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EFFICIENCY OF WASTE MANAGEMENT MODELS IN TRANSITION ECONOMIES: A COMPARATIVE ANALYSIS OF GEORGIA AND EASTERN EUROPEAN COUNTRIES

Abstract: This article examines waste management models in transition economies through an analysis of their key features, challenges, and achievements. It reviews the general characteristics of waste management systems, including issues related to infrastructure, legislation, and private sector involvement. Special attention is given to the analysis of the waste management model in Georgia, highlighting both successes and current problems. A comparative analysis is also conducted on the experiences of Eastern European countries, such as Poland, Lithuania, and Romania, in implementing modern approaches to waste recycling and disposal.

Key words: waste management, transition economy, waste recycling, separate collection, Georgia, Eastern Europe, ecology, infrastructure.

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Introduction

The issue of waste management occupies an important place in the sustainable development (SD) agenda, especially in the context of global population growth and urbanization. An efficient waste management system (WMS) contributes to environmental preservation and to sustainable economic development by integrating waste into recycling and reuse processes. Transition economies, undergoing institutional and economic transformations, face a number of unique challenges, such as insufficient infrastructure, weak legislation, and a low level of environmental awareness among the population. These issues require the adoption of modern approaches and tools to enhance waste management efficiency.

Georgia is a representative of transition economies. It demonstrates both progress and challenges in the field of waste management. Despite significant efforts to adapt to international environmental standards, Eastern European countries such as Poland, Romania, and Lithuania achieves greater success in this area. A comparative analysis of waste management models between Georgia and

Eastern European countries can help identify key success factors and propose possible ways to adapt them to the Georgian context.

The aim of the article is to conduct a comparative analysis of waste management models in Georgia and Eastern European countries to identify the most effective approaches. The study evaluates their applicability in Georgian conditions and develops practical recommendations for improving WMS in transition economies.

Main part. General characteristics of waste management in transition economies

Waste management is one of the key elements of SD [1]. However, transition economies face specific challenges in this area. The shift from centrally planned to market economies in these countries is often accompanied by institutional, financial, and infrastructure-related problems that impact the efficiency of WMS.

In transition economies, WMS are characterized by several common features. In most cases, waste legislation is underdeveloped, leading to regulatory gaps. There are no clear rules for handling different

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types of waste (hazardous, construction, biological, etc.), nor are there mechanisms of accountability for non-compliance with regulations. Countries struggle with a lack of modern landfills, recycling plants, and waste collection systems. Most waste is dumped in unauthorized landfills, posing a threat to the environment and public health. In transition economies, the environmental awareness of the

population is often low. This results in limited public participation in recycling and separate waste collection programs. Weak funding for WMS undermines their efficiency. It often leads to short-term solutions, such as waste burial, instead of long-term environmentally sustainable approaches. Additionally, waste management in these countries is complicated by various factors (table 1.)

Table 1. Waste management challenges in transition economies [2, 3].

Factors	Description
Historical legacy	Presence of old landfills and contaminated sites requiring reclamation but lacking sufficient funding.
Increase in waste volumes	Economic growth and urbanization lead to an increase in waste volumes that existing infrastructure cannot handle.
Insufficient private sector involvement	The private sector plays a limited role in waste management due to weak incentives and complex regulatory barriers.
Corruption and inefficient management	Corruption schemes in some countries result in the misallocation of funds intended for improving WMS.
Lack of educational processes	Absence of governmental initiatives to educate the population about the consequences of non-ecological behavior, resulting in insufficient public awareness and participation.

Despite the outlined difficulties, transition economies are striving to adopt modern approaches to waste management. Promising directions include the gradual implementation of broad waste management strategies, which encompass separate waste collection, recycling, and waste minimization. These efforts are supported by technical and financial assistance from international organizations such as the European Union, UNDP, and the World Bank. The use of monitoring and WMS is also being introduced to improve efficiency. Additionally, raising public environmental awareness and involving the private sector in waste management play an important role.

Waste management in transition economies remains a complicated task. It requires a systematic approach, cross-sectoral cooperation, and the adoption of international expertise. Effective management in transition economies also necessitates strong legislative frameworks, adequate financial support, and active public involvement to ensure long-term sustainability and environmental protection.

Analysis of the waste management model in Georgia

Waste management in Georgia has met significant changes in recent years, directed at harmonizing with European standards and improving the environmental situation in the country. Despite the progress achieved, substantial difficulties remain, requiring a comprehensive approach and further reforms.

In 2015, Georgia adopted the **Waste Management Code**, which aims to establish a legal framework for preventing waste generation, expanding its secondary use, and securing

environmentally safe waste treatment. According to this code, municipalities are responsible for developing and implementing waste management plans, as well as organizing the collection, transportation, recycling, and disposal of waste. In 2016, the **National Waste Management Strategy** for 2016-2030 was approved, which includes nine objectives aimed at transforming Georgia into a society effectively managing its waste. Later, the strategy was updated with four new directions: improving the management of hazardous waste, managing plastic waste, creating and implementing systems for the collection and treatment of biodegradable waste, and improving the management of inert and construction waste. In 2021, the total municipal solid waste (MSW) generated in Georgia amounted to 1,1 million tons. The volume of waste increased by 4,14% compared to 2020. Of this, approximately 69,5% was produced in urban areas, while the remaining 30,5% originated from rural zones [4].

Despite the presence of strategic documents, Georgia confronts a number of challenges in the field of waste management. According to 2021 report [5], approximately 988,9 thousand tons of the total MSW generated are collected, transported, and disposed of at existing engineered landfills, covering only about 87-88% of the total MSW produced. The largest waste stream consists of biodegradable materials, which account for over 64% of the total MSW. According to the aforementioned strategy, Georgia has 61 registered landfills, of which 24 were closed due to high environmental risks, while 30 remain operational during the transition period with implemented compliance measures. However, these facilities still

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fail to fully meet the standards for non-hazardous waste landfills. For example, all waste generated in the Rustavi area is sent to the Rustavi Landfill, where a sorting line processes paper, glass, and plastic from municipal waste, while the remaining waste is disposed of in the landfill. All waste handling activities are anticipated to be relocated to Tbilisi in

the near future as the Rustavi landfill approaches full capacity. Another pressing issue is the generation of plastic waste. According to statistics [6], the region is experiencing a constant increase in the production of plastic packaging and bottles, with 93% of this output eventually becoming waste (fig. 1).

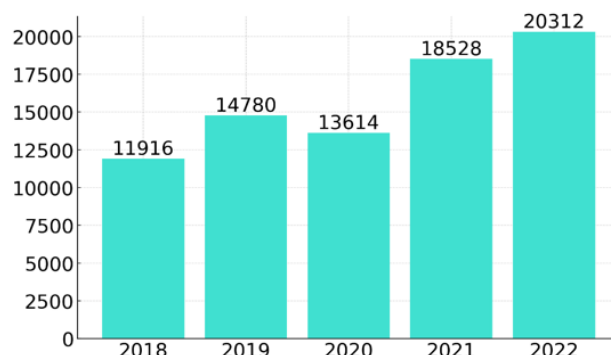


Figure 1. Production of plastic packaging in Georgia, tons.

To address these issues, Georgia is actively collaborating with international organizations to improve waste management and modernize infrastructure in this field. The **Circular City Labs - Testing Reusable Packaging Systems in Cities** project, implemented by German International Cooperation Society (GIZ), aims to reduce greenhouse gas emissions by preventing waste

generation. The project focuses on developing economically viable reusable packaging systems and other circular economy approaches in urban area. To respond to the problem of large volumes of biodegradable waste, one of Georgia's first large-scale composting facilities, the **Kutaisi Composting Centre**, was established with a projected production capacity of 2000 tons of compost per year (fig. 2).



Figure 2. Kutaisi composting centre for green waste [7].

The Kutaisi Composting Centre was launched with the support of the EU JOP Black Sea Basin as part of the «Waste Free Rivers for a Clean Black Sea» project. Since the centre began operations in 2021, the amount of municipal waste directed to landfills has declined. Specifically, in 2022, approximately 15% less municipal waste was disposed of compared to 2020, largely due to the center's implementation.

The European Union's support within the framework of the **Eastern partnership** program holds an important place in this process [8]. The EU provides financial and technical assistance for implementing projects aimed at creating modern

waste management facilities. This involves the landfills that meet European environmental standards. Projects for constructing modern landfills involve the implementation of advanced technologies, such as wastewater filtration systems, gas extraction, and environmental risk monitoring. In the Adjara region, an environmentally safe landfill was built with EU support, minimizing environmental pollution and securing the safe disposal of waste. Such landfills serve ecological and socio-economic purposes, and improve living standards for the local population.

Despite these successes, many unresolved issues remain. One of the most significant problems is the

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lack of sufficient funding for the WMS. Municipalities often face financial constraints that hinder infrastructure modernization and the support of new initiatives. International donors such as UNDP and the World Bank continue to actively collaborate with Georgia, as they provide grants and technical assistance.

Georgia's experience in waste management illustrates both the achievements and challenges of a transition economy. Examples of infrastructure modernization, the implementation of separate collection and recycling programs, and the elimination of illegal landfills demonstrate that with the support of international partners and active participation of civil society, substantial progress can be achieved. SD requires further strengthening of legislation, increased funding, and greater involvement of the private sector.

Comparative analysis of waste management models in Eastern European countries

Poland, Romania, Bulgaria, and Lithuania, have made significant progress in modernizing WMS over the past decades. The transitional nature of their economies has influenced the development of these systems, but integration into the EU and access to international resources have allowed them to achieve notable success.

Poland demonstrates one of the most successful examples of waste management reform among Eastern European countries. After joining the EU in 2004, the country committed to adapting its legislation to EU directives. This included the implementation of principles for waste minimization, increasing recycling rates, and reducing the amount of waste sent to landfills. One of the key steps was the introduction of a separate waste collection system. The majority of Polish households had access to containers for separate collection of plastic, paper, glass, and organic waste. In this regard, Poland is making significant efforts to improve the system of separate waste collection and recycling, particularly focusing on plastic waste.

Romania faced significant challenges in waste management after joining the EU in 2007. Before this, much of the waste was dumped in unauthorized landfills, posing significant environmental risks. Under EU pressure, strict measures were taken to eliminate such landfills and establish modern facilities. One notable example is the project in Cluj-Napoca, where an old landfill that posed a threat to the local ecosystem was closed and replaced with a new landfill meeting EU standard. This project was partially funded by EU grants and included the installation of leak monitoring and gas extraction systems.

Lithuania is one of the leaders among Eastern European countries in waste recycling rates. More than 50% of all waste in the country is either recycled

or used for energy production [9]. This high level of reusing was achieved through the introduction of a deposit system for packaging. The system charges a deposit for plastic, glass, and aluminum packaging, which is refunded when the containers are returned to special machines. This encourages citizens to return used packaging and minimizes the amount of waste ending up in landfills.

Bulgaria demonstrates mixed results in waste management. The country has made efforts to improve its infrastructure: modern landfills have been built, and separate waste collection programs have been introduced. Weak private sector involvement limits the development of recycling. A solid waste processing plant was built in Sofia with EU support, but a significant portion of recyclable materials is still exported due to a lack of local processing facilities. Bulgaria also confronts the problem of low public participation in separate waste collection. Awareness campaigns are being conducted, but their reach remains limited, especially in rural areas.

For Georgia, this experience can be particularly valuable. Implementing a deposit system for packaging similar to Lithuania's could significantly decrease the amount of plastic waste. Modernizing landfill programs, like those in Romania, could serve as a foundation for reducing the number of unauthorized dumpsites. The key factor also remains attracting international support and creating conditions for private sector development, as demonstrated by Poland's experience. Introducing targeted educational programs at various levels can increase public understanding of sustainable waste management practices. For instance, Georgia has already taken steps toward environmental education through initiatives like the «Eco-Schools» program, which engages students in waste sorting and recycling activities, and the «Clean Region» project, promoting community involvement in waste reduction. These projects emphasize the importance of education and active participation, laying the groundwork for a more sustainable approach to waste management across the country.

Studying waste management models in Eastern European countries shows that significant progress is achievable even in transition economies. The examples of these countries can serve as an important guide for Georgia on its path toward a sustainable and environmentally responsible WMS.

Conclusion

Effective waste management takes an important part in ensuring environmental sustainability and economic growth. The experience of Eastern European countries shows that modernizing infrastructure, introducing economic incentives, and engaging society are the foundation of successful recycling and waste minimization systems. For transition economies such as Georgia, creating a

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modern infrastructure for separate waste collection, recycling, and landfill management, as well as fostering active cooperation with international partners, remains a serious direction. The successful

implementation of these measures will reduce environmental pressure and bring the country closer to international standards of SD.

References:

1. Kharlamova, M. D. (2019). *Resource Saving and Recycling of Production and Consumption Waste* / M. D. Kharlamova, A. A. Abdyzhaparova, D. O. Kapralova, Moscow: Peoples' Friendship University of Russia (RUDN), 2019, 132 p, ISBN 978-5-209-08901-8, EDN AIEGZF.
2. Abdullina, L. (2024). Mechanisms of adaptation of small and medium enterprises to the circular economy: international practices. *Znanstvena misel journal*. 2024. № 96. pp. 20-23.
3. Konstantinov, D.S., Solovyev, K.A., Gazizyanov, A.I., & Sazonov, A.I. (2024). Implementation of environmental practices in business strategies: analysis of sustainable management models. *First Economic Journal*. 2024. No. 7(349). pp. 133-141.
4. (2024). *National Waste Management Strategy 2016-2030 and National Waste Management Action Plan 2022-2026 / EU4Environment*. Retrieved 25.11.2024 from [https://rec-caucasus.org/wp-](https://rec-caucasus.org/wp-content/uploads/2022/12/National-Waste-Management.pdf)
5. (2021). *GEORGIA Solid Waste Sector Assessment Report*. The World Bank. 2021. 235 p.
6. (2024). *Circular Economy in Georgia: Report*. GIZ. 2024. 30 p.
7. Tskhakaia, K. (2024). Biodegradable Waste Management in Georgia: Opportunities and Challenges. *Rigas Tehniskas Universitates Zinatniskie Raksti*. 2024; 28(1): 556-65.
8. Makarychev, A., & Butnaru-Troncota, M. (2022). Europeanisation through education: Promoting European studies in 'Eastern Partnership' countries. *Journal of Contemporary European Research*. 2022 Jul 1;18(2):208-29.
9. (2024). *More than 40% of EU plastic packaging waste recycled / Eurostat*. Retrieved 25.11.2024 from <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210113-1>