an assessment of the payback period of investments. Updating, modernization and replacement of elements of the material and technical base should be economically justified and lead to an increase in the efficiency of resource use.

Ecological and economic criteria:

- increasing the volume of environmental products;
- restoration and improvement of soil fertility;
- land transfers.

Include an assessment of the environment and natural resources. Renewal, modernization and replacement of the material and technical base should contribute to environmental sustainability and minimize negative impacts on the environment.

4 Conclusion

The material and technological base of the reclamation complex has its own characteristics. Based on the research, patterns and principles of improving the material and technical base were identified, algorithms and evaluation efficiency criteria for planning modernization, updating and replacement of the material and technical infrastructure were proposed.

Updating and modernization of the material and technical base is an important step in improving the efficiency of land reclamation measures and ensuring food security of the country

5 Financing of work.

The work was carried out at the expense of the University Development Program within the framework of the Strategic Academic Leadership Program "Priority-2030".

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