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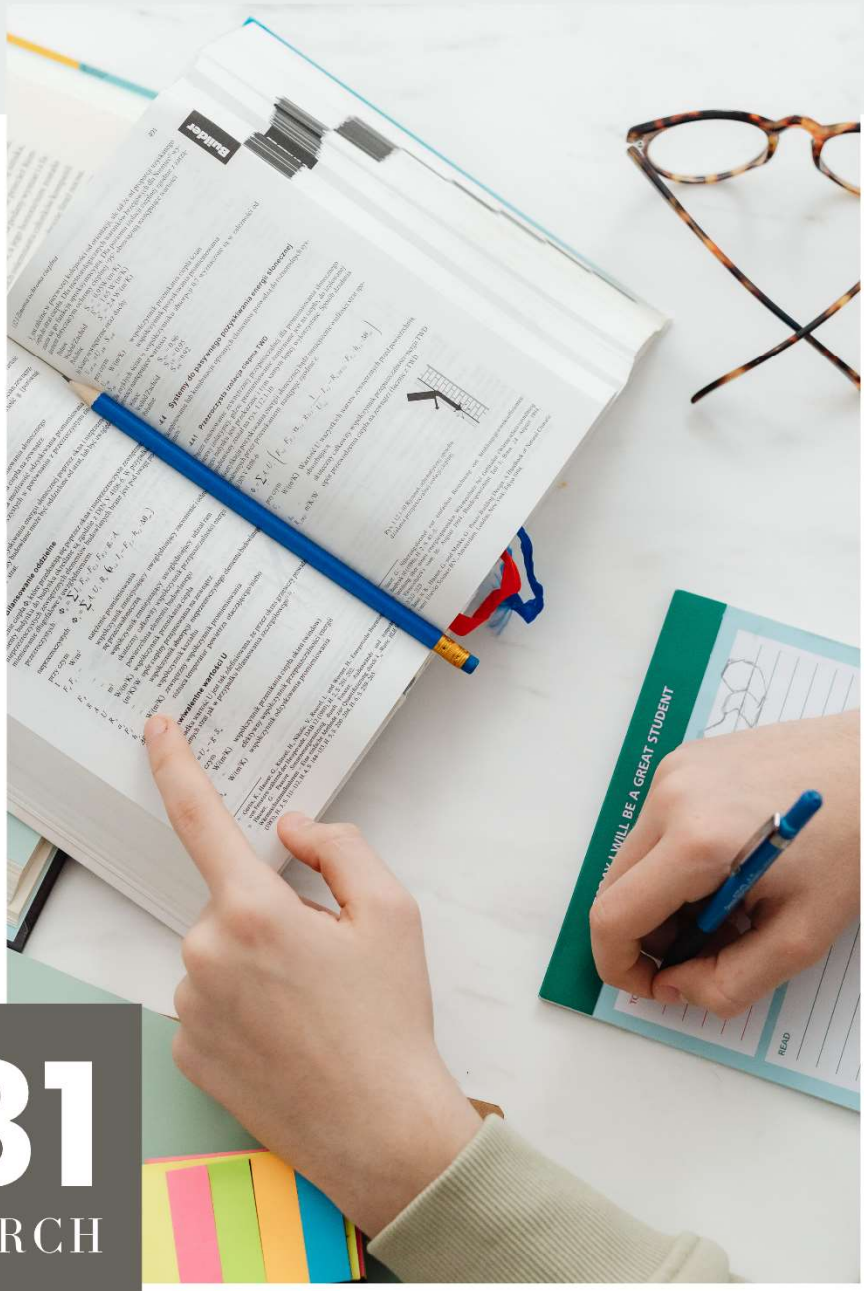
COLLECTION

Innovation, integration and modern problems in the scientific activities of young researchers and students: theory and practice



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Innovation, integration and modern problems in the scientific activities of young researchers and students: theory and practice collection of materials of the international scientific and practical conference on the topic

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In the collection of materials of the conference, the role and role of Science, Education and production in the era of globalization, the pressing problems of the issues of interaction of these processes, feedback on their solutions were presented by mature specialists of the field.

In addition, research on the scientific and practical topic, carried out in the economics, Exact Sciences, Natural Sciences and socio-humanities during the globalization period, information is presented in the scientific and practical fields, which includes the latest innovative technologies in the fields of production.

It can be argued that this collection is one of the specific intersections of current thoughts and innovative ideas of the world of science. This scientific and practical conference was actively attended by professors and scientific researchers engaged in scientific research in Uzbekistan and foreign countries. In increasing the position of the scientific and practical conference, the professors and teachers of domestic and foreign higher educational institutions made a significant contribution.

Professors and teachers of foreign higher educational institutions who actively participated in the work of the conference made a worthy contribution to the high level of interaction with scientists of our country. The processes of international cooperation with foreign countries and exchange with them in the field of Science in the era of globalization have a positive effect on the development of Higher Education, the fields of Science and production. The materials of this conference are special in that they include a wide range of research, from theoretical developments to practical solutions, demonstrating the diversity of approaches and directions in this area.

In conclusion, it should be noted that this scientific and practical conference will be a very useful collection for everyone who is interested in modern research in the fields of further development of Higher Education, Science, Education and production in the era of globalization. The authors are responsible for the content and quality of the articles and abstracts included in the collection.

THE ROLE OF THE CIRCULAR ECONOMY IN A COUNTRY'S INDUSTRIAL SECTOR

Qodirova Dilnura Ozodjon qizi
Student of the faculty of Philology and language teaching, Jizzakh branch of the National university of Uzbekistan
Saitov Sirojiddin Abduvaliyevich
Scientific Supervisor, Senior lecturer, Jizzakh branch of the National university of Uzbekistan
dilnuraqodirova88@gmail.com

Annotation: This thesis examines the concept of the circular economy, its core principles, and its strategic role in the development of national industry. In the context of increasing resource scarcity, environmental degradation, and the limitations of the traditional linear economic model, the circular economy is considered an effective mechanism for ensuring sustainable industrial development. The study analyzes the economic, environmental, and social benefits of efficient resource use, waste reduction, recycling, and reuse within industrial sectors. In addition, international best practices and the possibilities of adapting them to national industrial development are discussed.

Keywords: circular economy, industry, sustainable development, resource efficiency, recycling, environmental protection.

One of the most pressing challenges facing the global economy in the twenty-first century is the growing scarcity of natural resources and the disruption of ecological balance. The traditional linear economic model based on the principle of "take–make–dispose" is no longer capable of ensuring long-term economic and environmental sustainability. In particular, industrial sectors are characterized by high levels of raw material consumption, energy use, and waste generation, which significantly increase pressure on the environment. Under these conditions, the transition to a circular economy has become an objective necessity. The circular economy is an economic model aimed at maximizing resource efficiency, extending the life cycle of products, and transforming waste into secondary resources. This approach plays a crucial role in industrial modernization, the introduction of innovative technologies, and the transition toward a green economy. Therefore, studying the role of the circular economy in national industry is of great theoretical and practical importance.

The circular economy is increasingly recognized as a key mechanism for enhancing resource efficiency and long-term sustainability in industrial development. Unlike the traditional linear economic model, which operates on a "take–make–dispose" basis and consumes large amounts of virgin materials, the circular economy prioritizes the reuse, recycling, and optimal utilization of resources. By keeping materials and energy in use for as long as possible, this

approach significantly reduces the demand on finite natural resources and minimizes environmental degradation. As a result, industries can reduce both production costs and dependency on imported raw materials, which strengthens resilience against global market fluctuations. Moreover, improving resource efficiency through circular practices also supports broader sustainability goals, such as lowering greenhouse gas emissions and reducing waste generation, thus aligning industrial growth with environmental protection strategies. One of the core advantages of the circular economy in industry is its potential to transform waste into valuable inputs. Rather than treating waste as a disposal problem, industrial systems can repurpose by-products and discarded materials into new industrial inputs, enhancing material cycles and reducing the overall ecological footprint of production processes. This not only creates economic value from previously unused materials but also supports a shift toward eco-efficient and sustainable industrial ecosystems. In sum, the circular economy serves as a strategic tool for resource efficiency and industrial sustainability by reducing raw material consumption, cutting production costs, and promoting environmentally responsible practices that reinforce long-term industrial competitiveness and resilience.

The circular economy offers substantial environmental and economic benefits that contribute to the sustainable growth of industrial sectors. By shifting away from the traditional linear model of "take–make–dispose," circular practices focus on reducing waste, conserving natural resources, and minimizing environmental impact. For instance, reusing and recycling products slows down the depletion of raw materials, reduces pollution, and lowers greenhouse gas emissions—key factors in tackling climate change and preserving biodiversity. Prioritizing efficient product design, recycling of materials, and extended product lifecycles helps industries decrease their ecological footprint while protecting ecosystems and human health. Economically, the circular economy improves resource efficiency and cost-effectiveness in industrial activities. Companies that adopt circular strategies can reduce their dependence on expensive virgin raw materials by increasing the use of secondary resources and recycling waste materials, which in turn lowers production and disposal costs. This enhances supply chain resilience and reduces vulnerability to global price fluctuations in raw materials. Additionally, circular models foster the emergence of new business opportunities, such as recycling services, repair and refurbishment sectors, and innovative product design industries, which stimulate economic growth and create employment opportunities. Moreover, the transition to a circular economy encourages industries to adopt sustainable production processes that align economic development with environmental protection. By integrating circular principles, industrial enterprises become more competitive, adaptable, and better positioned to meet regulatory requirements focused on environmental performance. Ultimately, the dual benefits - environmental preservation and economic value creation - make the circular economy a strategic pathway for sustainable industrial development.

The circular economy not only enhances resource efficiency but also acts as a significant driver of innovation and structural transformation within industrial

sectors. By redefining traditional production models, the circular economy fosters the development of new technologies, business models, and industrial processes that prioritize sustainability and competitiveness. Industrial transformation under a circular model involves redesigning products and systems to minimize waste, increase reuse and recycling, and integrate advanced technologies such as digitalization, automation, and intelligent resource tracking. This shift supports innovation across production, supply chain management, and product lifecycle strategies, enabling firms to remain competitive in a rapidly changing global market.

In addition, circular economy practices stimulate the emergence of eco-innovations and technological advancements that contribute to structural changes in industry. Innovations in recycling technologies, circular supply chains, and industrial symbiosis—where by-products from one process become inputs for another—are examples of how circularity encourages cross-sector collaboration and value creation. These innovations help industries move away from linear modes of production toward systems that create higher value with lower environmental cost. This deep restructuring often leads to new economic activities, such as remanufacturing, repair services, sustainable materials development, and digital tracking solutions, which in turn diversify industrial output and strengthen economic resilience. Furthermore, the circular economy encourages industry-wide transformation by aligning with cutting-edge technological paradigms such as Industry 4.0 and beyond. Technologies like the Internet of Things (IoT), artificial intelligence, and advanced data analytics support circular processes by improving efficiency, transparency, and traceability across production and supply chains. These technological integrations not only accelerate circular transitions but also drive competitive advantage, enabling industrial firms to innovate continuously and adapt to evolving sustainability standards and market demands. Overall, the circular economy functions as a catalyst for industrial innovation and structural transformation, promoting sustainable growth while reshaping how industries produce, consume, and create value.

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