

## ISSUES OF DIGITALIZATION OF ENVIRONMENTAL CONDITION MONITORING OF ENTERPRISES WORLDWIDE

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**Abstract.** The vital task of maintaining the natural balance of the ecosystem with economic considerations raises urgent issues related to sustainable development. Transition to a circular economy through the use of digital technologies, firstly, to determine the nature of digitization of the circular economy, secondly, to organize theoretical and practical information about it, to digitize environmental monitoring, to use it as a tool for considering the circular economy resolves issues. This article is devoted to issues of digitalization of environmental monitoring of enterprises.

**Keywords:** Circular economy, digital monitoring of the environment, environmental status of enterprises, digital economy.

## ВОПРОСЫ ЦИФРОВИЗАЦИИ МОНИТОРИНГА ЭКОЛОГИЧЕСКОГО СОСТОЯНИЯ ПРЕДПРИЯТИЙ МИРА

**Аннотация.** Жизненно важная задача сохранения природного баланса экосистемы с учетом экономических соображений ставит актуальные вопросы, связанные с устойчивым развитием. Переход к экономике замкнутого цикла за счет использования цифровых технологий, во-первых, определить характер цифровизации экономики замкнутого цикла, во-вторых, систематизировать теоретическую и практическую информацию о ней, оцифровать экологический мониторинг, использовать его как инструмент учета круговая экономика решает проблемы. Данная статья посвящена вопросам цифровизации экологического мониторинга предприятий.

**Ключевые слова:** Циркулярная экономика, цифровой мониторинг окружающей среды, экологический статус предприятий, цифровая экономика.

## INTRODUCTION

The vital task of balancing economic interests with maintaining the natural balance of the ecosystem raises pressing issues related to sustainable development. Here, the development of high-tech sectors of the economy becomes one of the main factors for improving market activity, which at first glance does not mean putting the task of preserving environmental well-being in the first place. On the other hand, there is a need to transition to a more stable socio-technical system. Environmental problems, loss of biodiversity, as well as water, air and soil pollution, resource depletion and overuse of land increasingly threaten the Earth's life support systems. It can be seen that the degradation of ecological systems has a negative impact on economic indicators, as it reduces the quality of natural and human resources. It should be noted that the goals of achieving sustainable development are relevant for the whole world, this issue is included in the agenda of the UN as sustainable development issues until 2030.

The world scientific community considers the concept of circular economy (CE), which is being actively implemented in Japan, China, Germany and other countries of the European Union, as one of the ways out of the current situation. Until recently, the evolution of production activity was considered within the framework of a universal linear model of resource

consumption, namely: collection and extraction of resources → product production → product delivery to the customer → product destruction. However, the need for economic development and environmental protection is drawing our attention to a non-linear model, which means "circularity" of the economy or "circular economy", which allows combining economic growth with environmental responsibility. From this point of view, the use of "Internet of Things" (IoT) technology, intensive data exchange, and predicative analytics are of particular importance for economic interaction based on a circular model.

## **MATERIALS AND METHODS**

The circular transition of the economy cannot be accompanied by active interdisciplinary interaction. On the one hand, the tasks set by circular economy are deductive and inductive thinking, including hypothetical and deductive method, analysis and synthesis, institutional analysis, as well as statistical, comparative and causal analysis, factor analysis, method of analogy, historical, social and cultural economy. uses the historical method and other general theoretical methods that allow to take into account the characteristics. On the other hand, they require specific knowledge about ecological processes. Specific methods related to the studied topic require working with data from geocological, hydrogeological, landscape-geochemical, engineering-geological studies, as well as analytical experimental work in laboratory and field conditions, as well as physical and digital modeling methods using GIS and laboratory analytical studies.

## **RESULTS**

Today, one of the generally accepted shortcomings of the circular economy is the lack of both conceptual clarity and a single definition of this concept. Non-linearity of enterprises refers to the "circularity" or "circular economy" of the economy, which allows economic growth to be combined with environmental responsibility. A circular economy is an industrial system that is restorative and renewable by design. It replaces the concept of limited resources with recovery, switches to renewable energy sources, eliminates the use of hazardous chemicals that interfere with the recycling process, and encourages better waste management through ideal design of materials, products, systems, and business models. The circular economy model is based on the principles of sustainable development, its main tools are ecological innovations and green technologies, that is, environmentally friendly technologies. The transition to a circular economy requires significant changes in the design, production, consumption, use, disposal and reuse of waste. The main task of the office is to maximize the life cycle of valuable materials.

## **DISCUSSION**

Thus, we understand the process of digitalization of the circular economy as follows:

1. To provide access and exchange of important and detailed information that ensures mutual cooperation of all interested parties (state, regional and local authorities, population, scientific community, business community, etc.);
2. To envisage the use of digital technologies to introduce innovations into the business model in order to obtain new income, create additional value and increase the stability of the ecosystem.

## **CONCLUSION**

The main principle of the circular economy is the principle of reduction, which includes reducing the negative impact on the ecological system. Monitoring of the environment with the help of advanced information technologies allows effective and quick response to environmental

security threats. Economic development puts great pressure on regional ecosystems and the environment. Usually, the economic benefits associated with the establishment and operation of large production facilities lead to ecosystem degradation and adversely affect surface water, groundwater, air and soil properties. Monitoring without IoT technology faces a number of operational challenges, such as low automation, inefficient operational costs, and lack of spatial and temporal coverage. The development of IoT technology improves the collection and analysis of environmental data. Information control over changes in the ecosystem helps to effectively adapt to changing parameters and to solve risks to ecological security at an early stage. Digital monitoring enables the observation, collection and summation of high-resolution, high-quality detailed environmental data, as well as dynamic real-time data monitoring and sharing.

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