

THE PROBLEM OF HAZARDOUS WASTE MANAGEMENT IN THE REPUBLIC OF MOLDOVA

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Abstract: *In recent years, the problem of hazardous waste management has been very acute in the Republic of Moldova and is getting even worse. This situation is caused by important changes in the national economy, such as: privatization or bankruptcy of large industrial enterprises, changing the spectrum of economic units, with the prevalence of small and medium enterprises, implementation of advanced technologies, application of new chemicals, use of pesticides and other harmful substances in agriculture, etc. The amount of waste we generate is closely linked to our consumption and production patterns. At the same time, demographic changes, such as the increase in the number of single-person households, also affect the amount of waste we generate. In the context of these realities, a major risk problem for the health of the environment and the population is generated by toxic waste, stored in industrial landfills, of former enterprises. The most important challenge facing the authorities is to minimize the impact of hazardous waste on the population and the environment. Thus, risk minimization is possible only through an efficient and correct management of waste of any kind. In the study, the author aimed to analyse and evaluate the management of hazardous waste, to identify the most important problems and risks to the health of the population. This study was developed within the State Program 20.80009.0807.22 Development of the mechanism for the formation of the circular economy in the Republic of Moldova.*

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JEL Classification: *Q54, Q57, Q58.*

1. Introduction

The crisis caused by Covid-19 mitigates part of the impact of economic activities on the environment and climate. Thus, waste management is a major problem for countries in their anti-pollution actions, including for the Republic of Moldova. The most effective way to solve this problem is proper waste management through the existence of a legislative framework that establishes a series of rules on efficient waste management.

In recent years, many of the products consumed become waste in a very short time. At the same time, resource consumption has increased significantly in the context in which the application of sustainable practices has been taken into account for a very long time. As an example, the amount of plastic produced in the last decade exceeds that produced in a century (1950 - 1.5 million and in 2018 - 359 million). Thus, it is absolutely necessary to implement and apply at national level sustainable production and consumption patterns, which will make it possible to decouple economic growth from resource consumption. This decoupling is possible by reducing the consumption of primary sources in the production process by reusing the products, respectively by expanding the share of reused and recycled materials.

Therefore, the circular economy is an alternative to a traditional linear economy (do, use, throw away) in which the value of products, materials and resources is kept in the economy for as long as possible and waste production is kept to a minimum.

2. Waste management policy in the European Union

In recent years, the European Union has adopted a number of key measures that have been taken in areas such as food waste, green design, organic fertilizers, guarantees

for consumer goods, innovation and investment, etc. All these initiatives are important to support the circular economy that covers the entire value chain, from production to consumption, waste management and the use of secondary raw materials.

Waste management policy in the EU has been set out in the circular economy mini-package which addresses specific waste management issues:

- Communication on a European strategy for plastics in the context of the transition from a linear to a circular economy - COM (2018) 28
- Communication on the interface between legislation on chemicals, products and waste COM (2018) 32
- Monitoring framework on the circular economy COM (2018) 29.

The Waste Framework Directive, together with other EU Waste Directives (on waste disposal, end-of-life vehicles, waste electronic devices, batteries, packaging waste, etc.) includes specific objectives. For example, by 2020, each EU country had to recycle half of its municipal waste and by 2016, 45% of batteries had to be collected and by 2020, 70% of non-hazardous construction and demolition waste (mass) had to be recycled or recovered.

Regarding the regulation of waste management at EU level, a number of legislative acts have been adopted. Therefore, the main waste directives are:

- Directive (EU) 2018/849 of 30 May 2018 amending Directive 2000/53 / EC on end-of life vehicles;
- Directive 2006/66 / EC on batteries and accumulators and waste batteries and accumulators;
- Directive 2012/19 / EU on waste electrical and electronic equipment;
- Directive (EU) 2018/850 of 30 May 2018 amending Directive 1999/31 / EC on landfills;
- Directive (EU) 2018/851 of 30 May 2018 amending Directive 2008/98 / EC on waste;
- Directive (EU) 2018/852 of 30 May 2018 amending Directive 94/62 / EC on packaging and packaging waste.

The revised legislative framework on waste entered into force in July 2018. Thus, after amending Directive 2008/98 / EC, the main objective of the new Directive 2018/851, according to Article 1 is to establish "measures to protect the environment and health of the population by preventing or reducing the generation of waste, the adverse effects of waste generation and management and reducing the overall effects of resource use and increasing the efficiency of their use, which are essential for the transition to a circular economy and to guarantee the Union's long-term competitiveness. "

In this Directive, art. 5 specifies the correct management of waste by "using economic instruments and other measures in order to provide incentives for the application of the waste hierarchy, or other appropriate instruments and measures."

The main objective of the communication is to harness the energy of waste used for waste treatment by (ensuring energy recovery from waste in the EU) supporting the objectives of the circular economy action plan and strictly following the waste hierarchy established by the EU.

The waste hierarchy is the cornerstone of EU waste policy and legislation and a key element in the transition to the circular economy. Its main purpose is to establish an order of priority that minimizes the adverse effects on the environment and optimizes the efficient use of resources in waste prevention and management operations.

Following the above, the revised legislative framework on waste under Directive 2018/851, in order to move to a European circular economy with a high degree of resource

efficiency, Member States shall take the necessary measures to achieve the following objectives:

Directive 2018/851, according to art.11 par. 2

- ✓ separate collection of hazardous household waste (until the end of 2022), biological waste (until the end of 2023), textiles (until the end of 2025).
- ✓ the preparation for reuse and recycling of municipal waste is increased to a minimum level of 55% by weight by 2025, respectively 60% by weight by 2030 and 65% of waste by 2035.
- ✓ From 1 January 2027, Member States may consider municipal bio-waste entering aerobic or anaerobic treatment as recycled only if it has been collected separately or separated at source, in accordance with Art. 22.
- ✓ landfilling to reduce the landfill to a maximum of 10% of municipal waste by 2035;
- ✓ By 1 January 2025, Member States shall organize the separate collection of hazardous waste fractions from households to ensure that they are treated and that they do not contaminate other municipal waste streams.
- ✓ specific measures to combat food waste and marine litter, with a view to achieving the United Nations Sustainable Development Goal of reducing food waste per capita by 50% worldwide, in the retail and consumer network, and on reducing food losses in production and distribution chains by 2030;
- ✓ Directive 2018/852, according to art.6 par. 5
- ✓ recycling of packaging waste by 31 December 2025 at the latest, at least 65% of the total weight and at least 70% of the weight of packaging waste will be recycled by 31 December 2030;
- ✓ recycling targets for certain packaging materials, no later than 31 December 2025, for the recycling of the following specific materials contained in packaging waste: Paper and board: 75%, Ferrous metals: 70%, Glass: 70%, Aluminum : 50%, Plastic: 50%, Wood: 25%.
- ✓ recycling targets for certain packaging materials by 31 December 2030 at the latest: Paper and board: 85%, Ferrous metals: 80%, Aluminum: 60%, Glass: 75%, Plastic: 55%, Wood: 30%.

The EU waste management policy is set out in the various Environmental Action Programs, is implemented through the Waste Management Strategy and subsequent legislative measures, through EU Directives, Regulations and Decisions on specific waste management issues.

According to a European Commission communiqué "The circular economy - a zero waste program for Europe", stipulates that by 2025 the disposal of all recyclable waste must be eliminated, and by 2030 Member States should make efforts to eliminate waste virtually, which to use as resources.

3. Normative and institutional framework on waste management in the Republic of Moldova

In the Republic of Moldova, the activity of waste management is stipulated and the management of hazardous waste is based on the Law on waste no. 209 of 29.07.2016. The coordination of the management activity is assigned to the Ministry of Agriculture, Regional Development and Environment. Therefore, the Environment Agency and the Inspectorate for Environmental Protection are assigned to it in the field of waste management. An important role is assigned to the local public administration authorities, which aim to establish an integrated waste management system at regional level and to ensure regional cooperation in order to set up regional waste management associations.

State organizations with responsibilities in the field of environment and waste management in the Republic of Moldova:

- Ministry of Agriculture, Regional Development and Environment:
- Moldovan Waters Agency;
- Moldsilva Agency,
- Environmental agency,
- Inspectorate for Environmental Protection,
- Agency for Geology and Natural Resources,
- State Hydrometeorological Service,
- National Agency for the Regulation of Nuclear and Radiological Activity,
- Project Implementation Unit in the field of environment, etc.

The legal and institutional framework of waste management is provided by Law 209/2016 on waste, which regulates waste records and management and establishes mandatory measures for the protection of the environment and public health, through actions to make more efficient use of resources, but also to prevent or reduce the adverse effects of waste generation. The text of this normative act is based on the principles of sustainable development that harmoniously combine economic development, environmental protection and public health protection.

According to national legislation, waste is "substances, materials, objects, residues of raw materials from economic, household and consumer activities, which have lost, in whole or in part, their original value for use, some of which are reusable after processing" (art. 1 of Law no. 1347-XIII of 09.10.1997 on production and household waste).

The role and responsibilities of central and local authorities in relation to hazardous waste would be the following:

1. Create and implement relevant legislation in line with the transposition of the programs of the EU directives and the environmental acquis;
2. Creation of a national reporting and data system for hazardous waste;
3. Raising awareness of hazardous waste producers;
4. Raising public awareness of the impact of hazardous waste on health and the environment;
5. Providing economic and financial incentives for the development of appropriate hazardous waste management as well as for the creation of a market for hazardous waste management services.
6. Management of hazardous waste for which producers or holders do not exist or cannot be identified, such as historical waste.

The Ministry of Agriculture, Regional Development and Environment issues permits to enterprises that carry out waste management activities. In 2021, 40 enterprises are registered.

4. The trend of hazardous waste in the Republic of Moldova

Toxic waste is the most harmful and dangerous to the environment and human health, containing heavy metals (such as lead), found in used car batteries, can affect the mental health of children. For example: An old cell phone battery can pollute 600,000 liters of water with heavy metals. Hazardous / toxic waste management is one of the difficult problems that need to be solved in the Republic of Moldova. According to the latest statistical data provided by the NBS, in 2019, the total amount of hazardous / toxic waste generated was 10484 tons, increasing by 1.7 times compared to 2014 (6223 tons), and compared to 2001 this trend is in decrease by 12% (11879 tons). However, the tendency to aggravate the problem of waste in the Republic of Moldova, especially

hazardous waste, is generated by the faulty way in which various stages of waste processing are currently solved.

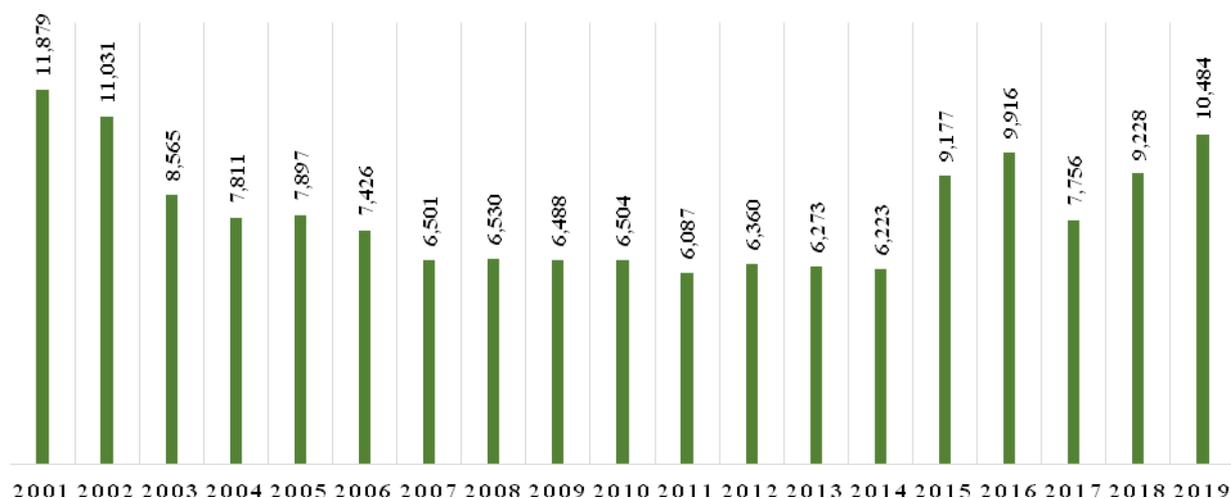


Figure 1. Toxic / hazardous waste at the end of the year in the Republic of Moldova, in the period 2001-2019, tons

Source: developed by the author based on statistical data.md

Hazardous waste management in the Republic of Moldova is performed by the following methods: recycling, neutralization, export for final disposal and storage. Thus, according to statistical data, waste generation fluctuates annually, and the amount of waste formed and managed is increasing. In 2019, a total amount of 4747 thousand tons of toxic waste was managed. Most toxic waste managed in the period 2001-2018, were registered in 2017 with a quantity of 6857 tons. Of which a large part of them, about 4254 thousand tons is represented by waste formed. Thus, the management of hazardous waste in the Republic of Moldova is performed by the following methods: recycling, neutralization, export for final disposal and storage. During the years 2015-2018, most of the hazardous waste was recycled 90%. Thus, in 2019, 4,582 tons were recycled.

Analyzing the series of statistical data on sanitation of localities, there is a slow increase, on average about 3.6% of waste volumes in 2017-2019, in the case of rural localities the generation trends are increasing on average by 30%, and in the case of urban growth is more modest than 1.3%. In total, in 2020, 187 services specialized in waste collection and disposal are organized and operate (53 services in the urban sector and 134 services in the rural sector), respectively 296 rural localities benefit from municipal waste collection services. Most of the toxic waste accumulated at the district level is reflected in the table below.

Table 1. Top 15 Districts with the most toxic waste in the Republic of Moldova, tons

Top	Rayon	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	Ialoveni	651,2	655,6	573,5	459,6	454,1	462,1	768,4	1 040,0 0	1 473,6 0	1 473,6 0	1 473,40	1 472,00
2	Căușeni	1 195,8 0	1 196,20	1 196,4 0	1 196,2 0	1 093,4 0	1 093,4 0	1 053,2 0	1 053,2 0	1 053,2 0	1 053,2 0	1 053,20	1 053,20
3	Orhei	383,4	360,3	384,6	363,4	363,5	363,6	362,5	362,9	363,2	363,6	363,9	364,2
4	Cahul	218,2	217,8	217,8	217,8	217,8	217,8	219,1	219,5	226,5	229,1	234,9	243
5	Taraclia	475	475	434,5	362	351,2	351,2	166,4	163,1	190	187,1	170,5	172
6	Leova	234,7	235,2	235	235	247,1	247	173,6	199,4	199,4	199,5	199,5	161,7
7	Hâncești	105,2	105,3	107,9	108,2	108,9	108,9	107,5	105,2	105,9	139,8	106,8	103,7
8	Telenești	101,2	101,2	101,2	101,2	101,2	101,2	101,2	101,2	101,2	101,2	101,2	101,2
9	Călărași	199,3	199,3	199,3	199,3	199,3	199,3	67	67	67	67	67	67
10	Cimișlia	97,4	98,3	98,7	60,4	60,7	60,7	61,1	62	61,8	61,9	61,4	63,9
11	Nisporeni	50	51,2	51,2	61	176	176	61,1	61,1	61,1	61,1	61,1	61,2
12	Anenii Noi	80,7	80,7	80,7	52,8	52,8	52,8	52,8	52,8	52,8	52,8	52,8	52,8
13	Basarabesca	26,1	23	7,2	7,8	55,1	55,1	5,9	37,9	69,4	145,8	34,7	38,3
14	Dondușeni	15,7	14,2	17,8	4,1	9,9	9,9	10	9,5	16	9,6	10	9,9
15	Strășeni	8,7	9,3	8,6	9	7,6	7,6	7,7	7,9	7,9	7,9	7,9	7,6

Source: developed by the author based on statistical data.md

Hazardous waste stock is the amount of hazardous waste to be treated or disposed of. Hazardous waste is normally stored before treatment or disposal. Some hazardous waste cannot be treated, disposed of or exported during the year in which it is generated. At the end of the year, this amount of hazardous waste that will contribute to the stock of hazardous waste to be treated or exported for disposal in the coming years.

According to the Sanitary Regulation on the management of medical waste, each waste producer is responsible for the safe management of waste, separate collection and packaging of waste, temporary storage and safe transport of waste, treatment and final disposal. At the same time, the producer of medical waste is obliged to keep records of data and information on waste produced and its management, education and training of staff. Some hazardous waste cannot be treated, disposed of or exported during the year in which it is generated. At the end of the year, this amount of hazardous waste that will contribute to the stock of hazardous waste to be treated or exported for disposal in the coming years.

Some of the most hazardous waste is electronic and medical waste. Electronic waste includes lamps, monitors, thermal insulation equipment, appliances, batteries. They contain many toxic substances: lead, nickel, cobalt, mercury, bromine. If e-waste ends up in landfills, hazardous substances enter water and soil, and from there - into the body of animals and humans. These substances can cause cancer and disorders of the endocrine glands. The share of e-waste is getting higher and higher, because people are constantly buying new technology.

At present, in the Republic of Moldova, prevention, protection and, at the same time, control measures generate various types of medical waste, such as: infected protective equipment such as - gloves, masks, goggles, protective visors used, waste containing blood or other body fluids, disposable syringes, mercury thermometers, psychotropic substances, antibiotics. If toxic medical waste ends up in landfills, it pollutes surface and groundwater.

Reaching the body with drinking water, antibiotics increase human resistance to drugs. And after burning hazardous waste, toxic substances will reach the environment.

5. Conclusions and recommendations

In light of the above, the outbreak of the Covid-19 epidemic on the territory of the Republic of Moldova poses an enormous risk to public health and the environment. Concerns are growing about toxic waste. Respectively, the hazardous medical waste generated in the medical-sanitary units, as well as regarding the household waste. Following the above, we elucidate the most important issues and come up with recommendations for solving the problem. It is important that the state authorities create a functional system for waste collection and then the population will sort it, because in the country there is no separate collection system well developed. Environmental protection authorities should monitor environmental components in epidemic areas and control bodies should carry out verification actions on how to manage medical waste.

The problem of waste management in the Republic of Moldova depends on several factors, but what remains more important is the lack of funding and an integrated waste management system, as well as the lack of infrastructure and services needed to adequately protect the environment. local, national and global level.

Waste management, also known as waste management, refers to education on waste collection, transport, treatment, recycling and storage. Usually, the term refers to materials resulting from human activities and reducing their effect on human health, the environment. Thus, the management of hazardous waste is insufficiently controlled in the Republic of Moldova. The appropriate flow of hazardous / toxic waste is not established. Possible private activities in this area do not have the necessary information on the volume of hazardous waste that should be treated and disposed of properly, so that costs and fees cannot be accurately estimated. There is still a need to establish the legal and regulatory framework for the recycling and treatment of waste in line with EU requirements. For the efficient management of toxic / hazardous waste, we come up with the following recommendations:

- Harmonization of the normative and legislative framework related to the Waste Law according to the European legislation;
- Population: rational consumption, collected and separated waste, paid services;
- LPA: integration in the regional waste management system, sorting / incineration stations, regional landfills;
- CSOs: pro-activism in decision-making and policy monitoring.

Hazardous waste management is a complex subject consisting of several components. There is no perfect model that can be applied in any situation, but the EU has firm principles on which to base its approach to waste management that can be applied in the Republic of Moldova.

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