CIRCULAR ECONOMY – ZERO WASTE STRATEGY FOR THE COMMUNITIES OF THE REPUBLIC OF MOLDOVA

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Abstract:

In this article, the authors aim to cross the path of waste circularity from collection to recycling, but also to identify good practices in the organization of selective waste collection, as well as existing intelligent solutions, which will allow the optimization of processes within the waste management system. The presented material is intended for the academic environment, relevant institutions, organizations in the field of environmental protection, as well as all those interested in the circular economy and the processes related to waste collection.

Keywords: *circular economy, "3Rs", "9Rs", waste management, energy conservation, biodiversity education, climate change.*

JEL classification: Q53, Q54, Q56.

Introduction

The circular economy is a model of production and consumption that reflects the reuse, repair, recycling and refurbishment of existing materials and products as much as possible in order to extend their life cycle. An influence on the development of the circular economy concept is the active involvement of all interested factors (public authorities, the business environment, research institutes and non-governmental organizations).

Access to education for a circular economy can be ensured by any existing initiative within the protection sphere environment: energy conservation, waste management, biodiversity education, climate change

Description of the Problem

Waste management represents one of the important problems faced by the Republic of Moldova in environmental protection activities. Currently, the problem of waste is becoming increasingly acute, due to the increase in its quantity and diversity, as well as its increasingly pronounced negative impact on the environment. The urban and industrial development of localities, as well as the general increase in the standard of living of the population, leads to the production of increasingly large amounts of waste. The basic objectives of the current policy of the European Union regarding waste, to which we are going to align ourselves, consist in the prevention of waste generation and in the promotion of reuse, recycling and recovery to ensure environmental protection. Waste is increasingly perceived as a source of valuable raw material for the industrial sector, with approaches such as reuse, recycling and energy recovery, regulation of packaging waste, end-of-life vehicles, equipment waste is applied electrical and electronic, biodegradable waste and tires.

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Methodology and Data

To carry out the study, the authors applied traditional research methods: monographic method, document analysis, comparison, trend analysis, etc. The conclusions that resulted from the analysis of documents, reports and case studies confirm the hypothesis that the circular economy is an important lever in achieving the strategies and policies of sustainable development of the Republic of Moldova. The material presented is intended for the academic environment, relevant institutions, organizations in the field of protection the environment, as well as to all those interested in the circular economy and waste collection processes.

Results

The idea of circularity or closing the economic loop appeared in 1976 in the report "The potential to substitute the human workforce for energy", presenting the vision of an economic loop in relation to the creation of new jobs, the increase in economic completeness , saving resources and preventing waste.

The European Commission defines the notion of a circular economy in which "the value of products and materials is maintained as much as possible; waste and resource use are minimized, and when a product reaches the end of its life, it is reused to create additional value; this can bring major economic benefits, contributing to innovation, economic growth and job creation." [6] Thus, there is a need to adopt a circular economy model because the world's population is constantly growing, the supply of primary raw materials is limited. Some EU countries depend on others for raw materials. And their extraction leads to increased energy consumption and CO2 emissions.[4]

The circular economy was originally based on three key principles, called "3Rs": reduce - reuse - recycle, eventually transformed into "9Rs" (refuse, rethink, reduce, reuse, repair, renovate, remanufacture, repurpose, recycle, recover), where waste is raw material. The waste production process cannot be completely stopped, but each of us can adopt ecological behavior to have a positive impact. [9]

Waste management represents one of the important problems faced by the Republic of Moldova in environmental protection activities. The problem of waste is becoming increasingly acute nowadays, due to the increase in its quantity and diversity, as well as its increasingly pronounced negative impact on the environment. The urban and industrial development of localities, as well as the general increase in the standard of living of the population, leads to the production of increasingly large amounts of waste.[8] The basic objectives of the current policy of the European Union regarding waste, to which we are going to align ourselves, consist in the prevention of waste generation and in the promotion of reuse, recycling and recovery to ensure environmental protection.

A big problem for the Republic of Moldova is represented by unauthorized dumps that persist over time. In most cases, landfills are non-compliant, since they do not have the necessary facilities to ensure environmental protection, there are no drainage and leachate evacuation systems, a fact that it can lead to water leaks from and on the surface of the deposit with concentrations of pollutants (ammonium, nitrates, copper, zinc, etc.). Non-degradable waste (plastics, metals, electronic waste, household appliances) are stored without separation, together with biodegradable waste, thus creating conditions for the solubilization of metal parts by the acidic waters generated by the fermentation processes. [7]

For certain types of waste, there are practically no viable recycling options at national level (for example, for glass, there is both a relatively low technical capacity of glass factories to process waste and a lack of interest, given the quality poor value of the supplied glass waste, respectively the additional costs that would be necessary to obtain waste of the appropriate quality). Recycling is a concept of the 20th century and emerged as one of the possibilities to

limit waste and use resources more efficiently. It has become increasingly clear that industrialization and sustained population growth have led to the consumption of ever greater amounts of resources.

The interest in recycling is greater in the case of metal, plastic and paper, but even here relatively important quantities are recorded which are collected separately and then transported outside the borders of the Republic of Moldova for the actual recycling. Outdated legislation does not motivate private companies working in the sector where public participation is of major importance, therefore they avoid this sector and the few who enter the system cannot reach the increased level of development due to the many obstacles they face.[3]

In the field of recycling, we find the following strategies:

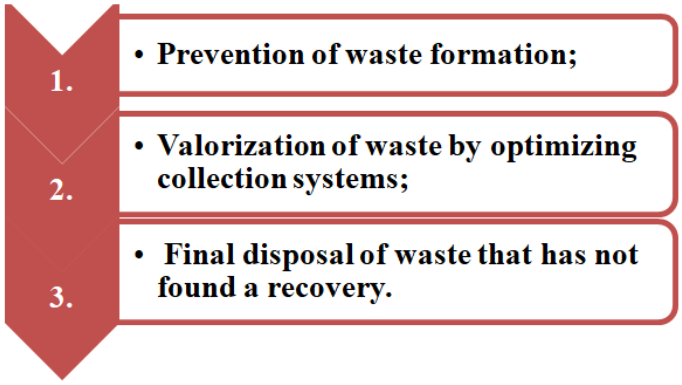

Fig.1 Strategies in the field of recycling

Source: Developed by the authors based on the source [1].

Thus, the use of the mentioned strategies results in the following effects:

- reducing the amount of energy and raw materials needed to manufacture new products;
- reducing the quantities stored at landfills or incinerators;
- putting important amounts of raw material back into the economic circuit;
- reduction of air and water pollution;
- reducing the risks to our health and the environment, caused by improper disposal of hazardous waste.

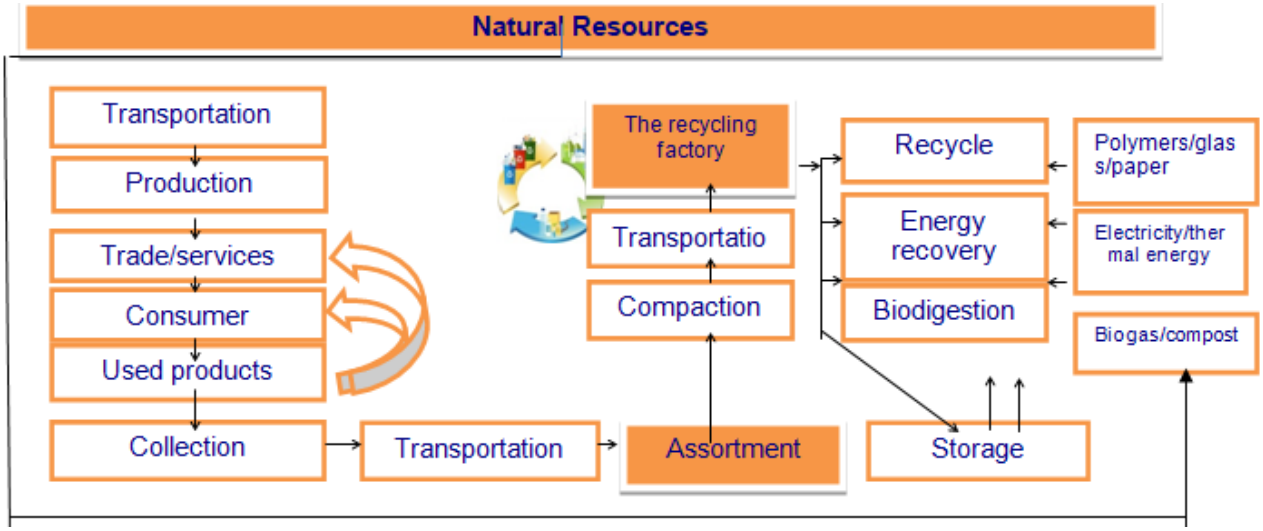

Fig. 2 Waste route from collection to recycling

Source: Developed by authors based on source [2]

The waste management process through the collection model takes place through the separate collection of waste in specially arranged bins, the transport of waste to the sorting station, the sorting of waste, including baling of waste, transport of waste to the recycling plant, where the recycling of the collected waste takes place by obtaining the new product. Part of this waste can be recycled (solvents, oil etc.). Others must be stored in places specially designed for hazardous waste (see fig.2).

In the Republic of Moldova there are 60 operators who hold environmental authorizations for waste management, of which 5 operators hold authorization for the collection and transport of household waste, 2 operators (Î.M.,,Gospodăria Comunală Străseni" and S.R.L.,,SALUBRIS GRUP ") hold authorization for the collection and transportation of municipal waste and an operator (S.R.L. ,,ABS") that holds authorization for the collection, transportation, sorting, temporary storage and treatment (composting and baling) of municipal waste. One of the largest operators serving the municipality of Chisinau is Î.M. Auto Sanitation Directorate. The activity of this operator is aimed at collecting and transporting household waste to the municipal landfill. About 5000 m3 of household waste are evacuated from the city every day. Below are presented the tariffs for the collection and transportation of solid household waste, for the services provided to individuals and legal entities (table 1).

Table 1

Tariffs for the collection and transportation of solid household waste Î.M. Directing "Self-Salubrity"

Services for natural persons	**Rates**
Services provided to the population of Chisinau for 1 m3	without VAT – 55.50 lei
Monthly rate for one person	per block – 9.25 lei private sector – 18.50 lei
Legal person services	**Rates**
Solid household waste collection and transportation services provided to economic agents in the city of Chisinau for 1 m3	without VAT – 100.00 lei with VAT - 120.00 lei
Services for processing and burying 1 m3 of waste and transporting it to the landfill from economic agents and entities	without VAT – 20.00 lei with VAT - 24.00 lei

Source:[10]

Zero Waste for Communities/Cities is an eco-innovation model, implemented internationally, adapted to European and national legislation, recognized and promoted by the European Commission since 2013.[6] The Zero Waste Strategy for Communities/Cities was developed by Dr. Paul Connett, toxicologist, activist and scientist, for the purpose of eradicating waste locally and globally, without landfills or waste incinerators. Among the recommended measures are: separate collection at the source for recyclable and biodegradable waste; the implementation of economic instruments, such as "pay-as-you-throw", to motivate citizens to avoid waste production and to sort more and more correctly in their own household; promotion of the guarantee-return system, which is considered an effective tool for reducing plastic pollution of the seas and oceans; banning single-use plastic products and encouraging the marketing of products in bulk; encouraging urban mining (repair, reuse and recycling centers for furniture pieces, construction materials, electronics or other resources) through fiscal facilities; research and redesign for products that cannot be repaired, reused, composted or recycled.[5]

Conclusions

Waste management is one of the important problems faced by local public authorities. Currently, the problem of waste manifests itself more and more acutely, due to the increase in its quantity and diversity, as well as its increasingly pronounced negative impact on the environment. In the vast majority of rural and urban regions, the waste management service is limited only to the collection, transportation and storage of waste, without the procedure of separation or sorting, which is against the specific principles of the integrated waste management system.

The successful organization and implementation of an integrated waste management system must be achieved by understanding institutional roles, applying effective techniques for monitoring the practical implementation of national legal requirements in the field of waste management, knowing the best practices in the field, including normative instruments necessary for the organization of the integrated management system. At the same time, the local public authorities must direct their efforts towards the development of the infrastructure in localities for the implementation of the principles of the integrated waste management system, the development of the management of the operation of the communal household public service for the purpose of waste management by applying the principles of the circular economy, the development of practices and services regarding separate collection and waste recycling.

It is imperative to increase the degree of involvement of local authorities in achieving the separate collection of municipal waste, at the source of organic waste, both through awareness and coercion. The goal is to increase the amount of recyclable waste, especially post-consumer, that will be recycled or reused. In this sense, we believe that it is important to develop and achieve an integrated vision, in the medium and long term, at the level of local public administrations on the circular economy.

Future Directions

In order to implement a sustainable solid waste management system, the following measures need to be applied:

-creating premises for the separate collection of waste. This option involves the separate collection of 4 types of solid waste at the source (in households) or at collection points/platforms.

-encouraging the composting and reuse of manure is necessary, both at the level of the individual household and at the level of the local public service. Thus, an infrastructure that aspires to EU standards for the disposal of municipal solid waste would be developed and a reduction of the costs necessary for the final disposal of waste with low environmental impact would be achieved.

-separate waste collection would promote the establishment of economically viable sanitation services. In order to carry out the separate collection of waste, waste generators must have waste separation means.

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