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Modern Tools for Sustainable Development of Territories. Special Topic: Project Management in the Regions of Russia

SUSTAINABLE DEVELOPMENT OF TERRITORIES ON THE BASIS OF ELEMENTS OF CIRCULAR ECONOM

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Abstract

In the transition to a new technological era requires qualitatively different tools of managing and organizing interaction between all participants. The use of the sustainable development principles contributes to the transition to new types of management and provides favorable conditions for the existence of the population of various territories in the future. The Russian Federation is just beginning to embark on this path, so it is important for managers at different levels and entities to be familiar with the best practices in this area. It is well known that sustainable and harmonious territorial development depends on the rational use, purification and further utilization of elements obtained in the process of purification from water. The article presents the results of the research aimed at developing recommendations for the activation of the territorial business initiative based on the circular economy of treatment facilities in the Russian Federation. The basic research methods were the analysis and evaluation of the effectiveness of the circular economy in the field of treatment facilities in the world practice, the analysis of domestic legal acts on environmental, socio-economic, municipal development and management of the territories of the Russian Federation, the analysis of environmental impact of industrial enterprises on water resources. The use of named methods made it possible to identify the main problems in the work of treatment facilities, and to find tools, the implementation of which will contribute to the sustainable development of the territories on the basis of elements of the circular economy.

Keywords: Circular economy, sustainable development, territories, water.

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1. Introduction

In modern conditions of transition to a new type of economic, industrial and social relations, there is a need to ensure sustainable development in a highly competitive environment, both organizations and territories in which they operate. Circular or "cyclic economy" as it sometimes called is the one of the ways of such development.

The concept of "circular economy" is the most often used in the aspect of preserving the value of resources (raw materials, water, energy) for the longest period of time, with special attention paid to: resource efficiency, achieved environmental performance, sustainable supply and consumer awareness in matters of environmental management.

One of the elements of the circular economy is the rational use of treatment facilities, which stimulates the introduction of advanced technologies in related industries, and as a result, has an effect on the development of territories.

2. Problem Statement

Ensuring the sustainable development of territories on the basis of elements of circular economy raises a number of problems of both scientific and practical content. In particular:

- one-sided perception of the concept of sustainable development in a domestic science and practice;
- insufficient attention to issues of efficient use of water resources;
- the lack of experience in the functioning of domestic enterprises in a circular economy;
- consider in detail each of the problems.

2.1. One-sided perception of the concept of sustainable development in a domestic science and practice

Prior to the Russian President Decree of 19.04.2017 № 176 "About the strategy of environmental safety of the Russian Federation for the period up to 2025" in the domestic theory and practice mainly focused on the social processes of sustainable development, the emphasis on which was made in 1994 in the presidential Decree №236 "On the state strategy of the Russian Federation on environmental protection and sustainable development", environmental issues of human and industrial activity were given secondary attention (Water strategy of the Russian Federation until 2020, 2009).

Ostrovsky (2002) believes that sustainability will be achieved if we consider the municipality at the same time taking into account the factors of internal and external environment: as an independent system and as an element of a more complex system – the region, the country, the planet as a whole. Research of the legal regulation of the environmental aspects focus on the participation of local authorities: for example, Kichigin and Hludeneva (2011) offers a direct correlation to the number of residents, size of territory, the current environmental situation, and Rusin (2012) offers the definition of a list of environmental decisions that can be taken by the state only taking into account the opinion of municipal governments and citizens living in the relevant territories.

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Such approaches have contributed to the separation of social, environmental and production aspects in enterprises

2.2. Insufficient attention to issues of efficient use of water resources

The lack of attention to the effective use of water resources in Russia is due to their abundance. Their availability is estimated at 30.2 thousand cubic meters per person per year. In recent years, there has been a negative trend in their pollution, especially nitrates. This is also facilitated by the growth of industrial production. In the economy, the annual use of water resources is estimated at 62.5 cubic km of water (Federal State Statistic Service, 2018).

2.3. The lack of experience in the functioning of domestic enterprises in a circular economy

Economic entities in the Russian Federation have not been adapted to operate in a circular economy. The main difficulties arose with the use of recycled materials, as well as the activation of the business for the implementation of recycling at enterprises (Bezdudnaya, Zinchik, Kadyrova, Induchny, Treiman, & Iudin, 2018).

3. Research Questions

The study raised the following questions.

What is the successful worldwide experience in the development of the circular economy?

What are the opportunities for water recycling?

Are there any business projects in this area, implemented in the territory of the Russian Federation?

What support and management tools can be applied to these projects?

4. Purpose of the Study

It is assumed that the answers to the posed research questions will help to achieve the goal and will contribute to the development of recommendations to enhance the territorial business initiative based on the circular economy of treatment facilities in the Russian Federation.

5. Research Methods

5.1. Analysis of the successful worldwide experience in the development of the circular economy

At the initial stage of the analysis, the most effective examples implemented in the EU within the framework of the circular economy were selected on the basis of literature sources. After selecting the projects considered to be the most effective, it was decided to analyze them more deeply in order to find their advantages and tools that can be used in the territory of the Russian Federation. The study identified projects aimed at the development of the circular economy in the field of treatment facilities (Fagerholm, Torralba, Burgess, & Plieninger, 2015).

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International experience shows that the issue of water resources purification can be approached in a more diverse way. In January 2014, the Swedish environmental research Institute R3Water launched a project funded under the EU FP7 "Demonstration of innovative solutions for water reuse, restoration of values and resource efficiency in urban wastewater treatment". The project demonstrated solutions to support the transition from clean energy and chemical treatment facilities to treatment facilities that provide resources and other value (Water in the circular economy – innovations for urban water treatment, 2019).

To achieve this goal, R3Water has developed and demonstrated more than 10 innovative technologies at demonstration sites in three countries (Belgium, Spain and Sweden) in three areas:

1) resource Efficiency in their purification: improved aeration (Perlemax); improved Anammox process; modeling and energy audits (ICRA, Aquafin); improved (Prediktor); improved technology of biogas production.

2) Promote water reuse: online monitoring (ADASA, Aqua-Q); effective disinfection (teqma); treatment of pharmaceutical residues (IVL).

3) Resource Recovery: by the valorisation (increase the value) of sludge and recycling of nutrients and other assets (Ava Green Chemistry, Renotech).

Promotion of market development was one of the goals of the project. All the technologies and solutions in the project have made progress in commercialization, the results of the project have been distributed to stakeholder groups through various channels such as seminars, brochures, homepage, LinkedIn, visiting demonstration sites, etc. (Hoekstra, 2006).

The management of the Swedish Institute for environmental research has attracted 12 partners from seven European countries, which have well-established links between innovative associations of process engineers, research institutes and representatives of treatment facilities. The project received funding from the European Union programme for research, technological development and demonstration under grant agreement No. 619093.

Environmental projects developed under European Directive 2008/98/EC on waste demonstrate a positive experience in transforming waste treatment facilities into resource collection facilities. In Italian legislation, they are reflected in Regulation 205/2010 and define the following sequence with regard to pollution prevention and waste management: prevention; preparation for reuse; recycling; other types of recovery, such as energy recovery; disposal (Progetti ambientali di valenza sociale, 2019).

5.2. Assessment of water recycling in Russia

The study of statistical information on the technology and structure of treatment facilities allowed to establish that in the territory of the Russian Federation more than 90% of water resources are used in industry, energy and for the purposes of housing and communal services, their distribution is as follows: thermal and nuclear energy 37%; agro-industrial complex 23%; mining and processing industry 12%; housing and communal services – 19%.

Statistical analysis of data on the inflow of pollutants from wastewater into water bodies in the Russian Federation is presented in Table 01.

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As can be seen from the table, the share of chlorides, nitrogen and phenol is increasing in the last period, and the share of nitrates is large. This negative effect affects most of the country 's population. The European territory of Russia is home to about 70% of the population and this is where the main production facilities are concentrated. However, only a 10% of the country 's water sources are located in this territory and mass pollution is caused by them.

Table 01. Composition and volume of pollutants in Russian wastewater

Years	Volume of wastewater discharge, billion cubic meters	as part of the wastewater discharged:							
		Sulfate, Mln tons	Chlorides, mln tons	Total nitrogen, Kt	nitrates, Kt	Lipid and oil, Kt	Phenol, tons	Lead, tons	Mercury tons
2010	49.2	1.9	5.7	36.5	366.4	4.1	28.0	9.0	0.02
2015	42.9	1.9	5.6	25.5	421.2	2.1	16.1	5.7	0.01
2018	40.1	1.7	6.3	31.5	387.9	1.9	21.2	4.2	0.01

Source: (Federal State Statistic Service, 2018)

The study of issues of work with wastewater in the Russian Federation showed that it is mainly in the direction of their purification from various impurities. In particular, due to the sufficiently large number of chemical elements that can enter the water, mechanical, chemical, physical-chemical, biological and biochemical purification methods are used.

Mechanical cleaning is usually preliminary. It removes water insoluble fractions. The most common chemical methods, such as: neutralization; oxidation; reduction.

In the field of biochemical protection, biofilters, air filters and air tanks are used.

Various reagents are actively used in physical and chemical methods. This group of waste water treatment methods includes coagulation, ion exchange, flotation.

5.3. Analysis of legal practice and exploration of peculiarities of water recycling in Russia

The study of domestic experience in the field of introduction of elements of circular economy in the sphere of treatment facilities allowed us to establish that the pilot projects have already appeared, in which modern approaches are actively used. In particular, in the Leningrad region launched a project for the production of aquatic products (shrimp) company “Northern shrimp” with the support of the business incubator “Ingria” (Center of cluster development, 2018).

It is one of unique projects at which implementation automatic purification of circulating water, energy is supplied through the processing and disposal of used tires. The effect is achieved when the waste of one enterprise becomes a source of energy for another, inter-sectoral interaction is formed at the level of private business. However, such projects have pilot character and their active promotion should be a task for the near future.

Research of legal regulation and law enforcement practice allowed to establish that in the territory of the Russian Federation there are no legislative acts regulating the market of secondary material resources. Their General application does not exceed 8% despite the fact that the national project

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"Ecology" has been launched and significant amendments have been made to the Federal law "On production and consumption waste", which obliges to keep records and dispose of waste.

6. Findings

In international practice, the effectiveness of the circular economy is assessed in three areas: the area of purification itself; the promotion of reuse; and resource recovery issues.

One of the most effective methods of wastewater treatment is the process of oxygen-free oxidation of ammonia, which is a unique biological process of nitrogen removal, and which produces significant savings (up to 60%) in aeration needs compared to classical nitrification, denitrification processes. This technology requires further development and practical application in the territory of the Russian Federation.

In the Russian Federation the main efforts are directed to the protection of the environment by preventing business from operating within environmental facilities. However, effective instruments aimed at introducing a circular economy are not enough.

The experience of Russian and foreign activities has shown that in order to involve business in this sphere it is necessary to create conditions for obtaining economic effect from the introduction of elements of circular economy. This direction needs state support, as well as the development of scientific schools. Preferential incentives, ensuring the availability and guarantee of the necessary volumes of secondary material resources, the development of technological and technical solutions in the field of waste management can become a tool for ensuring the introduction of elements of the circular economy in enterprises.

For many enterprises, the question arises of the further applicability of the released secondary material resources. As in Russia there is no inter-sectoral interaction, when the waste of one industry forms resources for others. The formation of platforms for such interaction is a prerequisite for the development of a circular economy.

7. Conclusion

The introduction of elements of the circular economy, especially in small territorial agglomerations, is impossible without the support of the authorities. One of the ways to combine business and government agencies can be municipal-private partnership. It can be implemented in the framework of a concession agreement, in which the ownership of the objects is retained by the public partner, and the investment and operational risks are borne by the private partner. Risk reduction should be ensured by the introduction of advanced technologies proven in international practice.

To implement this interaction, it is necessary to form an agreement between the parties working within the framework of the development of the circular economy. Steps to build a systematic work in this area can be:

- Identification of all stakeholders, from waste producers, to the consumers of secondary material resources.
- The definition of the list of technologies applicable to the task.

- The calculation of the economic, social effect, the definition of the environmental performance of the projects.
- The formation of systems of production control to reduce environmental risks of the projects.
- Building interregional cooperation in the promising areas of cooperation.
- Reducing bureaucratic and tax burden on business, which implements projects with elements of the circular economy.

At the state level, due to the system of grants, it is necessary to provide the required level of development in the field of circular economy. The state should act as a guarantor for enterprises implementing projects of circular economy.

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