



RESEARCH INTO THE PROSPECTS FOR IMPLEMENTING NEW MECHANISMS OF TRANSBOUNDARY INSTITUTIONAL COOPERATION IN THE FIELD OF WASTE RECYCLING IN CENTRAL ASIA

Dr. Farida Kuldasheva
Komila Rakimova

Abstract: *This study examines the transition of Central Asian countries from a linear economic model to a circular economy under conditions of increasing environmental pressure and institutional fragmentation. The research problem is associated with the inconsistency of legal regimes, the asynchronous participation of states in international environmental conventions, and the absence of unified waste accounting standards, all of which hinder the development of regional recycling value chains.*

The aim of the study is to develop a scientifically grounded model for transboundary institutional cooperation in the field of waste recycling in Central Asia. The research applies a mixed-methods approach, including comparative institutional analysis, content analysis of international reports, and semi-structured expert interviews.

The findings demonstrate the relative effectiveness of the Public–Private Partnership (PPP) model in Uzbekistan and the Extended Producer Responsibility (EPR) system in Kazakhstan. At the same time, critical barriers were identified, including energy shortages, weak statistical monitoring systems, legal fragmentation, and dependence on donor financing.

The study concludes that sustainable regional integration in waste management requires coordinated supranational mechanisms, digital monitoring systems, and harmonized regulatory approaches within regional cooperation platforms such as CAREC and ICSD IFAS.

Keywords: *Circular economy; waste management; Central Asia; transboundary cooperation; recycling; Public–Private Partnership (PPP); Extended Producer Responsibility (EPR).*

1. Introduction

Central Asia remains significantly affected by the environmental consequences of Soviet industrialization, including uranium tailings in the Fergana Valley and the ecological effects of the Aral Sea crisis. Simultaneously, the region is experiencing rapid growth in municipal solid waste generation. In Uzbekistan alone, approximately 14 million tons of waste are generated annually, while only a limited share is recycled.

Traditional landfill disposal methods have become environmentally and economically unsustainable. Many landfills have exceeded their operational capacity, contributing to soil degradation, water pollution, and public health risks. Environmental threats such as glacier melting, water scarcity, and mudflows increasingly require coordinated regional responses that cannot be effectively implemented within isolated national jurisdictions.

The study aims to identify institutional, fiscal, legal, and energy-related barriers to regional cooperation in waste management and to propose mechanisms for the formation of a unified regional secondary raw materials market.

2. Methodology

The study focuses on the waste management systems of Kazakhstan, Uzbekistan, Kyrgyzstan, and Tajikistan.

The research is based on a mixed-methods design combining qualitative and quantitative approaches. The empirical base includes:

- reports of international organizations (World Bank, UNEP, CAREC, PwC, and others);
- national legislation and environmental policy documents;

- semi-structured expert interviews with representatives of governmental institutions and private-sector stakeholders.

The expert sample included representatives of environmental agencies, EPR operators, investors involved in Waste-to-Energy projects, and regional policy specialists.

The analytical framework included:

- comparative institutional and legal analysis;
- thematic coding of interviews;
- SWOT analysis of national waste management systems;
- triangulation of qualitative and quantitative data.

The study was conducted between September and December 2025.

3. Results

The study identified several major institutional trends and structural barriers within the region.

Uzbekistan

Uzbekistan demonstrated significant progress in attracting foreign direct investment through Public–Private Partnership mechanisms. Waste-to-Energy projects valued at approximately USD 1.3 billion are expected to increase national waste-processing capacity and partially compensate for energy shortages.

Kazakhstan

Kazakhstan achieved relative institutional stability through the implementation of the Extended Producer Responsibility (EPR) system. Initial implementation results included the recycling of significant volumes of tires and batteries. However, planned tax reforms and VAT increases may create additional fiscal pressure on recycling businesses.

Regional barriers

The research identified several structural barriers:

- energy shortages in Uzbekistan and Kyrgyzstan;

- weak statistical systems and the absence of standardized waste-weighing procedures;
- the dominance of the informal sector in waste collection;
- legal fragmentation and regulatory inconsistency.

The study also identified a form of “regulatory dualism” associated with the coexistence of EAEU regulations and Uzbekistan’s WTO accession process, potentially creating additional trade risks for secondary raw material exporters.

4. Discussion

The findings suggest that environmental reforms in Central Asia remain highly asynchronous. Differences in legal obligations and institutional capacities continue to limit regional cooperation in waste management.

For example, the incomplete harmonization of environmental legislation and the inconsistent participation of states in international environmental agreements complicate the legal movement and processing of hazardous waste across borders.

The comparison with international experience demonstrates that market mechanisms alone are insufficient for the development of a circular economy in the region. State-supported instruments such as green public procurement, deposit-refund systems, and coordinated regional regulatory mechanisms remain necessary.

The study also demonstrates that the hidden social and environmental costs associated with landfill expansion, public health deterioration, and land degradation may economically exceed the costs of implementing circular technologies and modern recycling infrastructure.

5. Conclusions

The study demonstrates that fragmented national strategies in waste management have largely exhausted their potential.

The findings indicate that successful regional integration requires:

1. The creation of transparent digital information systems, since current statistical mechanisms frequently exclude the informal sector, which plays a dominant role in the collection of recyclable materials.

2. The harmonization of fiscal and regulatory approaches in order to prevent “fiscal dumping” and the relocation of recycling businesses to jurisdictions with weaker environmental regulation.

3. The development of coordinated regional infrastructure projects capable of combining environmental and energy-security objectives.

4. The strengthening of supranational cooperation platforms for environmental governance and data exchange.

6. Recommendations

- Introduce the CAREC Digital Corridor and a system for the mutual recognition of electronic compliance certificates for secondary raw materials.
- Develop regional Waste-to-Energy cooperation projects to reduce landfill dependence and partially compensate for regional electricity shortages.
- Strengthen the institutional role of regional environmental coordination centers in managing donor-funded recycling and hazardous-waste projects.
- Promote harmonization of waste-classification standards and environmental reporting systems among Central Asian states.
- Use regional summits and intergovernmental dialogue platforms to support the development of long-term environmental cooperation strategies.

7. References

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