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INNOVATION IN THE CIRCULAR ECONOMY: NEW TECHNOLOGIES AND THEIR IMPACT ON THE SUSTAINABLE USE OF RESOURCES

Innovations in the circular economy are a key element for transitioning from traditional consumption to sustainable resource use. Technological progress plays a crucial role in changing production methods, consumption, and waste management, thereby forming the foundation for a new economic approach that minimizes waste and optimizes resource utilization. The circular economy requires the integration of innovations at all levels—from local to global. An additional tool for this is impact investing, which provides an "evolutionary path for humanity's understanding of the importance of ensuring environmental safety, seeking harmonious coexistence with nature, recognizing the importance of minimizing the emissions of harmful substances into the environment from economic activities, and increasing attention to social inclusion." [1, c. 251].

First and foremost, modern technologies such as artificial intelligence and big data play a crucial role in tracking resources and optimizing supply chains. Artificial intelligence allows companies to analyze vast amounts of data to develop more efficient methods of recycling and reusing materials. This approach not only reduces costs but also significantly lowers environmental impact. Furthermore, the Internet of Things (IoT) contributes to the circular economy by creating smart management systems that can automate the processes of waste collection and recycling. Through real-time monitoring, IoT enables more efficient resource use and prevents their irrational consumption. Energy efficiency also plays a crucial role in the circular economy. Thanks to cutting-edge technologies in renewable energy, such as solar panels and wind

turbines, it is possible to reduce dependence on non-renewable resources. This not only reduces carbon emissions but also creates sustainable energy supply systems.

In the manufacturing sector, innovations such as 3D printing play a crucial role. This technology allows for the creation of products on demand with minimal material waste. The use of 3D printing can revolutionize traditional manufacturing processes, ensuring greater efficiency and waste reduction. Another important area is biotechnology. The development of biodegradable materials and the use of biological processes for waste recycling can significantly improve resource utilization and reduce the environmental impact. Biotechnologies not only help eliminate waste but also transform it into valuable resources, such as biofuel or bioplastics.

Understanding and integrating these innovations require new approaches to education and workforce development. Investments in education and training professionals who can effectively apply these technologies in practice are essential for the development of the circular economy.

«The analysis of the process of informatization of innovative technologies as a conceptual basis for ensuring macroeconomic trends in the conditions of a circular economy made it possible to develop a methodological approach to the interconnection of the components of the management process based on informatization. This approach includes innovations, informatization and the stages of forming input information for decision-making, which arise in response to modern needs for resources, are implemented with the help of modern measures and means of informatization, and ensure the preservation of resources by reprocessing them on the basis of informatization» [3, p. 4].

In Table 1, several key innovations in the circular economy are presented. It seems important to compare them based on their potential, environmental impact, and areas of application. Thus, it becomes possible for enterprise management to understand the priority of decision-making, which in turn evolves in its quality.

Table 1

Innovation	Potential	Environmental impact	Areas of application
Artificial intelligence	High	Reduce emissions	Supply chain optimization, recycling
IoT (internet of things)	Medium to high	Improved resource management	Consumption monitoring, waste collection automation
Renewable energy	High	Reduction of dependence on fossil fuels	Energy production, replacement of traditional sources
3D printing	Medium	Minimizing waste	Precision manufacturing, medicine, architecture
Biotechnology	High	Improved waste management	Production of bioplastics, biofuels

Table 1 describes five main technologies, each of which interacts with others to enhance sustainability and efficiency in the circular economy. Here is a detailed description of the interactions between these technologies:

Artificial intelligence (AI) and IoT (Internet of Things): AI analyzes data collected through IoT devices, allowing you to optimize the use of resources and energy in real time. IoT provides data collection on the state of machines and processes that AI uses to automate and improve waste and resource management.

Artificial intelligence and renewable energy: AI can predict energy needs and manage its consumption by integrating renewable energy sources such as solar and wind to optimize their use.

Artificial intelligence and 3D-druk: AI can help optimize design for 3D-druku, reducing material waste and improving production efficiency. Using AI to analyze and improve 3D-druku processes contributes to the development of more accurate and less waste production methods.

IoT and renewable energy: IoT devices can monitor the state of renewable energy sources such as solar panels or wind turbines, ensuring their efficient operation and

maintenance. IoT helps in the accurate monitoring of energy production and consumption, which contributes to its more efficient use.

3D-druk and biotechnology: 3D-druk can be used to create biodegradable materials or components for biotechnology applications. The development of new biomaterials through 3D-druku can contribute to the creation of sustainable and ecological products.

Biotechnology and renewable energy: Biotechnology can develop new methods of producing biofuels from waste using renewable resources. The combined use of biotechnology and renewable energy can improve energy production methods, making them more sustainable and less dependent on fossil fuels.

Therefore, analyzing innovations in the circular economy confirms that the use of advanced technologies is critical to ensuring the sustainable use of resources. Artificial intelligence and IoT provide important tools for optimizing supply chains and managing resources, greatly increasing efficiency and reducing environmental impact. Renewable energy demonstrates the importance of transitioning from fossil fuels to cleaner energy sources, contributing to the reduction of greenhouse gas emissions. 3D printing and biotechnologies play a role in minimizing waste and producing environmentally friendly materials, aligning with the requirements of the circular economy. These technologies not only promote efficient resource use but also open new opportunities for creating sustainable business models and stimulating economic growth.

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FORMATION AND USE OF THE RESOURCE POTENTIAL OF TRANSPORT ENTERPRISES

In modern economic conditions, the basis of the stable functioning of the enterprise is the determination of the need for resources, as well as the use and reproduction of resource potential. The creation of resource potential is the process of substantiating areas of business opportunities, their structuring in accordance with competitive directions, organizational forms, and also by types of resources. Among them, the following can be distinguished: financial, production, technical and technological, economic, managerial, marketing, innovative and others, which, in turn, become the basis for the formation of the corresponding potential.

"Traditionally, the structure of innovation potential includes: resource, institutional and social components, which reflect the basic conditions of innovative activity of economic entities. business entities. Informatization and digitalization lead to a change in the perception of the innovative potential of the economy and its components, adding