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CIRCULAR ECONOMY: SUSTAINABLE TRANSFORMATION OF PRODUCTION AND CONSUMPTION IN THE MODERN WORLD

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Abstract

This article presents the key principles of the circular economy, which represents a promising approach to sustainable development and efficient resource utilization. The paper examines the main advantages of transitioning to a circular economy, as well as examples of successful implementation of this concept across various industries and countries. It discusses the importance of the circular economy in addressing environmental challenges, reducing waste, and stimulating innovation in the modern world, and also outlines the actions through which the circular economy is being actively developed.

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Throughout human history, people have generated waste; however, with the continuous growth of the population and its needs, the volume of waste has been steadily increasing. As a result, humanity is facing an increasing number of environmental threats and challenges, risks to food security, and the depletion of limited natural resources necessary to sustain life on Earth. In the context of Uzbekistan, the relevance of transitioning to a circular economy is significantly strengthened by the implementation of state strategic programs aimed at ensuring sustainable development and environmental safety. In particular, the Development Strategy of New Uzbekistan for 2022–2026 (Presidential Decree No. PF-60 dated January 28, 2022) and the “Uzbekistan–2030” Strategy (Presidential Decree No. PF-158 dated September 11, 2023) define priority tasks related to improving resource efficiency, reducing environmental pollution, developing waste processing systems, and expanding the principles of a “green economy.” In addition, measures outlined within the framework of the “Green Economy Transition Strategy” and reforms in the field of solid waste management emphasize the introduction of modern recycling technologies, reduction of landfill volumes, and rational use of natural resources. These policy directions objectively necessitate a shift from the traditional linear model of “take–make–dispose” toward a circular economic model.

Therefore, the concept of the circular economy has become one of the key directions for ensuring sustainable and efficient development today. Thus, the circular economy represents a model of production and consumption that emphasizes the repeated, rational use, restoration, and recycling of existing materials and products for as long as possible. The goal of the circular economy is to decouple economic growth from the use of primary raw materials by creating a circular system of production and consumption with minimal losses. It is well known that natural resources are limited, which makes their efficient management throughout the entire life cycle—ranging from production and consumption to design, the formation of environmentally responsible consumer behavior, and finally disposal and recycling—a critically important issue.

In addition to the obvious reduction of negative environmental impacts, the implementation of circular economy practices enables enterprises to reduce costs, improve their corporate image and competitiveness in markets, create new jobs, and introduce innovations into production processes. This is confirmed by a study conducted by the World Economic Forum, which concluded that the adoption of circular business models could unlock economic opportunities worth up to \$4.5 trillion. In effect, the study equates circularity with profitability. Supporting the argument regarding job creation, estimates by the International Labour Organization indicate that the transition to a circular economy could generate up to 6 million jobs worldwide [4].

For these reasons, the transition to a resource-efficient and resource-saving circular economy is of critical importance.

The effective functioning of waste management systems within a closed-loop framework is based on the so-called “three R principle”: Reduce, Reuse, and Recycle—minimizing consumption and waste generation, reusing products, and recycling materials. In this context, the concept of extending the product life cycle emerges through improving product quality, thereby shifting toward an economy where the focus is not on purchasing new goods or equipment, but on obtaining services related to maintenance, repair, restoration, or modernization. Undoubtedly, the most critical enabler of this principle is technology, which ensures efficiency in resource extraction, production, transportation, and consumption.

The ultimate objective of policies based on the “three R principle” is to create a societal model in which resources are utilized so efficiently that the very concept of “waste” ceases to exist [3].

At the global level, the development of the modern economy is accompanied by a number of systemic problems related to the inefficient use of natural resources and the accumulation of waste. The prevailing linear economic model has led to excessive extraction of raw materials, environmental degradation, climate change, and biodiversity loss. The rapid growth of the world population and consumption patterns has significantly increased the volume of solid waste, a large share of which is not recycled. This creates additional pressure on ecosystems and contributes to pollution of land, water, and air. Furthermore, the instability of global supply chains, rising resource prices, and increasing risks to food security highlight

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the vulnerability of the current economic model. These challenges necessitate the transition to a circular economy aimed at ensuring sustainable resource management and long-term economic resilience.

Table 1. Comparative Analysis of Linear and Circular Economy Models

Criteria	Linear Economy	Circular Economy	Expected Effect
Resource use	Intensive use of primary raw materials	Efficient use of renewable and secondary resources	Reduction of resource depletion
Production model	"Take-make-dispose"	Closed-loop production cycle	Minimization of waste generation
Waste management	Disposal in landfills	Recycling, reuse, recovery	Reduction of environmental pollution
Product lifecycle	Short lifecycle, frequent replacement	Extended lifecycle, repair and modernization	Cost reduction and resource saving
Economic impact	High production costs in the long term	Cost optimization and efficiency growth	Increased competitiveness
Innovation level	Limited innovation focus	High level of eco-innovation and digitalization	Technological advancement
Employment	Traditional job structure	Creation of new "green jobs"	Employment growth
Environmental impact	High environmental pressure	Reduced emissions and ecological footprint	Improved environmental sustainability

This table presents a comparative assessment of the key characteristics of linear and circular economic models. It highlights fundamental differences in resource utilization, production approaches, waste management practices, product lifecycle, and overall economic and environmental impacts. The analysis demonstrates that the transition to a circular economy enables more efficient use of resources, reduction of environmental pressure, stimulation of innovation, and creation of sustainable conditions for long-term economic growth.

In Uzbekistan, similar challenges are becoming increasingly evident in the context of economic growth and industrial development. The country faces issues related to the growing volume of municipal and industrial waste, insufficient recycling infrastructure, and limited implementation of resource-efficient technologies. A significant share of waste is disposed of in landfills, which negatively affects environmental conditions and public health. In addition, the economy remains relatively dependent on primary resource extraction, while mechanisms for secondary resource use and waste valorization are still underdeveloped. Challenges also include low levels of public awareness regarding sustainable consumption, insufficient integration of circular principles into business practices, and the need for further institutional and regulatory improvements. Addressing these issues requires a systematic transition toward circular economy principles, supported by state policies, technological innovation, and increased stakeholder engagement.

Significant changes are also required in consumption patterns. Every day, individuals make choices regarding goods and services, and the collective decisions of millions of consumers have a substantial impact on the environment. Increasing consumer awareness of the circular economy and stimulating demand for environmentally friendly products contribute to the formation of an economy that is more sustainable and environmentally responsible.

With regard to the specific actions through which the circular economy is being actively developed, the following can be highlighted:

1. The replacement of traditional raw materials with organic and renewable alternatives aimed at long-term resource use. In addition, production waste should not be overlooked; instead, it should become input material for new production processes, the creation of new products, or be used as a source of energy. In this way, resource recovery should be systematically implemented within the economy.

Many types of waste, such as plastic, glass, and metals, can be recycled for secondary use, while organic waste can be composted to produce fertilizers and soil additives. A successful example is the experience of Timberland, a major U.S. manufacturer of outdoor clothing and footwear. At one of its subsidiary plants, the company recycles worn-out tires by converting them into rubber granules and then into sheet rubber, which is incorporated into the material used for shoe soles.

2. Extending the service life of products reduces the need for frequent replacement and upgrading of both goods and the equipment used in their production. This, in turn, lowers production costs and decreases the volume of resources required for manufacturing.
3. Sharing platforms are also highly relevant at present. They facilitate interaction among users of a product, thereby increasing its utilization rate. Within this model, a product itself embodies a resource and expands its potential for use, meaning it can be accessed by multiple consumers rather than owned by a single individual. This approach is based on paying for access to a product rather than owning it. For example, consumers rent out their homes, bicycles, cars, tourist equipment, boats, and other unique goods or services.
4. BlaBlaCar is the world's largest international online service for finding carpooling companions, while Airbnb is a globally popular platform for renting and leasing private housing. In the B2B sector, the leasing-based online platform MachineryLink Solutions enables farmers to jointly use expensive agricultural machinery and equipment. In Uzbekistan, certain experience has also been accumulated in implementing sharing platforms. Among such initiatives are electric scooter rental services such as JET and Eleven, bicycle rentals like Kolobike, car-sharing services such as AnyTime and Hello, as well as the shared use of charging devices [2].

In summary, it can be concluded that the concept of the circular economy is gaining increasing popularity each year and is becoming more widespread across countries worldwide. The study has provided clear evidence that the circular economy not only contributes to environmental protection and the reduction of climate impact, but also creates new opportunities for economic growth, including cost reduction in production, job creation, the introduction of innovations, and the development of sustainable business models. The circular economy represents a promising direction for the development of the modern economy, facilitating the solution of global challenges and ensuring sustainable environmental well-being for future generations, where resources are valued, waste is minimized, and sustainability and prosperity become key objectives for society as a whole.

In order to address the identified challenges and further enhance the development of the circular economy, the following measures are proposed:

1. It is necessary to strengthen the regulatory and institutional framework by introducing clear standards for waste management, extended producer responsibility mechanisms, and effective monitoring systems, which will ensure systematic control over resource use and waste reduction.
2. The development of modern recycling and waste processing infrastructure should be prioritized, including the creation of regional recycling clusters, investment in advanced technologies, and the expansion of public-private partnerships to increase efficiency and coverage.
3. It is advisable to introduce economic incentives aimed at stimulating circular practices, such as tax benefits, subsidies for eco-innovations, and preferential financing for enterprises implementing resource-efficient and low-waste technologies.
4. Special attention should be given to raising environmental awareness and promoting sustainable consumption behavior through education, digital platforms, and information campaigns, which will form a culture of responsible resource use and support the long-term development of the circular economy.

In conclusion, the study confirms that the transition to a circular economy represents an essential and strategically important direction for ensuring sustainable economic development in the modern world. The analysis has demonstrated that the circular model not only contributes to reducing environmental

pressure and rationalizing the use of natural resources, but also creates significant economic benefits through cost optimization, increased competitiveness, and the development of innovative business models. At the same time, the research shows that despite the growing global adoption of circular principles, a number of systemic challenges remain, particularly in developing economies, including insufficient infrastructure, limited institutional capacity, and low levels of public awareness. In the context of Uzbekistan, the relevance of the circular economy is reinforced by ongoing reforms and state programs aimed at transitioning to a green and resource-efficient economy. The implementation of circular economy mechanisms requires a comprehensive and coordinated approach involving government institutions, the private sector, and society as a whole. Only through the integration of regulatory measures, technological innovation, and changes in consumption behavior will it be possible to ensure an effective transition to a sustainable economic model. Thus, the development of the circular economy should be considered not only as an environmental necessity, but also as a key factor of long-term economic growth and societal well-being.

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