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GREEN ECONOMY IN CENTRAL ASIA: BARRIERS AND PROSPECTS FOR SUSTAINABLE DEVELOPMENT

Saidakbarov Khusniddin Abdisalamovich-
Tashkent State University of Economics,
Associate Professor of "Accounting Department" DSc
Email: saidakbarovxusniddin794@gmail.com
ORCID: 0009-0000-1277-3877

Abstract: Central Asia has escalating environmental challenges, including water scarcity, soil degradation, and air pollution, which jeopardize the region's long-term economic stability and social welfare. This essay examines the region's transition to a green economy, emphasizing the strategic importance of inclusive development, circular economy models, and renewable energy sources. It analyses national initiatives, including Kazakhstan's Green Economy Concept and Uzbekistan's efforts to advance renewable energy, while emphasizing the significance of regional cooperation platforms, such as CAREC and IFAS, in facilitating environmental governance across borders. Obstacles persist, notwithstanding the beneficial improvements made. These impediments encompass disjointed policies, insufficient funding, and limited technological proficiency. The article posits that sustainable growth in Central Asia can be attained through coordinated efforts, investments in eco-friendly infrastructure, and the empowerment of local communities. By harmonizing environmental sustainability with economic resilience, Central Asia may redefine its development path and position itself as a model for inclusive, low-carbon growth.

Keywords: Green economy, Central Asia, sustainable development, renewable energy, circular economy, environmental management, climate resilience, regional cooperation, green infrastructure, water scarcity, land degradation, air pollution, solar and wind energy, green jobs.

1.**Introduction**.

Briefly defining the concept of "green economy," it is characterized by minimal carbon emissions, resource conservation, and social inclusion, and has attracted worldwide attention as a response to environmental degradation and economic imbalance. In Central Asia, which includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, the green economy is not only a government goal, but also an important aspect of development. The history of resource-intensive industries in the region, as well as environmental disasters such as the drying up of the Aral Sea,

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indicate the need for a transition to a sustainable green economy. It should be noted that the experience of developed countries shows that a green economy serves to improve not only the economy of a particular country, but also the relations of countries that want to implement it. Because to run a good economy, first of all, it is necessary to establish a good policy, and this is achieved primarily through the implementation of a good neighborly policy with neighboring countries. Central Asia, consisting of Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, and Turkmenistan, is going through a delicate but important transition period. The region, historically characterized by a remnant mining industry from the Soviet era, centralized planning, and deteriorating environmental conditions, is now redefining its growth direction with a focus on sustainability. The green economy, which emphasizes low-carbon development, resource conservation, and social inclusion, serves as a strategic foundation for addressing local challenges and global commitments.

This transition is not only a local change, but also a strategic process that affects the whole world. In the context of global challenges of climate change, energy instability, and environmental degradation, Central Asia's shift towards sustainable development provides valuable insights, opportunities, and foundations for other developing economies. The success or failure of the region in this initiative will lead to consequences that will go far beyond its borders. Central Asia is facing unique environmental problems. Warming in the region is twice the global average, and rising temperatures endanger water supply, agricultural productivity, and public health. The drying up of the Aral Sea is one of the most visible ecological disasters in the world, and desertification and soil salinization continue to endanger rural life. These problems prompted a revision of growth models. Governments are increasingly recognizing that environmental degradation is not only a byproduct of growth but also hinders progress.

The Green Economy Concept of Kazakhstan, founded in 2013, sets high goals for the efficiency of using renewable energy sources and resources. Uzbekistan has accelerated investments in solar and wind energy, while simultaneously changing the methodology of water management and agriculture. Kyrgyzstan and Tajikistan, which have great hydropower potential, are studying regional energy trade to reduce dependence on fossil fuels. These strategic shifts indicate a growing recognition that sustainability is more important for stability and prosperity than luxury. The topography of Central Asia provides unique benefits for sustainable innovation. The vast steppes of Kazakhstan and Uzbekistan are suitable for solar and wind power plants, but the mountainous landscapes of Kyrgyzstan and Tajikistan facilitate the development of hydropower. Turkmenistan, with its large natural gas reserves, is going through a more complex

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transition period, but has begun exploring ways to reduce energy efficiency and methane. In addition to electricity, the region is exploring sustainable agriculture, ecotourism, and climate-resilient infrastructure. Urban centers such as Tashkent and Almaty are implementing green building rules, electric transport systems, and waste recycling initiatives. These programs show that innovation can develop not only in rich countries, but also where there is political determination and strategic commitment.

The green economy of Central Asia is closely linked to the goals of global stability. In exploring alternative fossil fuels, the region's renewable energy potential can facilitate the diversification of global supply chains and reduce dependence on high-carbon sources. Kazakhstan's wind corridors and Uzbekistan's solar fields are not only national resources but also an integral part of a comprehensive solution to global energy security. In addition, Central Asia's initiatives to restore degraded ecosystems will improve global health. The partial restoration of the Aral Sea basin demonstrates the effectiveness of coordinated environmental initiatives. These restoration measures will serve as a model for other regions affected by environmental degradation.

The region's adherence to international norms, including the Paris Agreement and the Sustainable Development Goals (SDGs), demonstrates its global significance. By integrating sustainability into public administration, planning, and diplomacy, Central Asia is establishing itself as a responsible participant in the global environmental landscape. The green transition ensures regional stability from a geopolitical point of view. Environmental cooperation reduces the likelihood of conflicts over common resources, builds trust between neighboring structures, and strengthens diplomatic relations. In an industry traditionally characterized by competition and fragmentation, sustainability represents a holistic agenda.

2.Research methodology.

In this study, a qualitative, exploratory research approach was used to study the institutional roles, methods, and impacts of the Central Asian Regional Economic Cooperation (CAREC) and the International Fund for Saving the Aral Sea (IFAS) in promoting green development throughout Central Asia. The methodology is suitable for understanding complex, multi-level management systems and systems of environmental cooperation. Analysis of secondary data by reviewing documents, including the study of official reports, strategic plans and publications of the CAREC, IFAD, ADB (Asian Development Bank), UNDP (United Nations Development Programme) and regional governments.

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Media and news sources: Analysis of current achievements, initiatives, and public dialogue on the activities of the CAREC and IFAC.

Objective: To gain a deep understanding of institutional effectiveness, barriers, and promising areas.

Cyclical economic models can create green employment opportunities while reducing environmental impact through waste management reform, introducing eco-design, and developing industrial symbiosis. Pilot initiatives in Kazakhstan and Uzbekistan demonstrate potential. Empowering youth, women, and rural areas is of paramount importance. Green employment in agriculture, construction, and energy can stimulate inclusive growth if supported by vocational education and social security networks.

Regional cooperation initiatives, such as the International Fund for Saving the Aral Sea (IFAS) and the Central Asian Regional Economic Cooperation Initiative (CAREC), can promote knowledge exchange and joint investment in sustainability.

Regional context and environmental pressures:

Central Asia is among the most climate-sensitive regions in the world. Critical environmental problems include:

• Water scarcity:

Management of transboundary water resources is problematic, especially in the Syr Darya and Amu Darya basins.

• Air pollution:

In urban centers such as Almaty and Tashkent, the concentration of solid particles is increasing due to outdated transport and heating systems.

• Land degradation:

expansion of pastures, deforestation, and salinization jeopardize agricultural efficiency.

3.Results

Central Asian governments have begun to incorporate sustainable concepts into their national development approaches: Kazakhstan introduced the "Green Economy" concept in 2013, aiming for 50% renewable energy by 2050.

In Uzbekistan, special attention is paid to solar and wind energy, and large funds are allocated for photovoltaic installations.

The CAREC has strengthened regional connectivity and environmental solidarity by ensuring cross-border energy trade and sustainable transport corridors. The International Fund for

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Saving the Aral Sea put forward joint initiatives on water resource management in the Aral Sea basin, and developed environmental rehabilitation and diplomatic dialogue. Waste management reforms and environmental industry projects began in certain urban areas, demonstrating opportunities for resource conservation and job creation. Green employment opportunities are emerging in agriculture, construction, and energy, offering new prospects for youth and rural areas.

Environmental education and vocational training initiatives helped transform the workforce towards sustainability. Governments have begun to align national strategies with global frameworks such as the Sustainable Development Goals and the Paris Agreement. Thanks to the participation of the media, education, and civil society, public attention to environmental problems has increased.

Kyrgyzstan and Tajikistan, which have great hydropower potential, are studying regional energy trade to reduce dependence on fossil fuels. Nevertheless, due to the limited capacity of institutions, fragmented management, and low public attention, the implementation of the intended goal is inconsistent. In the development of renewable energy, the vast deserts of Central Asia and increased solar radiation create great opportunities for renewable energy.

Joint regional efforts on network integration and financing can facilitate scalable solutions. If several identified problems are solved, there is a possibility of achieving even better results. Despite developments, many obstacles remain, for example:

Financial shortcomings: Green initiatives often face obstacles in obtaining cost-effective financing.

• Policy fragmentation: Lack of consistency prevents cross-border cooperation.

• Technological dependence: Many countries are dependent on imported green technologies, limiting local innovations.

• Lack of data: Lack of reliable environmental data hinders effective monitoring and assessment.

Addressing these challenges requires synchronous action, capacity building, and global support.

4.Summary.

Central Asia is taking an important turning point in the pursuit of sustainable development. The transition to a green economy is not only a political decision, but also a strategic need influenced by the region's environmental sensitivity, economic vulnerabilities, and population problems. The article shows that the problems are significant: water scarcity, land degradation, and outdated infrastructure continue to hinder development. However, within these problems,

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there is a transformational possibility. Renewable energy, especially solar and wind energy, provides the ultimate path to achieving energy autonomy and carbon neutrality.

Uzbekistan and Kazakhstan have begun investing in large-scale solar power plants and wind corridors, indicating a shift in regional priorities. Expanding these initiatives is not just an aspiration, but requires significant financial resources, regional cooperation, and capacity building in both the public and commercial sectors. The need for inclusive and equitable development is also important.

The green economy should be environmentally sustainable and socially just. This includes creating green employment opportunities, expanding the capabilities of agricultural technologies, and ensuring that the population in need of assistance is not left behind during the transition period. In particular, educational and enlightenment initiatives aimed at young people can form a new group of leaders and innovators who are not indifferent to the environment. For success, regional cooperation is necessary.

Organizations such as the CAREC and IFAC simply need to move from discussion forums to catalysts for joint action - promoting cross-border initiatives, standardizing environmental regulations, and disseminating technological expertise. The interconnected characteristics of the ecosystems of Central Asia require a coordinated approach, not scattered initiatives.

A green economy is not a distant dream; it is the foundation of stability, prosperity, and regional stability. By introducing sustainable practices, investing in innovation, and developing cooperation, Central Asia can change its path of development.

The path to the future can be complex, but through strategic foresight and unified decision-making, the region can transform its environmental problems into a driver of sustainable prosperity and change.

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