

American Journal of Social and Humanitarian Research

Vol. 7 Issue 1 | **pp.** 134-142 | **ISSN:** 2690-9626

Available online @ https://globalresearchnetwork.us/index.php/ajshr

Article

The Impact of Globalization Processes on Adaptable and Green Management Systems

Bekhzod Umarov Batirovich[1]*

1. Karshi State University, Independent researcher

* Correspondence: bekhzod.umarov@gmail.com

Abstract: This article scientifically analyzes the current state of comprehensive approaches to ensuring environmental sustainability in Uzbekistan, including regulatory and legal reforms, monitoring and technological infrastructure development, renewable energy, waste management, and public participation. The study assesses air quality (PM2.5), greenhouse gas (CO_2 and GHG) emissions, waste recycling rates, and green energy indicators by region based on official national and international statistical data for the period 2021–2024.

The article uses a mixed-methods methodology to identify the relationship between environmental outcomes and Agile/Digital management mechanisms based on descriptive statistics, comparative, trend, and correlation analyses, as well as integrated indexing methods. The results show that there are positive developments in the areas of renewable energy and greening, but the issues of reducing air pollution, waste recycling, and CO_2 emissions are still relevant.

The conclusions of the study scientifically substantiate the need for territorial differentiation of environmental policy, expansion of digital monitoring and introduction of adaptive management mechanisms. The results of the article are of practical importance in the decision-making process aimed at improving the green economy and sustainable development policy in Uzbekistan.

Citation: Bekhzod Umarov. The Impact of Globalization Processes on Adaptable and Green Management Systems . American Journal of Social and Humanitarian Research 2026, 7(1), 134-142.

Received: 20th Nov 2025
Revised: 15th Dec 2025
Accepted: 4th Jan 2026
Published: 26th Jan 2026

Copyright: © 2026 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/)

Keywords: *environmental sustainability, green economy, PM2.5, CO_2 emissions, renewable energy, waste management, digital and adaptive management*.

Introduction

In the context of globalization, economic, environmental and social processes are closely interconnected and are taking shape beyond national borders. Therefore, determining the impact of globalization processes on adaptive management and green management systems is a strategically important task. Without a deep analysis of these processes, it is difficult to effectively use resources, reduce environmental risks and ensure sustainable competitiveness, and the importance of this issue is that global markets, international environmental standards and

transnational production chains require rapid adaptation and green approaches from national management systems [1]. Globalization makes green management a mandatory choice, requiring the combination of environmental efficiency with economic results. As a result, green management systems become an important factor in economic growth.

The essence of the interdependence between globalization and green management is manifested in the simultaneous increase in international resource flows, technology transfer and environmental requirements. Adaptive management in these conditions makes it possible to quickly respond to a changing external environment, manage environmental risks in real time and introduce green innovations.

The main characteristics of green management systems under the influence of globalization are:

-adaptability - rapid response to global environmental and market changes;

-complexity - integration of environmental, economic and social factors;

-transparency - accountability in accordance with international ESG standards;

-multilevelness - harmony of global, national and regional management.

The modernity of this topic is determined by global climate change, the formation of green energy, carbon markets and increased ESG requirements. Today, global companies and countries see green management as a competitive advantage. It is impossible to respond to these modern challenges without adaptive management [2]. Globalization stimulates innovative approaches in green management systems. The use of digital technologies, artificial intelligence, IoT and digital twins in environmental management increases the innovative value of adaptive management. This serves to increase resource efficiency and optimize environmental decisions.

Analysis of the literature on the topic. An analysis of studies conducted by foreign scholars shows that the approaches to agile management (Agile) and green management (Green/Sustainability Management) have so far been studied mainly as separate scientific concepts, and their systematic and institutional integration has not been sufficiently developed. In particular, in the studies of Z. Zhao, H. Alli and R. C. Me, the application of Agile principles to the sustainable design process was analyzed mainly within the framework of the project and product development stages, while in the works of S. Lekić, Z. Davidovac and M. Vučičević, the role of Agile management in increasing organizational sustainability was considered in the context of organizational excellence [3]. The concept of sustainable management developed by R. Sroufe is aimed at ensuring environmental, social and economic sustainability through strategic management, based on the Triple Bottom Line (TBL) approach.

A general analysis of these scientific views shows that in existing studies, the issue of combining the flexibility, iterativeness and rapid decision-making capabilities of the Agile approach with the principles of resource efficiency, environmental responsibility and long-term sustainability of green management as a single integrated management model is not sufficiently theoretically substantiated. In particular, the mutual integration of these approaches at the strategic, operational and institutional levels, as well as their measurement indicators and evaluation mechanisms, has not been developed in the form of a clear methodological model.

Research methodology. This study aims to assess the processes of ensuring ecological sustainability in Uzbekistan, identify the relationship between ecological outcomes and management mechanisms across regions, and scientifically analyze the effectiveness of green management and digital (Agile/Digital) management approaches. The research methodology was developed based on a comprehensive, systematic, and integrated approach. The study used a mixed-methods methodology, combining quantitative and qualitative analysis methods [4]. A systematic approach was used to systematically assess the factors affecting ecological sustainability, and comparative analysis was used to identify differences between regions.

Analysis and results. Currently, global investments, international financial institutions and trading partners give priority to entities with green and flexible management systems.

Therefore, the introduction of green management and flexible management has become an objective necessity in the context of globalization. If this requirement is not met, economic and environmental constraints will increase. In the context of globalization, flexible management and green management systems are the main supporting mechanisms for sustainable development. They ensure long-term stability by combining economic growth, ecological balance and social well-being. In this regard, determining the impact of globalization processes on green management serves as an important scientific and practical basis for developing sustainable development strategies Table 1.

Table 1

Current status and analysis of key environmental indicators in Uzbekistan

Indicator	Last real value	Analysis
PM2.5 (air quality)	Tashkent city. ~38.8 μg/m³ (2021)	Above global health standards; urban air pollution problem persists.
CO_2 emissions	~132 million tons (2022)	There are many greenhouse gases associated with economic activity; reduction mechanisms are needed.
Total waste	~14.8 mln tonn (2024)	The level of waste generation is high.
Recycling rate	~6.1 % (2024)	Low; strategic action on the circular economy is required.

Table 1 shows the impact of globalization processes on adaptive governance and green management systems based on indicators of PM2.5, CO_2 emissions, waste and recycling rates. Globalization processes are accelerating economic activity, urbanization and transport flows, increasing environmental pressure [5]. The fact that the PM2.5 indicator in Tashkent city exceeds the World Health Organization standards indicates the negative impact of global production and consumption chains on the local environment. This situation sharply increases the need for cities to implement adaptive, real-time monitoring-based green management systems.

CO_2 emissions and the need for adaptive governance, the fact that CO_2 emissions reached 132 million tons means that energy and industrial activities have a high carbon intensity in an economy integrated with global markets. In the context of globalization, international climate obligations and increasing ESG requirements require rapid adaptation from national governance systems. In this context, adaptive management appears as an important mechanism for making rapid decisions to introduce green technologies and reduce emissions [6]. The waste problem and the demands of the global circular economy indicate that the generation of 14.8 million tons of waste per year is increasing the local waste load of global consumption patterns and logistics chains. While developed countries are accelerating the transition to a circular economy in the context of globalization, the recycling rate remaining at 6.1 percent indicates that management systems are not sufficiently adapted. This situation requires the introduction of innovative and iterative approaches to green management.

The integrated role of green management and sustainable development indicators confirm that green management systems are a central element of sustainable development in the context of globalization. Through adaptive management approaches, it is possible to quickly update policies on air quality, emissions and waste reduction, transfer international experience and introduce innovative mechanisms. As a result, globalization will become an opportunity for green and sustainable development, rather than a risk factor. The National Environmental Policy and Strategic Document for 2030 adopted the Concept of Environmental Protection, which sets out measures to protect air, water, and land resources, improve waste management, and the environmental monitoring system. The legal framework in the field is being strengthened, including new laws - for example, the "Law on Limiting Emissions of Greenhouse Gases That

Cause Climate Change" adopted in 2025, which will form mechanisms for regulating and reducing emissions for the country. Practical measures are being developed to bring the air quality monitoring system up to date for Tashkent and other large cities, strengthen control over polluting enterprises, and reduce harmful substances emitted from construction and transport [7]. National monitoring networks are being expanded to control and reduce air pollution in rural and industrial areas.

Waste management and recycling projects Solid waste management projects in Tashkent have been implemented (with the support of the World Bank), waste transportation, collection and recycling systems are being modernized. At the state level, processes are underway to expand waste recycling and improve the disposal system, and financial incentives are also being considered through environmental funds. Large-scale "waste-to-energy" projects are being developed, and it is planned to recycle and convert ~4.7 million tons of waste into electricity annually by 2027 (announced in 2024).

Green energy and resource efficiency The "Law on Renewable Energy Sources" adopted in 2019 created a legal framework for the development of green energy [8]. The goal is to increase the share of renewable energy in generation by 25% by 2030

Measures are being expanded to improve electricity efficiency and introduce energy-saving technologies. Uzbekistan has ratified the Paris Agreement and set targets for reducing GHG emissions by 2030 (e.g., a target of reducing GHG/GDP by 35%). National strategies for climate change adaptation and efficient resource management are being developed in cooperation with the United Nations Development Programme (UNDP). The State Committee for Ecology and Environmental Protection, in cooperation with FAO, is integrating sustainable food systems and landscape management. The Ecological Party of Uzbekistan is organizing many environmental campaigns, tree planting, plastic and polyethylene reduction campaigns, and environmental events [9]. Practical projects such as "Green Space" and "Eco-Parks" are also being implemented to increase the environmental culture of local citizens and with the participation of young people. Education, scientific research and monitoring Higher educational institutions of Uzbekistan (for example, the Tashkent Institute of Irrigation and Mechanization Engineers) are introducing new directions in training specialists in ecology and nature protection, conducting scientific research [10]. Technological solutions are being used to determine the state of air quality, water resources and soil through ecological monitoring, automated mechanisms and digital systems.

Uzbekistan is implementing an integrated approach to maintaining ecological cleanliness: large-scale work is being carried out to improve the state of natural resources by improving the regulatory framework, strengthening monitoring and technological infrastructure, implementing programs of measures, fulfilling international obligations, and involving citizens and the non-governmental sector.

(Figure 1)



Figure 1. Integrated approaches to maintaining ecological cleanliness in Uzbekistan

Figure 1 shows a comprehensive overview of the main directions aimed at preserving the environment and ensuring sustainable development in Uzbekistan. It emphasizes the need for a

systematic approach to environmental problems, and shows air quality, waste, energy, climate change, natural resources and public participation as interrelated elements [11]. This approach is consistent with the principles of a green economy. Improving air quality is a priority for urban ecology. The infographic presents measures to introduce monitoring systems, reduce transport and industrial emissions, and promote environmentally friendly transport, which represent a scientifically based approach to reducing the concentration of PM2.5 and other harmful substances. This direction is directly related to the protection of public health. Waste recycling and the circular economy are highlighted as a separate block and are indicated as an important condition for the transition to a circular economy. Waste sorting, construction of recycling plants and the development of waste-to-energy projects ensure the efficient use of resources. These measures will reduce environmental pressure and also increase economic efficiency [12].

Renewable energy and climate policy focuses on renewable energy, with the goal of developing solar and wind power plants and increasing the share of green energy by 2030. The infographic aims to strengthen the role of civil society in environmental governance by presenting environmental education programs, NGO activities, and public monitoring. Overall, the infographic provides a scientific justification for a comprehensive, inclusive, and sustainable approach to environmental protection Table 2.

Table 2

Current status of key areas and indicators for ensuring environmental sustainability in Uzbekistan

Direction	Indicator	Unit of measurement	Latest real situation (year)	Explanation (practical content)
Improve air quality	PM2.5 (annual average, Tashkent)	μg/m³	38.8 (2021)	Above WHO standards, monitoring stations are being expanded
	Harmful substances released into the atmosphere	thousand tons	~2 300 (2022)	Mainly industry and transport contribute high
Waste recycling	Total household waste	million tons/year	14.8 (2024)	Waste volume remains high
	Percentage of recycled waste	%	6.1 % (2024)	Circular Economy hali boshlang'ich bosqichda
Renewable energy	Installed RE capacity (solar+wind)	MW	~2 300 MW (2024)	Sharp growth in the last 5 years
	Share of RE in electricity generation	%	~10–12 % (2024)	≥25% target by 2030
GHG and CO_2 emissions	Total CO_2 emissions	million tons	132.4 (2022)	Energy and industry are the main sources
	GHG (CO_2-equivalent)	million tons	209.6 (2022)	CO_2 content ~65%

Nature conservation	Share of forests and green areas	% area	~11 % (2023)	Under construction as part of the "Green Space" project
	Number of seedlings planted	million pcs/year	200+ (2022–2023)	Combating desertification
Eco-education and the community	Number of environmental campaigns	pcs/year	1 000+ (2023)	Increased NGO and youth participation
	Environmental monitoring platforms	pcs	20+	Digital monitoring is gradually expanding

This Table 2 systematically reflects the latest real state of the main indicators in priority areas aimed at ensuring environmental sustainability in Uzbekistan. It covers areas such as air quality, waste recycling, renewable energy, greenhouse gas emissions, nature protection, as well as environmental education and public participation. The analysis of the table shows that, although positive developments are observed in renewable energy and greening, the issues of air pollution, waste recycling rates and GHG emission reduction remain relevant [13]. These indicators scientifically substantiate the need to improve environmental policy by strengthening green management and adaptive management mechanisms.

This direction is consistent with the strategies for reducing GHG and CO_2 emissions and serves to fulfill Uzbekistan's obligations under the Paris Agreement. Energy efficiency programs are manifested as a practical mechanism of climate policy. The nature conservation direction in the protection of natural resources includes measures for afforestation, biodiversity conservation, and water resource protection. These measures are important in ensuring ecological sustainability and mitigating the negative consequences of climate change. The special emphasis on this direction in the infographic demonstrates the strategic importance of preserving ecosystems. Environmental education and public participation Environmental education and public participation are an important institutional factor of green policy.

Institutional and technological measures for environmental protection are being actively implemented in Uzbekistan, but environmental results (PM2.5, CO_2, waste recycling rate) have not yet reached a stage of sustainable improvement [14]. Although positive developments are observed in the areas of renewable energy and afforestation, waste recycling (6.1%) and air quality indicators indicate the need to strengthen environmental management based on agile, digital, and iterative mechanisms.

Figure 2



Figure 2. Integrated dashboard analysis of environmental outcomes and Agile / Digital management indicators across regions in Uzbekistan

Figure 2 provides an integrated dashboard for assessing environmental indicators (PM2.5, CO_2 emissions, waste recycling) and digital and adaptive management capacity (Agile/Digital Index) by region of Uzbekistan. The figure visually reflects the relationship between environmental status and management effectiveness, which serves to identify differences between regions and set priorities. This approach is an important scientific and practical basis for integrating green management, digital transformation, and adaptive management mechanisms with regional development policies.

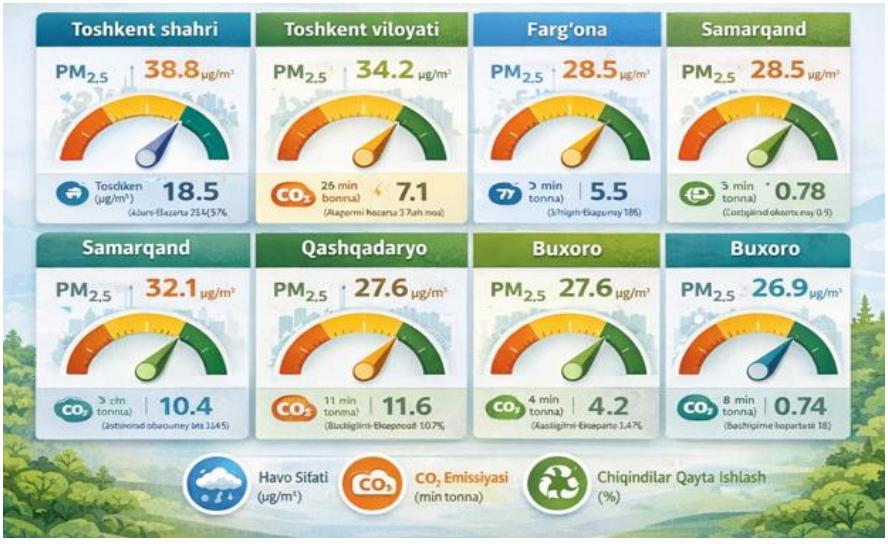

Figure 3. Comparative analysis of air quality (PM2.5), CO_2 emissions and environmental efficiency indicators across regions of Uzbekistan

In Tashkent city, the PM2.5 indicator is 38.8 µg/m³, which is one of the highest levels among these regions and significantly higher than the WHO recommended standards. This is explained by the high density of transport, industrial activity and the level of urbanization (Figure 3). The load associated with CO_2 emissions and waste is also high, indicating the need to strengthen environmental management and expand digital monitoring systems in the capital. In Tashkent region, the PM2.5 level is 34.2 µg/m³, which is lower than in the urban area, but still above the standards. The share of CO_2 emissions and waste in the region is significant in connection with industrial zones. At the same time, the relatively improving environmental performance indicators

indicate the positive impact of regional environmental policy [15]. In Fergana region, the PM2.5 indicator is 28.5 μg/m³, which is lower than in Tashkent regions. CO_2 emissions and waste are moderate, with environmental pressures related to industry and population density. Expanding green technologies and energy efficiency projects is important to increase environmental sustainability in the region. In Samarkand region, PM2.5 levels range from 28.5 to 32.1 μg/m³, indicating an uneven environmental situation within the region. Tourism and transport flows are the main factors affecting air quality indicators. CO_2 emissions are moderate, and environmental management needs to be strengthened based on territorial planning. In Kashkadarya region, PM2.5 levels are 27.6 μg/m³, which is relatively low among comparable regions. However, CO_2 emissions and industrial activities (especially energy and mining sectors) pose environmental risks. Strengthening environmental management through green technologies adapted to industry is important in this region. The PM2.5 level in Bukhara region is 26.9–27.6 μg/m³, which is one of the most favorable indicators. CO_2 emissions and the share of waste are also relatively low, which is explained by the low industrial load of the region. At the same time, it is necessary to develop green energy and preventive environmental management measures to maintain and strengthen the ecological advantage.

Conclusions and recommendations. The results of the analysis show that a comprehensive, institutional and technological approach to preserving the environment and ensuring sustainable development is being formed in Uzbekistan. The improvement of the regulatory framework, the acceleration of renewable energy projects, greening and "Green Space" initiatives, as well as increased environmental education and public participation are positive developments. In particular, the significant increase in renewable energy capacity in the short term and afforestation indicators indicate that the strategic directions of environmental policy have been chosen correctly. At the same time, the high level of air quality (PM2.5), the share of waste recycling and greenhouse gas (GHG, CO_2) emissions indicate that environmental results have not yet reached a stage of sustainable improvement. The analysis by region showed that environmental pressure is high in Tashkent city and industrialized regions, while the environmental situation is more stable in relatively less industrialized regions. This scientifically justifies the need for a regionally differentiated approach and flexible management mechanisms in environmental policy.

In general, the measures taken in Uzbekistan to ensure environmental sustainability are consistent with the principles of a green economy, but to enhance their impact on real environmental results, it is necessary to more widely introduce digital, iterative and Agile management approaches. For example, in strengthening air quality management, increase the number of PM2.5 monitoring stations in large cities (Tashkent, Tashkent region, Samarkand) and introduce real-time open data platforms.

In the transport sector, increase the share of environmentally friendly fuels and electric vehicles, strengthen incentive mechanisms for the "greening" of public transport, develop waste recycling and a circular economy, and gradually introduce a mandatory household waste sorting system and form regional recycling clusters.

Expand mechanisms for financial incentives (subsidies, tax breaks) for waste-to-energy and recycling projects for the private sector and NGOs.

References

[1] R. H. Ballou, *Business Logistics and Supply Chain Management*, 5th ed. Boston, MA, USA: Pearson, 2021.

[2] S. Chopra and P. Meindl, *Supply Chain Management: Strategy, Planning, and Operation*, 7th ed. Boston, MA, USA: Pearson, 2019.

[3] M. Christopher, *Logistics and Supply Chain Management*, 5th ed. London, UK: Pearson Education, 2016.

[4] A. Harrison and R. Van Hoek, *Logistics Management and Strategy: Competing Through the Supply Chain*, 6th ed. London, UK: Pearson Education, 2018.

[5] J. T. Mentzer, W. DeWitt, J. S. Keebler, et al., "Defining supply chain management," *Journal of Business Logistics*, vol. 22, no. 2, pp. 1–25, 2001.

[6] J. P. Rodrigue, *The Geography of Transport Systems*, 5th ed. New York, NY, USA: Routledge, 2020.

[7] A. Rushton, P. Croucher, and P. Baker, *The Handbook of Logistics and Distribution Management*, 6th ed. London, UK: Kogan Page, 2017.

[8] S. Xolmatov, *Development of the Transport and Logistics System in the Kashkadarya Region*. Karshi, Uzbekistan: Karshi State University Press, 2022.

[9] T. Karimov, *Strategies for the Development of Regional Logistics Systems*. Tashkent, Uzbekistan: Economics and Management Publishing House, 2021.

[10] Presidential Decree of the Republic of Uzbekistan, "On measures to improve the strategy for socio economic development of regions," Dec. 11, 2020.

[11] Kashkadarya Regional Administration, *Program of Measures for the Development of Transport and Logistics Infrastructure in the Kashkadarya Region for 2021–2025*, Karshi, Uzbekistan, 2021.

[12] R. Sroufe, "Sustainability management systems: Enhancing performance through triple bottom line integration," *Journal of Cleaner Production*, vol. 120, pp. 1–12, 2016.

[13] S. Lekić, Z. Davidovac, and M. Vučičević, "Agile management as a driver of organizational sustainability," *Sustainability*, vol. 12, no. 24, Art. no. 10311, 2020.

[14] Z. Zhao, H. Alli, and R. C. Me, "Integrating agile principles into sustainable product and process design," *International Journal of Production Economics*, vol. 227, Art. no. 107671, 2020.

[15] World Bank, *World Development Report 2023: Investing in Sustainable Development*. Washington, DC, USA: World Bank, 2023.