

The importance of recycling - Packaging returned in the Guarantee-Return System

Georgiana Ionela Marin¹, Andra Nicoleta Mecu² and Florentina Chițu³

¹⁾²⁾³⁾ Bucharest University of Economic Studies, Bucharest, Romania.

E-mail: maringeorgiana17@stud.ase.ro; E-mail: andra.mecu@rei.ase.ro

E-mail: florentina.chitu@rei.ase.ro

Please cite this paper as:

Marin, G.I., Mecu, A.N. and Chițu, F., 2024. The importance of recycling - Packaging returned in the Guarantee-Return System In: R. Pamfilie, V. Dinu, C. Vasiliu, D. Pleșea, L. Tăchiciu eds. 2024. *10th BASIQ International Conference on New Trends in Sustainable Business and Consumption*. Almeria, Spain, 6-8 June 2024. Bucharest: Editura ASE, pp. 363-369

DOI: 10.24818/BASIQ/2024/10/088

Abstract

The use of recyclable materials is constantly increasing worldwide, due to economic, technological and environmental developments. The non-use of recyclable materials means that they will be degraded or corroded, and then completely destroyed by nature, thus illustrating a waste of resources and a negative impact on the environment. The Guarantee-Return System in Romania, launched on November 30, 2023, is the largest project based on the circular economy in the country. This initiative aims to promote a cleaner and greener environment, while aligning with collection and recycling targets set at European level. This paper analyzes the kilograms of packaging returned through this program in the major counties of the country, disseminated by region. The originality of the article emerges from the processing of recent data, especially January and February 2024. The Guarantee-Return System will increase the popularity of recycling in Romania, by providing a substantial amount of high-quality raw materials. Recycling is important for the circular economy, representing a new paradigm for sustainability that promotes a circular approach and creates new employment opportunities. Recycling should be approached as a shared obligation, with each individual having to ensure the long-term viability of resources. While participants in economic activities are involved in the process of collection, selection and recycling, the population must also assume an ecological role in society. Finally, recycling has numerous benefits for the environment and society. The Guarantee-Return system will stimulate the recycling market in Romania, offering important quantities of high-quality raw material.

Keywords

Circular economy, recycle, guarantee, recycled materials, sustainability, durability.

DOI: 10.24818/BASIQ/2024/10/088

Introduction

The annual volume of plastic materials worldwide (including fiber and additive) has exceeded 460 million tons, and the largest share is used in packaging, the construction sector and the transport sector (over 60% of the total volume), with an increase of approximately 350 million tonnes of waste (OECD, 2022).

The increase in plastic waste is primarily caused by products with a short lifespan, such as multi-layer packaging. Multilayer packaging is the combination of several layers of different substances for various functionalities (Morris, 2022). This packaging Recycling waste plays a crucial role in promotes specific functionalities such as high strength and flexibility properties. These attributes are intended to protect the product from the process of gas exchange or mechanical damage, usually with a shelf life of less than one year, and can be easily handled and moved (Anukiruthika et al., 2020).

It is estimated that 95% of the packaging value is lost in the first phase of use, the significant problem being the widespread adoption of multilayer packaging, which constitutes between 17 and 20% in the European Union (Food Packaging Forum, 2020). In this regard, the European Union launched the "European Strategy

for Plastics in a Circular Economy", promoting a more environmentally responsible approach to plastics. This strategy mandates that all plastic packaging sold in the EU must be either reusable or recyclable in an economically viable manner by 2030, highlighting the necessity for a revamped recycling approach (European Commission, 2018).

1. Literature Review

Recycling waste plays a crucial role in creating a long-term sustainable future (Ogunmakinde et al., 2022). Through this technological process, materials are converted into new products, reducing dependence on finite natural resources and decreasing stress on endangered ecosystems. Recycling not only has a positive environmental effect, but it also helps to conserve energy and resources necessary to create new substances (C. Thomas et al., 2013). To comprehend, it is essential to understand the steps involved in recycling. The first step is the collection of waste and classification of it by type of composition (Hiremath et al., 2015). This is significant because it ensures the effectiveness of the recycling process and prevents the contamination of recyclable materials. The method of color-coding and collecting recyclable waste is employed in multiple communities to promote the recycling process and ensure effective resource management (Leeabai et al., 2021).

- **Blue (Paper and Cardboard):** The blue bin or container is intended for collecting paper and cardboard. These materials are reusable and can be converted into new products like recycled paper, packaging or other products derived from cellulose. Paper and cardboard recycling may conserve forests and reduce the environmental burden of paper production from native resources (Eco Synergy, 2022).
- **Green (Bottle):** The green bin or container is specifically intended for glass collection. Glass is infinitely recyclable without compromising its properties. Recycling glass reduces landfill waste volume and minimizes the energy and resources needed to manufacture glass from new raw materials (Eco Synergy, 2022).
- **Yellow (Plastic and metal):** The yellow bin or container is specifically dedicated to the collection of plastic and metal. These materials are reusable and can be recycled into new products such as plastic packaging or metal objects. Recycling plastic and metal reduces environmental pollution and lower greenhouse gas emissions compared to manufacturing these materials from new sources (Eco Synergy, 2022).

By separating and collecting recyclable waste according to these colors, the recycling process is much simplified and the efficiency of the use of natural resources is increased, which contributes to the preservation of the environment and the expansion of a sustainable and sustainable circular economy (Cimpan et al., 2015). Once the waste has been collected and separated, it is processed in specially designed facilities. (Jouhara et al., 2017). This procedure differs depending on the type of material and usually involves several steps, such as cleaning, grinding and melting them. These processed materials are then transformed into new products or materials, including but not limited to new packaging, construction materials and reusable clothing. Recycled products are then reintegrated into the economic cycle and used in various industries and economic sectors (Singh et al., 2016). It is essential to promote the use of reusable products to promote the circular economy and sustainability.



Figure no. 1. Universal recycling signs

Source: Vermont Government Website (<https://dec.vermont.gov/waste-management/solid/universal-recycling/universal-recycling-symbols>)

In addition, in the figure above you can see the necessary information regarding the recycling process and social responsibility of consumers, producers and authorities.

- **Mobius Loops:** This symbol is common in the recycling industry as an example of the perpetual cycle of material. In this context, Mobius Loops show that packaging can be recycled and reused. However, it is essential to know that the presence of the symbol does not ensure that all recycling centers will

agree to implement this concept. It is possible that some recyclable materials cannot be recycled at all in certain special recycling centers (European Commission, 2021).

- The green dot: This symbol represents the fact that the company that produced the respective packaging participated in a financially supported packaging recycling program. These contributions can be dedicated to initiatives that promote responsible waste management or recycling (European Commission, 2021).
- Tidy man symbol: This symbol encourages responsible and sustainable behavior among consumers and demonstrates the need to clean up waste in specially designated containers. It is a request to prevent environmental pollution and to keep streets and natural areas as hygienic as possible (European Commission, 2021).

The symbols analyzed above represent the collaboration between consumers, producers and authorities, being necessary to promote a clean, healthy and sustainable environment. Through recycling, financial commitment and sustainable behavior towards the environment, a value chain can be created that conserves natural resources and minimizes negative effects on the environment. Last but not least to sum up, waste recycling is essential in the fight against climate change and environmental degradation. Adopting this behavior on both an individual and collective basis can have a significant impact on reducing our ecological footprint and protecting the planet for future generations (Marmo, 2008).

2. Research methodology

The main purpose of this paper is to analyze the total volume of returned packaging from the counties of Romania, according to its division by region. The research method approached is the quantitative research, regarding the collection and analysis of data regarding the returned packaging kilograms in the guarantee-return system, in January 2024 compared to February 2024. Official sources and statistical reports were used to collect the data, the information being accurate and reliable. In order for the sample chosen to be representative, the sampling method used was to choose the counties in each region of Romania, according to population density and urbanization level, in order to obtain a comprehensive and detailed overview of the total volume of returned packages.

3. Results and discussion

The European Union's waste policy is responsible for promoting a circular and sustainable economy, which involves taking resources directly from the environment and using them, then recycling them without causing much waste or a negative impact on the environment (Hartley et al., 2020). This policy results from the concept that recyclable materials should be managed in a sustainable manner and that resources should be used using multiple life cycles. The European Commission estimates that each person produces approximately 5 tons of waste annually, but only 38% of this volume is currently recycled (European Commission, 2021). This implies the need for more effective waste management and a greater emphasis on recycling and reducing the volume of waste.

At the beginning of 2021, Romania had one of the lowest recycling rates in the European Union. Only 11% of waste was recycled by 2020, in opposition to the European Union's target of 50% (Ecotecca, 2021). One of the objectives of the European Union is the adoption of legislation related to the protection of the packaging system (Mrkajić et al., 2018). This system involves taxing the purchase of a prepackaged product and incentivizing the return of empty packaging for reuse in the store.

To facilitate the recycling of materials and to have a more responsible waste management, it is important to know the materials with high recycling potential. For example, PET bottles, plastic bags and packaging, clear boxes and bottles of detergent or shampoo are all waste of this type, namely commonly reused (Eriksen et al., 2019). However, plastic continues to be the biggest polluter, and reducing its use or choosing alternatives that are environmentally friendly, such as glass or aluminum, are essential to protecting the environment.

For a more efficient management of packaging waste, legislation number 249/2015 regarding the management of packaging and packaging waste in order to prevent or reduce the impact on the environment, outlines the responsibilities of economic operators and organizations in returning products to manufacturers

annually. These organizations play a significant role in the collection, management and recycling of packaging waste, as well as in promoting public education and awareness of responsible waste disposal (Legislative Portal, 2015). Ultimately, recycling packaging waste is only one part of a wider commitment to sustainability. It is essential that the population focuses not only on recycling, but also on reducing consumption, promoting the reuse of packaging and adopting a lifestyle that is less harmful to the environment.

Romania's Guarantee-Return System (SGR) was launched on November 30, 2023 and represents a significant advance for the country's circular economy, promoting sustainability, environmental cleanliness, and social responsibility. SGR aims to collect packaging and then recycle it according to the European standard. 77% of PET will be collected by 2025 and 90% by 2029, these being the targets imposed on Romania by the European Union. For example, a drink with a volume of 0.1 to 0.3 liters is purchased from any store and a guarantee of 0.50 RON is paid for the container. These packages are identifiable by the "guaranteed package" symbol on them, which is only possible through the SGR program. Beverage is defined as any glass, plastic or metal container containing juices, nectars, cider, still water, mineral water, soft drinks, mixed beer, beer, wine, spirits, mixed alcoholic beverages.

These packages can be returned at any collection point in stores, either manually to the seller or through automated machines specifically installed for recycling. In order to be returned, packages must be uncrushed with the label intact and empty of contents. For each recycled beverage packaging, the 0.50 RON guarantee kept at the time of purchase is returned, then these packaging are collected and recycled, and then transformed into new beverage packaging (RetuRO, 2024).

Table no 1. The total amount of packaging returned in the Warranty-Return System, January-February 2024, by region and county

Region	County	Ian. 24	Feb. 24
	București	21.163	336.290
Banat	Caraș-severin	1.055	7.968
	Timiș	4.322	46.153
Bucovina	Suceava	1.548	162.72
Crișana	Arad	2.792	25.279
	Bihor	1.973	24.036
Dobrogea	Constanța	3.880	49.123
	Tulcea	310	2.788
Maramureș	Maramureș	958	12.257
	Satu mare	621	6.506
Moldova	Bacău	2.069	18.411
	Iași	2.995	33.465
Muntenia	Argeș	1.242	21.737
	Ilfov	4.094	54.147
Oltenia	Dolj	1.105	14.359
	Gorj	903	7.996
Transilvania	Cluj	3.308	44.006
	Sibiu	1.859	19.444

Source: RetuRO (<https://returogr.ro/despre-sgr>)

Out of Romania's total of 41 counties, 17 counties were analyzed, more precisely 2 counties from each region of the country, along with the capital, Bucharest. The reference year is 2024, and the unit of measure used is kilogram. In order to accurately observe the differences in the values of the counties from January and February, the data from the above table were logarithmized and presented in the following graph.

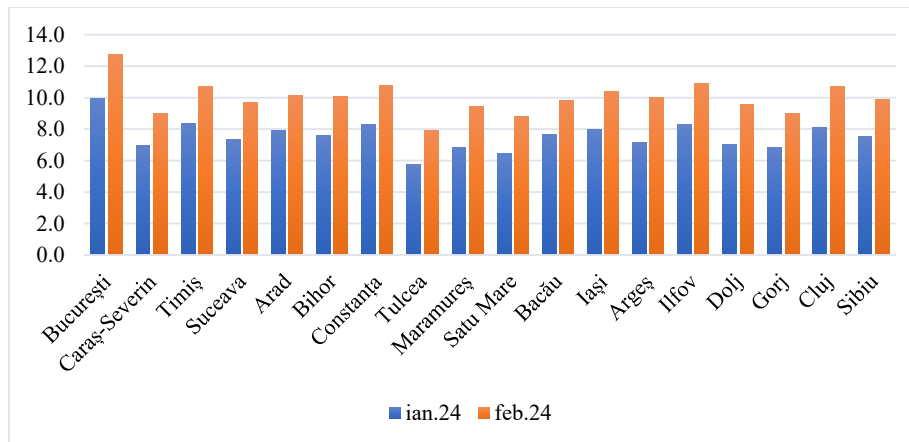


Figure no 2. The total amount of packaging returned in the Warranty-Return System, January vs February 2024, by county

Source: Own processing of data

According to figure 1, based on the total amount of packaging returned in January and February this year, we can observe various aspects related to consumer behavior and recycling infrastructure in different regions of Romania.

Bucharest continues to lead the way in the number of returned packages, with a significant increase in February compared to January, from 21.163 to 336.290 recycled packaging. This may indicate increased environmental awareness or increased consumer willingness to participate in recycling programs. In this case, the significant increase is also due to larger city sizes and population densities, which generate large amounts of waste.

Other areas that exhibited a significant increase in the volume of packaging that returned in February were: Banat (Caraș-Severin and Timiș), Crișana (Arad and Bihor) and Transylvania (Cluj and Sibiu). This increase is primarily due to the high degree of urbanization and economic development in these regions, which, although producing a greater amount of waste, emphasizes education and the awareness of the population about the value of recycling.

The regions of Bucovina (Suceava), Dobrogea (Constanța and Tulcea), Moldova (Bacău and Iași) and Oltenia (Dolj and Gorj) had a more moderate increase in the volume of packaging that was returned and recycled in February, compared to January. The population in these regions has less advanced recycling skills or a lower awareness of the importance of the environment.

Maramureș and Satu Mare (Maramureș Region) had a lower percentage of returned packaging in February, this being attributed to the higher population density and lower economic development in this region.

Overall, in the same regions of Romania, the analyzed data suggest that the amount of packaging that was returned in February has an upward trend compared to the previous month.

Conclusions

Recycling plays an important role in the circular economy, representing a new paradigm for sustainability and sustainability, which promotes a circular approach to resource management and generates new jobs. Recycling should be approached as a shared obligation, with each individual having to ensure the long-term viability of resources. While participants in economic activities are involved in the process of collection, selection and recycling, the population must also assume an ecological role in society.

The Guarantee-Return System (SGR) program contributes to encouraging an educated and aware society about the sustainability of the environment, a fact proven by the increasing trend of the total amount of packaging returned in all counties in Romania. This indicates an increase in awareness, understanding and acceptance of waste recycling among the population.

Recycling packaging reduces the volume of waste stored in the environment, thus mitigating its negative impact both on the environment and on human health, especially for those who live in close proximity to

landfills. The utilization of recycled components in the manufacturing process is more energy efficient than producing new components from raw materials, even when all associated costs, including transportation, are considered.

The increasing danger of plastic pollution necessitates immediate action, particularly within the food and beverage industry, which is a significant contributor to single-use plastic waste. As the global population continues to grow, so does the volume of single-use plastic consumed. The transition from a linear model of extraction, production, consumption, and disposal to a circular economy model may harbor some optimism. This approach centers around saving resources and decreasing the environmental impact of plastic trash, while also increasing the lifespan of the product.

Acknowledgement(s):

This paper was co-financed by The Bucharest University of Economic Studies during the PhD program.

References

- Anukiruthika, T., Sethupathy, P., Wilson, A., Kashampur, K., Moses, J.A. and Anandharamakrishnan, C., 2020. Multilayer packaging: Advances in preparation techniques and emerging food applications. *Comprehensive Reviews in Food Science and Food Safety*, [online] 19(3), pp.1156–1186. <https://doi.org/10.1111/1541-4337.12556>.
- Cimpan, C., Maul, A., Jansen, M., Pretz, T., Wenzel, H., 2015. Central sorting and recovery of MSW recyclable materials: A review of technological state-of-the-art, cases, practice and implications for materials recycling. *Journal of Environmental Management, Volume 156*, [online] pp.181-199. <https://doi.org/10.1016/j.jenvman.2015.03.025>.
- Eco Synergy, 2022. *Codul culorilor în colectarea separată a deșeurilor*. Eco Synergy. [online] Available at: <<https://ecosynergy.ro/codul-culorilor-in-colectarea-separata-a-deșeurilor-sa-invatom-sa-reciclam-responsabil/>> [Accessed 10 April 2024].
- Ecoteca, 2021. *Eurostat: În 2021 România a reciclat 11,3% din deșeurile municipale - Ecoteca*. [online] Available at: <<https://ecoteca.ro/eurostat-in-2021-romania-a-reciclat-113-din-deșeurile-municipale.html>> [Accessed 2 April 2024].
- Eriksen, M.K., Christiansen, J.D., Daugaard, A.E., Astrup, T.F., 2019. Closing the loop for PET, PE and PP waste from households: Influence of material properties and product design for plastic recycling. *Waste Management, Volume 96*, [online] pp. 75-85. <https://doi.org/10.1016/j.wasman.2019.07.005>.
- European Commission, 2018. *Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste (Text with EEA relevance)*. [online] Available at: <<https://eur-lex.europa.eu/eli/dir/2018/852/oj>> [Accessed 2 April 2024].
- European Commission, 2021. *Ghidul bunelor ecomaniere*. [online] Available at: <<https://education-for-climate.ec.europa.eu/community/system/files/2022-09/Ghidul%20Bunelor%20Ecomaniere%20-%20Patru%20de%20Reciclare%202021.pdf>> [Accessed 2 April 2024].
- Hartley, K., Santen, R., Kirchherr, J., 2020. Policies for transitioning towards a circular economy: Expectations from the European Union (EU). *Resources, Conservation and Recycling, Volume 155*. [online] <https://doi.org/10.1016/j.resconrec.2019.104634>.
- Hiremath, A.M., Tilwankar, A.K., Asolekar, S.R., 2015. Significant steps in ship recycling vis-a-vis wastes generated in a cluster of yards in Alang: a case study. *Journal of Cleaner Production, Volume 87*, [online] pp.520-532. <https://doi.org/10.1016/j.jclepro.2014.09.031>.
- Jouhara, H., Czajczyńska, D., Ghazal, H., Krzyżyńska, R., Anguilano, L., Reynolds, A.J., Spencer, N., 2017. Municipal waste management systems for domestic use. *Energy, Volume 139*, [online] pp.485-506. <https://doi.org/10.1016/j.energy.2017.07.162>.
- Leeabai, N., Areeprasert, C., Khaobang, C., Viriyapanitchakij, N., Bussa, B., Dilinazi, D., Takahashi, F., 2021. The effects of color preference and noticeability of trash bins on waste collection performance and waste-sorting behaviors. *Waste Management, Volume 121*, [online] pp. 153-163. <https://doi.org/10.1016/j.wasman.2020.12.010>.

- Marmo, L., 2008. EU strategies and policies on soil and waste management to offset greenhouse gas emissions. *Waste Management, Volume 28, Issue 4*, [online] pp. 685-689. <https://doi.org/10.1016/j.wasman.2007.09.030>.
- Morris, B.A., 2022. *The Science and Technology of Flexible Packaging: Multilayer Films from Resin and Process to End Use*. William Andrew.
- Mrkajić, V., Stanisavljević, N., Wang, X., Tomas, L., Haro, P., 2018. Efficiency of packaging waste management in a European Union candidate country. *Resources, Conservation and Recycling, Volume 136*, [online] pp.130-141. <https://doi.org/10.1016/j.resconrec.2018.04.008>.
- OECD, 2022. Global Plastics Outlook. [online] Available at: <<https://www.oecd.org/environment/global-plastics-outlook-aal1edf33-en.htm>> [Accessed 10 April 2024].
- Ogunmakinde, O.E., Egbelakin, T., Sher, W., 2022. Contributions of the circular economy to the UN sustainable development goals through sustainable construction. *Resources, Conservation and Recycling, Volume 178*. [online] <https://doi.org/10.1016/j.resconrec.2021.106023>.
- Food Packaging Forum, 2020. *Report on EU's flexible films market*. [online] Available at: <<https://www.foodpackagingforum.org/news/report-on-flexible-films-market-in-eu>> [Accessed 10 April 2024].
- Portal Legislativ. *LEGE nr. 249 din 28 octombrie 2015*. [online] Available at: <<https://legislatie.just.ro/Public/DetaliuDocument/172506>> [Accessed 12 April 2024].
- RetuRO. Despre SGR. [online] Available at: <<https://returosgr.ro/despre-sgr>> [Accessed 10 April 2024].
- Singh, J., Ordoñez, I., 2016. Resource recovery from post-consumer waste: important lessons for the upcoming circular economy. *Journal of Cleaner Production, Volume 134, Part A*, [online] pp.342-353. <https://doi.org/10.1016/j.jclepro.2015.12.020>.
- Thomas, C., Sharp, V., 2013. Understanding the normalisation of recycling behaviour and its implications for other pro-environmental behaviours: A review of social norms and recycling. *Resources, Conservation and Recycling, Volume 79*, [online] pp.11-20. <https://doi.org/10.1016/j.resconrec.2013.04.010>.
- Vermont Government Website. *Universal Recycling Downloads | Department of Environmental Conservation*. [online] Available at: <<https://dec.vermont.gov/waste-management/solid/universal-recycling/universal-recycling-symbols>> [Accessed 2 April 2024].