

STRATEGIES FOR THE DEVELOPMENT OF REVERSE DISTRIBUTION IN THE CONTEXT OF A SUSTAINABLE ECONOMY

Feodosie PITUȘCAN, Assoc. Prof., PhD

Trade Co-operative University of Moldova

E-mail: feodosie_pituscan@yahoo.com

ORCID: <https://orcid.org/0009-0008-4844-0263>

Sergiu MÎRZA, Lecturer, PhD

Technical University of Moldova

E-mail: sergiu.mirza@tem.utm.md

ORCID: <https://orcid.org/0000-0003-4180-733X>

Lilia CHIRIAC, Assoc. Prof., PhD

Technical University of Moldova

E-mail: lilia.chiriac@tem.utm.md

ORCID: <https://orcid.org/0000-0002-4249-6871>

DOI: <https://doi.org/10.59642/JRTMED.1.2026.03>

Universal Decimal Classification: 338.24+574

JEL Classification: Q56, Q53, M31, L91

Abstract

The beginning of the 21st century is marked by the accelerated development of industrial activities and the continuous growth in the consumption of goods and services. The increasing consumption of food and non-food products generates ever-larger volumes of waste, which exert significant pressure on the environment and contribute to the depletion of natural resources. Under these circumstances, the transition to a sustainable economy, based on the efficient use of resources and the reduction of negative environmental impacts, has become a strategic necessity.

The purpose of this paper is to identify and substantiate directions and strategies for the development of reverse distribution through the optimization of waste collection, processing, recycling, and recovery processes. The research aims to highlight the ways in which used, defective, or technologically obsolete products, reusable packaging, and waste generated during production processes can be reintegrated into the economic cycle, thereby contributing to pollution reduction and the conservation of natural resources.

The research findings demonstrate that the development of reverse distribution has a multidimensional strategic impact, contributing to the modernization of industrial and commercial processes, the enhancement of economic competitiveness, and the strengthening of ecological and social resilience. Reverse distribution represents one of the essential components of green marketing and the circular economy, offering real opportunities for efficient resource utilization and waste reduction.

Based on the analyses conducted, conclusions and recommendations were formulated regarding the development of efficient reverse distribution chains integrating manufacturers, agricultural enterprises, commercial networks, processors, service providers, and public authorities. The implementation of such mechanisms can significantly contribute to the promotion of sustainable development and to the improvement of the economic and environmental performance of society.

Keywords: reverse distribution, strategy, natural resources, distribution chain, waste, ecology, green marketing, sustainable economy

1. Introduction

The distribution sector constitutes an integral component of the economy, while reverse distribution represents a strategic segment aimed at reducing the loss of natural resources and reintegrating into the economic cycle defective, obsolete, physically and morally worn-out goods, returnable packaging, as well as certain types of waste generated during production and consumption processes. This sector holds significant development potential and can generate substantial economic and social benefits, particularly due to the growing public interest in reducing environmental pollution. Through the development of reverse distribution systems, economic agents utilize these returned products and waste materials as secondary raw materials and resources, thereby promoting resource efficiency and facilitating the sustainable development of the economy.

It should be noted that reverse distribution is understood as a managerial process designed to regulate and manage the flow of waste generated from the production or consumption of packaging, used products, defective goods, and similar materials, transferring them from consumers or distributors to manufacturers of recycled products or specialized processing facilities. The purpose of this process is to dismantle, recover, reuse, and valorize such materials, thereby reducing the demand for virgin raw materials and natural resources. This activity encompasses a wide range of components aimed at recovering value and enhancing consumer satisfaction, including the collection, return, repair, recycling, and processing of these categories of products. At the same time, it contributes significantly to reducing environmental pollution and promoting sustainable resource management.

The rapid development of information technologies and artificial intelligence has led to a substantial increase in production and consumption on the one hand, while accelerating product obsolescence and wear on the other. Consequently, the recovery and valorization of these categories of products have become essential for achieving a sustainable economy and reducing the consumption of natural resources. In this context, there is an increasing need to diversify distribution activities by establishing networks of enterprises engaged in the collection, storage, sorting, dismantling, and processing of waste materials, packaging, obsolete products, and other post-consumer goods. Such initiatives contribute to the creation of circular value chains and support the transition toward a more resource-efficient and environmentally sustainable economic model.

In recent years, a multitude of technological methods have emerged for the production, processing, and recovery of residual value from used and obsolete products, as well as for the recycling of waste generated from packaging circulation and related sources. Therefore, it is important to analyze, select, expand, and improve the quality of the raw materials used in the production of goods in order to ensure their effective utilization in meeting consumer demand, while also reducing the level of environmental pollution.

2. The current state of research on the issue and the purpose of the study

Researchers in the field of economics devote considerable attention to issues related to direct distribution flows, while comparatively less emphasis is placed on reverse distribution. In the specialized literature, reverse distribution and reverse logistics, which constitute a component

of the logistics chain, are examined from various perspectives, including economic and social viewpoints, focusing on production technologies, the organization of product flows from producers to final consumers, and the collection primarily of recyclable packaging. However, the issue is far more complex today, as it also requires the active recovery and valorization of waste generated from the consumption of non-food products, obsolete, worn-out, and defective goods — such as household appliances and electronic equipment — as well as food products with a short shelf life or those that have deteriorated, which can be used as raw materials or recycled in order to conserve natural resources.

Issues related to reverse distribution began to attract scholarly attention at the end of the twentieth century, when the problem of waste became increasingly acute at both the local and global levels. In the works of C. Florescu, P. Mălcomete, and N. Al. Pop [4, pp. 217–218], reverse distribution is defined as the process of collecting certain types of waste, acquiring reusable packaging, and reintroducing products with a low degree of wear into the market. D. Fuller [5, p. 178], in turn, describes reverse distribution as a channel, or part of a channel, designed to manage the flow of products or materials moving in the opposite direction, namely from the consumer to a processor or manufacturer.

Other authors concerned with this issue, such as David Ross [8, p. 8], analyze reverse distribution through the perspective of transportation, handling, storage, and logistics activities carried out in the reverse direction. Researchers also address in their studies the compatibility of reverse distribution channels with the environment by reducing waste flows generated from packaging distribution or by creating channels for the collection and disposal of waste resulting from the use of consumer goods. Other works examine strategies for designing reverse distribution channels aimed at reducing waste and minimizing environmental pollution caused by the increasing quantities of packaging, materials, and components recovered from waste streams, as well as the recovery of products for remanufacturing, refurbishment, recycling, repair, and their reintegration into the economic circuit [5].

The most recent attempt to provide a theoretical foundation for reverse distribution is presented by Sabin Chiş in the book *Foundations and Strategies for Promoting Sustainable Development: An Analysis of the Circular Economy and Education for Sustainability* (2024). The author examines sustainable development through the interdependence of its economic, social, and environmental dimensions, emphasizing the need to transition from the linear economic model to the circular economy model. He argues that the efficient use of resources, waste reduction, and the recovery of materials generated after consumption constitute essential conditions for achieving long-term sustainability [2].

The author also highlights the role of public policies, technological innovation, and education for sustainability in promoting responsible behavior among producers and consumers. The implementation of efficient reverse distribution systems requires not only adequate infrastructure and logistics mechanisms but also the development of an organizational culture oriented toward environmental protection and the responsible use of resources.

Through its multidisciplinary approach, the book provides a relevant theoretical framework for the development of reverse distribution strategies, demonstrating that reverse distribution is an indispensable component of a sustainable economy and a key factor in achieving the objectives of the circular economy.

A group of contemporary researchers led by K. Salas-Navarro examines the evolution of research on the relationship between reverse distribution and sustainability, demonstrating that reverse distribution is one of the principal instruments through which organizations contribute to the circular economy. Their study highlights that the processes of collection, reuse, recycling, and recovery of end-of-life products enable the transformation of waste into valuable economic resources. Furthermore, the authors emphasize that the implementation of reverse distribution generates simultaneous benefits across the three dimensions of sustainable development: economic, through cost reduction and value recovery; environmental, through waste reduction; and social, through the promotion of responsible consumption and sustainable practices [9].

Some studies conducted both domestically and internationally highlight the existence of significant potential for reducing the consumption of natural resources used in the manufacture of new products by utilizing old products as raw materials, particularly through the opportunity to create added value through processing activities such as dismantling, returning, recycling, and reconditioning. Furthermore, research in this field also emphasizes practical outcomes related to innovations in waste distribution and processing, as well as practical guidelines for the treatment of various types of waste, describing the minimum quality, certification, and logistics requirements necessary for the development of the reverse distribution sector, the collection and expansion of packaging and used goods flows, and their recycling.

However, the current level of research on issues related to reverse distribution reveals a significant gap between the understanding of the technical and scientific components of existing distribution systems and their practical implementation. In recent years, these issues have attracted the attention of the Government of the Republic of Moldova, which has developed a series of measures aimed at regulating commodity flows, adopting several legislative acts that establish specific requirements for monitoring the circulation of hazardous goods, as well as for the collection and redistribution of goods to processors and manufacturers. Accordingly, the Parliament of the Republic of Moldova has adopted a number of legislative acts regulating waste collection activities, including Law No. 209/2016 on Waste, as subsequently amended [10].

By Decision No. 939/2023, the Government of the Republic of Moldova approved the Regulation on Waste Landfilling [11], while on 31 July 2023, the Parliament of the Republic of Moldova adopted Law No. 237 on Organic Production and the Labelling of Organic Products [12], which regulates the standards for the production, certification, labelling, and control of organic products. In addition, several guidelines have been developed for the organization and operation of the Municipal Waste Management Service [13], among others.

At the current stage, there is insufficient cooperation between governmental institutions and economic agents both within the country and abroad, as well as a lack of cluster-type organization across the entire value chain, which should ideally encompass collection, processing, storage, marketing, export, and production activities. Furthermore, from an economic and managerial perspective, the mechanisms for creating added value through local processing, brand development, marketing instruments targeting high value-added markets, and models for integrating local operators into efficient reverse distribution channels remain poorly developed.

Thus, the existing results in the theory and practice of the field provide a solid foundation for the development of reverse distribution. However, an integrated approach is required, one that correlates collection, sorting, and processing technologies with reverse logistics and green marketing. The present research is aimed at strengthening and capitalizing on the contributions of economic agents and public authorities at all levels in order to formulate strategies for the development of reverse distribution and sustainable development. The purpose of this paper is to identify and substantiate the strategic directions for the development of green marketing and the reverse distribution sector in the Republic of Moldova, in correlation with neighboring countries, with an emphasis on the functional organization of value chain participants, the modernization of production and processing activities, the increase of added value, the reduction of valuable natural resource consumption, and the mitigation of environmental pollution.

The purpose of this paper is to focus on the application of managerial instruments at the levels of industry, trade, and consumption in order to develop reverse distribution as a component of green marketing, through the creation of networks and specialized channels for the collection, transportation, storage, sorting, and processing of various categories of waste, through the expansion and improvement of existing channels, and through the adoption of policies such as the establishment of waste sorting centers and the obligation of retailers to collect recyclable packaging, used technical goods, and other similar products.

The purpose of this article is to conduct research in this sector, and the results of the analyses will serve public authorities and stakeholders interested in the sustainable development of the national economy. They will support the creation of an integrated system and value chains, as well as more efficient reverse distribution channels, thereby contributing to the development of long-term partnerships.

The sustainable development of the reverse distribution sector in the Republic of Moldova will generate effects that will be reflected comprehensively in economic, social, and environmental terms. Its impact is not limited merely to expanding the range of products collected and recycled or increasing the return rate of packaging; rather, it entails a structural transformation of the distribution system and the organization of the value chain — from production to the consumer and, conversely, from the consumer back to the producer. In the short term, the effects are manifested through increased levels of collection and processing of returnable packaging, the establishment of waste collection and sorting centers, and the reduction of environmental pollution. In the long term, sustainable development leads to the diversification and modernization of the infrastructure for the collection, sorting, storage, and processing of waste generated from food and non-food products, as well as to the efficient organization of reverse flows in order to reduce the consumption of natural resources, mitigate environmental pollution, and create new employment opportunities.

From an economic perspective, one of the most important effects of developing the reverse distribution system is the increase in the gross domestic product of the state. Recycled, regenerated, and processed products, by their nature, provide a higher value ratio compared to the traditional distribution cycle. Under conditions where natural resources and raw materials are limited, the reintegration of these products into a new economic cycle creates significant added value for the economy. Thus, reverse distribution is no longer oriented exclusively toward the return of defective goods or returnable packaging, but also toward the collection,

storage, and processing of used and obsolete goods, as well as the sorting of waste (including packaging waste and others), which enables the replenishment of raw material resources and the reduction of natural resource consumption, thereby contributing to increased profitability for the national economy. Consequently, the creation and development of a reverse distribution system generates a competitive niche capable of supplying recycled products with a high degree of specialization for various industries, including the agro-industrial sector.

The development of the reverse distribution system does not merely represent an expansion of the network for the collection, sorting, and processing of returnable packaging, but rather a green marketing process through which a structural transformation of the economy takes place, encompassing the recovery and valorization of all categories of goods after their removal from the consumption cycle. This system can contribute to increasing added value, diversifying sources of raw materials for various industries, creating employment opportunities, enhancing efficiency, and strengthening the competitiveness of the Republic of Moldova in international markets, while at the same time providing the foundations for a more modern, efficient, and future-oriented economy.

3. Materials and methods

As sources and means for conducting the research, the analysis of the reverse distribution process in the Republic of Moldova was employed, together with statistical data regarding the evolution of the sector for the collection of waste and used or defective goods, particularly packaging, technical products, and household appliances, as well as publications from the specialized literature.

The analysis of EU directives concerning environmental pollution reduction and waste recycling highlights the tendency toward prioritizing the sustainable development of the market economy, which creates real opportunities for the Republic of Moldova, as a candidate country, to achieve the sustainable development of the reverse distribution sector.

The research employed strategic, comparative, and regression analysis, observation, survey methods, and the determination of statistical indicators.

4. Results and discussion

At the beginning of the twenty-first century, remarkable developments have been observed in the evolution of society, particularly due to the widespread development and implementation of information technologies (IT) and artificial intelligence (AI), which have contributed to the automation and robotization of industry, as well as to the mechanization of operations and technological processes across all sectors of the economy.

These innovations have contributed to increased production capacity and a higher level of satisfaction of consumer needs and demand. At the same time, the role of distribution and logistics processes has grown significantly, as they are responsible for ensuring the movement of products from producers to consumers, as well as, in the reverse direction, the transfer of defective, worn-out, or obsolete goods, recyclable packaging, and even waste from consumers to producers or processors. Consequently, there is a need to establish a complex system of networks and intermediary entities specialized in organizing distribution processes in both

directions in order to reduce the consumption of natural resources, time, and financial resources, increase the added value of the economy, and maintain ecological balance in the environment.

A sustainable economy cannot develop without the implementation of a comprehensive system of both direct and reverse distribution and logistics. For the modernization of the economy, reverse distribution represents a strategic opportunity, as these activities ensure an increase in the potential for added value creation and the adaptation of industry to growing consumer demand on the one hand, while reducing the consumption of natural resources on the other. This also contributes to reducing environmental pollution through the recovery and reintegration into the economic circuit of waste generated by the increasing use of single-use packaging, as well as obsolete, worn-out, damaged, or expired products. In the Republic of Moldova, at the current stage, the industry and infrastructure required for the collection and processing of waste from electrical, electronic, and household equipment, as well as tires, rubber products, plastics, and similar materials, are largely underdeveloped or entirely absent. In recent years, the need to develop a waste collection industry and to establish waste sorting and processing centers has been increasingly discussed at various levels. In reality, however, only fragmented initiatives can be observed, lacking continuity and a well-defined national strategy.

Sustainable development requires not only the separate collection of waste but also the expansion of the categories of waste being processed and the adoption of advanced practices from economically developed countries. This includes strengthening processing capacities through activities such as dismantling, refurbishment, restoration, and upgrading, as well as targeting markets with high added value. Furthermore, under current conditions, there is a need for cooperation among producers and commercial networks, as well as for the establishment of specialized centers for the collection, sorting, storage, processing, and transportation of waste, based on applied research and the modernization of efficient logistics systems.

Operators involved in reverse distribution through the collection, processing, and reintegration of waste into the economic circuit in the form of rehabilitated or upgraded goods, or as raw materials for the production of other goods, make a significant contribution to environmental protection, the reduction of natural resource consumption, and the decreased use of chemical substances. From an economic and social perspective, these activities generate employment opportunities in both rural and urban areas, diversify sources of income, and stimulate the development of enterprises specialized in reverse distribution and logistics systems.

Overall, the sustainable development of the economy and the reverse distribution sector can transform the Republic of Moldova into a competitive and reliable participant in the international market for products manufactured from processed plastics and recycled metals, thereby strengthening the country's economic, environmental, and social resilience. This is a sector with considerable growth potential that deserves support through dedicated public policies, smart investments, and cooperation across the entire value chain.

At present, most operators and companies involved in the collection and processing of waste, which produce new goods or raw materials for other products and return them to the economic circuit, establish commercial relationships with leading national and international

companies. In the Republic of Moldova, the development of the reverse distribution sector requires the establishment of direct partnerships with international traders; however, this is possible only if sufficiently large volumes of waste are collected for processing or recycling.

One of the most prominent companies specializing in the collection, sorting, and processing of waste in the Republic of Moldova is the MoldRec Group SRL Waste Recycling Association [14], founded in December 2013. The company contributes to the development of the reverse distribution sector through its network of 450 collection points and by collecting more than 31 thousand tons of waste annually. It provides pre-processing and co-processing services.

Another company involved in the reverse distribution process is the Moldcontrol Employers' Association, which has held an environmental authorization since 2020 and manages the collection of ten categories of electrical and electronic equipment, as well as batteries and accumulators, packaging waste, tires, and end-of-life vehicles [15]. Through its partners and authorized economic operators, the company manages the collection, transportation, storage, recycling, and environmentally safe disposal processes, using modern treatment technologies that comply with European quality standards in the field of recycling.

Other companies operating in the country are also specialized in waste collection and processing. For example, in the field of metal waste collection, companies such as Metalferos SA, Fier Grup SRL, Recycling Company SRL, Vinco SRL, Sudfier SRL, and Eco Recycling SRL are active. Other companies specialize in the collection of glass waste, such as Bostaplus SRL, while Vladecaprim SRL is engaged in the collection of paper waste. A noteworthy example is AO Prorep UP [16], which has developed a network of 20 collection points for small electronic waste, including hair dryers, mobile phones, tablets, cables, batteries, and similar products. These collection points are located at the premises of the organization's partners and cover all sectors of the municipality of Chişinău.

The company Eco Save [17], through its network of 110 collection points across the country, collects and recycles a wide range of materials, from packaging waste to household appliances and batteries. To date, it has recycled more than 2,300 tons of waste and organizes over 20 annual awareness campaigns on recycling. The company has implemented a collective collection system and facilitates recycling in an environmentally friendly manner. This system is regulated by Government Decisions No. 212/2018, No. 561/2020, and No. 586/2020, which establish the responsibility of producers and distributors placing electrical and electronic equipment, packaged products, batteries, and accumulators on the market of the Republic of Moldova to collect and recycle waste and end-of-life products. Consequently, the company has established contractual relationships with manufacturers of electronic and household goods, through which it assumes responsibility for the collection and recycling of obsolete and used products, as well as their processing in accordance with established procedures.

An acute problem in the Republic of Moldova concerns the recycling of animal-origin waste and food products. Thus, in 2012, Terafix SRL [18], located in the city of Străşeni, launched the first facility for the collection and processing of waste derived from animal products, including bones, feathers, hides, and other similar materials. The company collects animal-origin waste and transforms it into protein concentrate used as pet food. Although the

enterprise complies with the required standards, it is unable to export its products because it has not obtained certification in accordance with European standards.

The infrastructure for waste collection and processing must be developed in such a way that the processing activities do not harm the environment, while modern technologies compliant with international standards are implemented. In order to develop, these companies require support from the state to facilitate their integration into international markets. Such support is considered important by enterprises, as the local market faces significant limitations regarding waste processing and export development due to barriers established at the European level.

Modern trends in waste collection across Europe reflect a profound transformation of the market, driven by changes in consumer behavior, technological advancement, and an increasingly clear orientation toward sustainability. Green marketing and reverse distribution are no longer perceived merely as a niche within the packaging recycling and municipal waste processing industries, but rather as an integral part of the green economy, responsible consumption, the reintegration of resources recovered from waste recycling into the economic circuit, and the protection of the environment from excessive pollution caused by various types of waste.

An important trend in the development of reverse distribution is the geographical diversification of processing center locations. There is a growing need to establish a network of collection points across an extended market area, while processing, dismantling, treatment, or disposal activities require the construction of modern plants and factories in specific geographical locations, in compliance with the highest safety standards. Consequently, a considerable share of the waste collected in the country must be exported to other countries where such processing industries are more developed or where recycling facilities are available. For example, MoldRec Group SRL annually exports dozens of truckloads of used washing machines and refrigerators to the Frasinu processing plant in Buzău, Romania, for treatment and processing.

In order to identify the challenges faced by companies specializing in waste collection in the Republic of Moldova, we initiated a study aimed at evaluating the behavior, attitudes, and level of involvement of final consumers in ecological reverse distribution systems (returnable packaging, recycling, reuse, and product recovery). The research was conducted on the basis of a questionnaire and carried out within the Department of Economics and Business Administration of the Cooperative-Trade University of Moldova and the Department of Economic Theory and Marketing of the Technical University of Moldova during the period 15 November 2025 – 1 April 2026 [19].

The surveyed sample consisted of 288 respondents with the following socio-economic and geographical characteristics:

- by gender: female – 190 respondents (66.0%), male – 98 respondents (34.0%);
- by age: under 18 years – 4 respondents (1.4%), 18–25 years – 176 respondents (61.1%), 26–35 years – 18 respondents (6.3%), 36–50 years – 56 respondents (19.4%), over 50 years – 34 respondents (11.8%);
- by level of education: secondary education – 26 respondents (9.0%), post-secondary education – 48 respondents (16.7%), higher education – 188 respondents (65.3%), postgraduate education – 26 respondents (9.0%);

- by type of place of residence: rural – 78 respondents (27.1%), urban – 210 respondents (72.9%).

The research sample consisted of 288 respondents, characterized by diversity in terms of gender, age, educational attainment, and place of residence. However, the sample structure reveals a substantial concentration of respondents in the 18–25 age group (61.1%), as well as a high proportion of individuals with higher education (65.3%) and those residing in urban areas (72.9%). These characteristics indicate an overrepresentation of young and highly educated respondents, which may have influenced the perceptions investigated and limits the generalizability of the findings to the broader population.

Furthermore, the study was not designed to produce statistically representative estimates at the national level. Consequently, neither the margin of error nor the representativeness of the sample was calculated. As an exploratory study, its primary objective was to identify trends and relationships among variables rather than to generalize the findings to the entire population.

In addition, participants were selected using a non-probability sampling method based on respondent accessibility and voluntary participation. This sampling approach may introduce a degree of selection bias. Therefore, the findings should be interpreted with caution and regarded as reflecting the views of the investigated group rather than those of the general population.

Another methodological consideration concerns the research instrument. The questionnaire was developed based on the relevant literature and adapted to the objectives of the study; however, it was not subjected to a comprehensive psychometric validation procedure. Consequently, the conclusions drawn should be interpreted within the context of the exploratory nature of the research.

At the same time, the sample size and the diversity of respondents' socio-demographic characteristics made it possible to identify relevant trends in respondents' perceptions and provide a useful foundation for future research based on probabilistic, more balanced, and nationally representative samples.

The results of the survey regarding the thematic questions are presented below. The research began with a question aimed at determining whether consumers attitudes toward environmental protection influence their purchasing decisions, and the distribution of responses is illustrated in Figure 1.

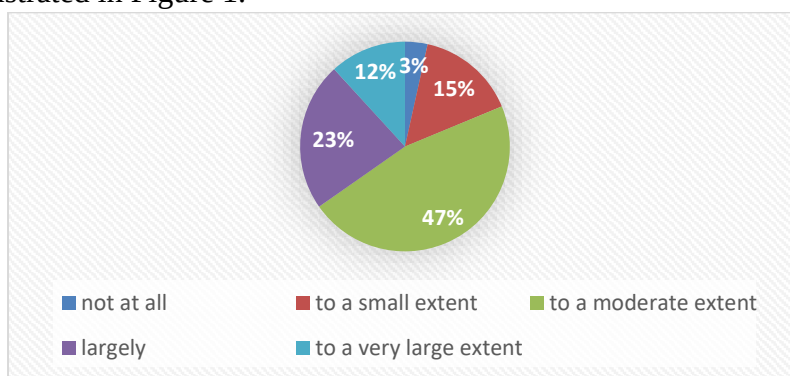


Figure 1. Responses of the surveyed individuals to the question: “To what extent do you consider that environmental protection influences your purchasing decisions?”

Thus, it can be observed that respondents perceive the influence of environmental protection on their purchasing decisions predominantly to a moderate or high extent. The largest share of responses falls within the category “to a moderate extent” (47%), suggesting that for nearly half of the respondents, environmental considerations are relevant but do not constitute the decisive criterion in the purchasing process.

This situation reflects a balanced consumption behavior, in which environmental concerns coexist with other factors, such as price, quality, or product accessibility. At the same time, a significant proportion of respondents indicated that environmental protection influences their purchasing decisions “to a large extent” (23%), while an additional 12% selected “to a very large extent.” Therefore, a total of 35% of participants assign considerable importance to environmental aspects when making purchasing decisions. This segment is particularly valuable from the perspective of green marketing, as it reflects the existence of a core group of conscious and engaged consumers who are inclined to support sustainable products and practices, including reverse distribution mechanisms. On the other hand, 15% of respondents stated that environmental protection influences their decisions “to a small extent,” while only 3% declared that it has no impact at all. These low percentages indicate that indifferent or negative attitudes toward environmentally responsible consumption are relatively uncommon within the surveyed sample.

If the respondents’ answers are analyzed through the perspective of the importance assigned to the phenomenon under investigation, using a semantic differential scale ranging from 1 to 5, the calculated mean score was 3.24. This average value positions the result above the neutral level (2.5), indicating a clear tendency toward the integration of environmental criteria into consumer behavior. From the perspective of green marketing, this result reflects the existence of a genuine potential for the development of ecological reverse distribution, as consumers already demonstrate a certain degree of sensitivity to environmental impacts. Thus, the final consumer is not yet fully guided by environmental considerations in purchasing decisions, but is currently in a transitional stage in which, through appropriate interventions—such as information campaigns, incentives, and the facilitation of collection infrastructure—this influence may become stronger and more stable.

Figure 2 illustrates the frequency with which respondents choose products with environmentally friendly or recyclable packaging, highlighting a predominantly moderate consumption behavior, yet with clear tendencies toward sustainable choices. The distribution of responses shows that the largest share belongs to the “sometimes” category, selected by 132 respondents (46%), indicating that nearly half of the participants incorporate environmental considerations into their purchasing decisions only occasionally. This result suggests that, although there is awareness of the importance of environmentally friendly packaging, such awareness has not yet been fully translated into consistent consumer behavior.

However, an important segment of the sample demonstrates a stronger orientation toward responsible consumption: 74 respondents (26%) frequently choose products with environmentally friendly packaging, while 12 respondents (4%) stated that they always do so. Thus, approximately 30% of respondents may be considered actively involved consumers who support sustainable products, representing a valuable target group for green marketing strategies. On the other hand, 50 respondents (17%) rarely choose such products, while 20

respondents (7%) never choose them, indicating the existence of barriers to the adoption of environmentally responsible behavior, possibly related to price, accessibility, or the level of consumer awareness.

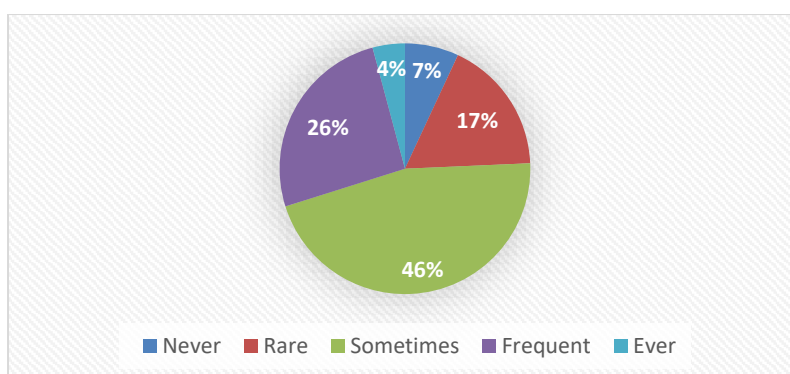


Figure 2. Responses of the surveyed individuals to the question: “How often do you choose products with environmentally friendly or recyclable packaging?”

Using the semantic differential scale to assess the frequency of choosing products with environmentally friendly packaging, a score of 3.03 was obtained. This average value is positioned very close to the “sometimes” level, confirming that the choice of products with environmentally friendly packaging remains an intermittent rather than a consistent behavior. The results indicate that the market is currently in a transitional stage: there is a solid base of environmentally conscious consumers, but this behavior has not yet become widespread. From the perspective of reverse distribution and green marketing, these findings highlight the need for targeted interventions aimed at increasing the frequency of such behavior through economic incentives, improved access to environmentally friendly products, and strengthened communication regarding their benefits.

Figure 3 reflects respondents’ willingness to pay a higher price for products with a reduced environmental impact and highlights an orientation that is predominantly dependent on the type of product.

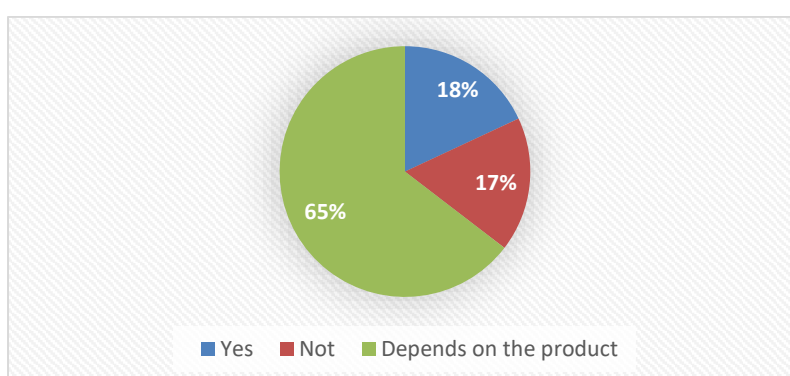


Figure 3. Responses of the surveyed individuals to the question: “Are you willing to pay more for products with a reduced environmental impact?”

The majority of respondents, namely 186 individuals (65%), selected the response “it depends on the product,” indicating that the decision to accept a higher price is not a general one but is influenced by the specific characteristics of the product being purchased. This category suggests a rational consumer behavior, in which individuals evaluate the relationship between environmental benefits and the utility or necessity of the product.

A relatively similar percentage is represented by respondents who firmly accept paying a higher price, namely 52 individuals (18%). These respondents constitute the segment of consumers with a stronger environmental orientation, being willing to financially support sustainable products regardless of the specific purchasing context. At the same time, 50 respondents (17%) stated that they are not willing to pay more for such products, indicating the existence of an economic barrier or an insufficient perception of the environmental added value associated with these products. Overall, the results show that, although there is a core group of consumers clearly oriented toward supporting environmentally friendly products, the majority adopt a flexible position that depends on the type of product. This situation highlights the importance of green marketing strategies that clearly demonstrate the benefits of environmentally friendly products and justify price differences, thereby contributing to the transformation of conditional willingness into consistent consumer behavior.

Figure 4 illustrates the frequency of respondents' involvement in a particular behavior associated with ecological distribution, highlighting predominantly occasional participation, although significant variations can be observed among the different response categories.

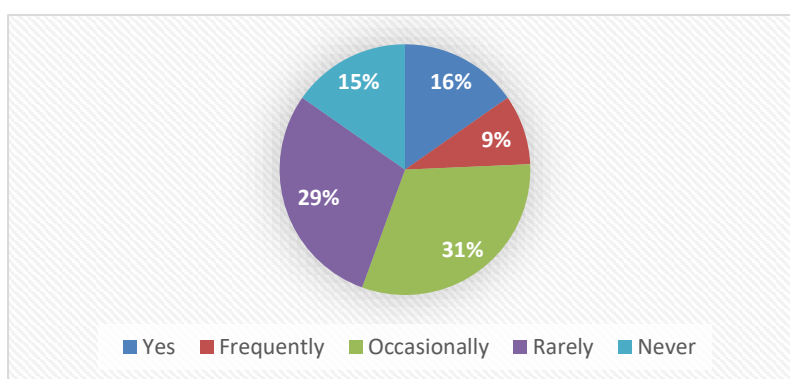


Figure 4. Responses of the surveyed individuals to the question: “Do you return reusable packaging (bottles, containers, etc.)?”

The largest share of responses falls within the “occasionally” category, selected by 90 respondents (31%), indicating that for a significant part of the sample, the behavior under analysis is not consistent but occurs sporadically, depending on circumstances or opportunities. This situation suggests the existence of potential for strengthening consumer involvement. A similar proportion is represented by the “rarely” category, chosen by 84 respondents (29%), reflecting a low level of engagement and confirming that, for many consumers, this type of behavior has not yet been integrated into their consumption routine. In addition, 44 respondents (15%) selected “never,” highlighting a significant segment of non-participants. On the other hand, higher levels of involvement are less represented: 26 respondents (9%) stated that they engage in this behavior “frequently,” while 44 respondents (16%) selected “yes,” which may be interpreted as consistent or affirmative involvement in the behavior under analysis. This segment, representing approximately one quarter of the sample, constitutes the active core of engaged consumers.

The calculation of the mean value of this indicator using the semantic differential scale yielded a score of 2.8. This average value is positioned below the midpoint of the scale (3 – “occasionally”), indicating that, overall, the analyzed behavior is characterized by a low to moderate level of involvement. Therefore, the results show that the majority of consumers do not yet demonstrate consistent behavior in the area of ecological reverse distribution, with

occasional or infrequent participation predominating. From the perspective of green marketing, this finding highlights the need to develop mechanisms capable of transforming sporadic participation into frequent behavior through improved accessibility, increased awareness, and the introduction of appropriate incentives.

Figure 5 highlights the main motivations of consumers for returning packaging, providing a clear picture of the factors that encourage or limit participation in ecological reverse distribution systems.

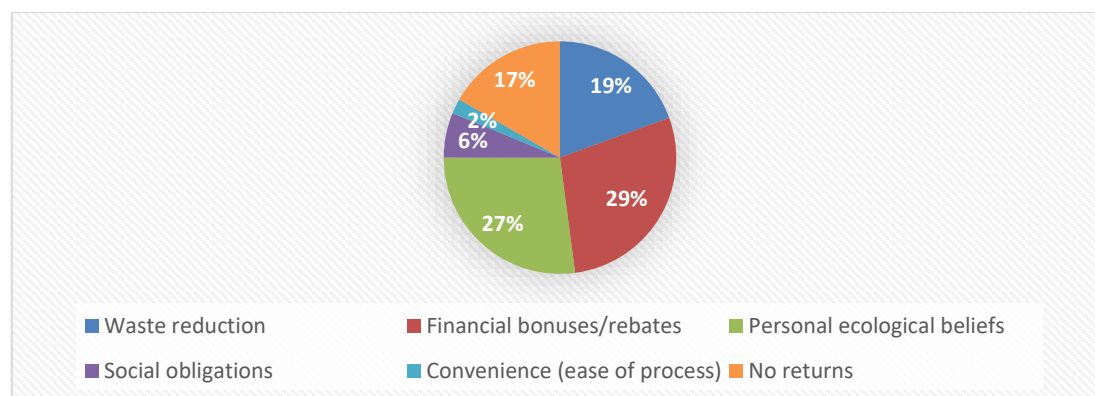


Figure 5. Responses of the surveyed individuals to the question: “What motivates you the most to return packaging?”

The most important motivation identified is represented by financial bonuses and discounts, indicated by 82 respondents (29%). This result highlights the decisive role of economic incentives in influencing consumer behavior, suggesting that immediate and tangible benefits are the most effective means of encouraging the return of packaging. A closely ranked motivation is personal environmental convictions, cited by 78 respondents (27%), indicating that a significant proportion of consumers act out of environmental responsibility and awareness of the negative impact of waste. This category reflects the existence of a segment of environmentally conscious consumers who do not rely exclusively on material incentives. In addition, waste reduction was mentioned by 56 respondents (19%), confirming that environmental protection arguments exert a genuine influence on consumer behavior, even if they are not the dominant factor.

On the other hand, motivations such as social obligations (18 respondents – 6%) and the convenience of the process (6 respondents – 2%) account for relatively small proportions, indicating that social pressure and logistical ease are not yet decisive factors in shaping packaging return behavior. An important finding is that 48 respondents (17%) stated that they do not return packaging at all, highlighting the existence of a significant segment of non-participants. This category may reflect barriers such as inadequate infrastructure, low interest, or insufficient incentives. Overall, the results show that economic motivations prevail over environmental ones; however, the latter also account for a considerable share, indicating a positive evolution of environmental awareness among consumers.

From the perspective of green marketing and reverse distribution, these findings suggest that effective strategies should combine financial incentives with environmental education and improved accessibility of collection systems in order to reduce the proportion of passive consumers and strengthen sustainable consumer behaviors.

Figure 6 highlights the types of packaging most frequently returned by respondents, providing a clear picture of consumers' practical behavior within ecological reverse distribution systems.

The results show that plastic packaging is the most frequently returned type of packaging, being indicated by 204 respondents. This predominance may be explained by the widespread use of plastic packaging in consumer products and by the existence of more developed collection systems for this type of material. In addition, consumers are becoming increasingly aware of the negative environmental impact of plastic, which may contribute to their more active involvement in its recovery and return.

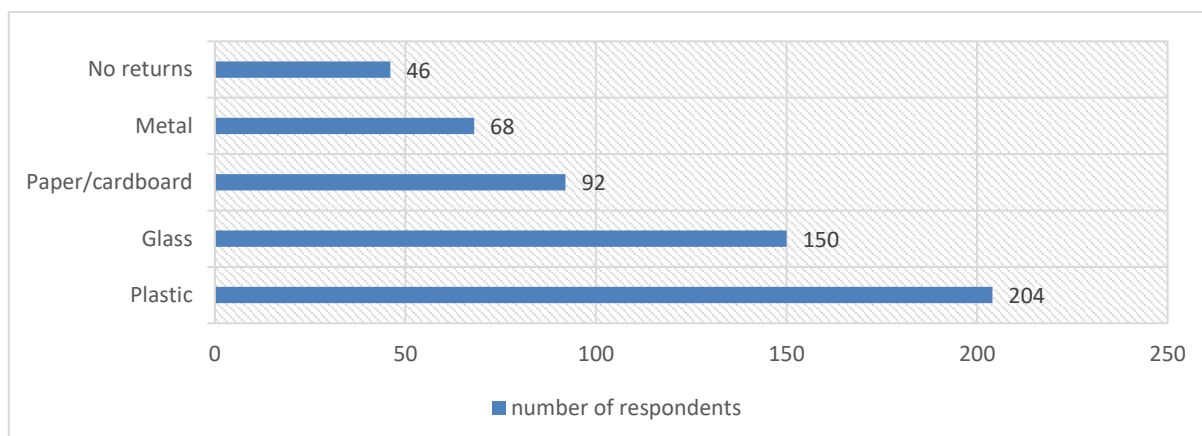


Figure 6. Responses of the surveyed individuals to the question: “Which types of packaging do you return most frequently?”

Glass packaging ranks second, being mentioned by 150 respondents. This result reflects the tradition of glass reuse and recycling, as well as the existence, in many cases, of well-organized return systems for this type of packaging (for example, returnable beverage containers). Paper and cardboard are returned by 92 respondents, indicating a moderate level of involvement in the collection of these materials. Although they are generally considered easy to recycle, the lower return rate may be influenced by the absence of direct return systems through retailers, as they are more often collected through alternative channels such as dedicated containers or municipal collection services. In the case of metal packaging, only 68 respondents indicated that they return this type of material, suggesting a lower level of participation. This may be explained by the relatively smaller volume of metal packaging used in everyday consumption or by the more limited accessibility of collection points. A relevant finding is that 46 respondents stated that they do not return any type of packaging, highlighting the existence of a segment of consumers who are not involved in reverse distribution activities. This category may reflect barriers such as inadequate infrastructure, lack of interest, or a low level of awareness. Overall, the results indicate that consumer involvement in packaging return activities varies according to the type of material, being higher for packaging materials that are highly visible and supported by well-developed collection systems.

From the perspective of green marketing, these findings highlight the need to expand collection infrastructure and information campaigns for all types of packaging, so that consumer participation in reverse distribution systems becomes more widespread, consistent, and effective.

The data presented in Figure 7 reflect respondents' perceptions regarding the degree of difficulty associated with carrying out an activity related to ecological reverse distribution (such as returning packaging or accessing collection points), highlighting an overall tendency toward perceiving the process as difficult.

The distribution of responses shows that the largest shares are concentrated in the categories “neither difficult nor easy” – 98 respondents (34%) and “difficult” – 94 respondents (33%). This indicates that, for the majority of respondents, the process is not perceived as easy but rather as neutral or difficult, which may constitute a barrier to active involvement in environmentally responsible behaviors. A significant proportion of 66 respondents (23%) consider the process to be “very difficult,” reinforcing the idea that real obstacles exist in accessing or using reverse distribution infrastructure. In contrast, only 24 respondents (8%) selected “easy,” while 6 respondents (2%) indicated “very easy,” demonstrating that positive perceptions regarding accessibility remain limited.

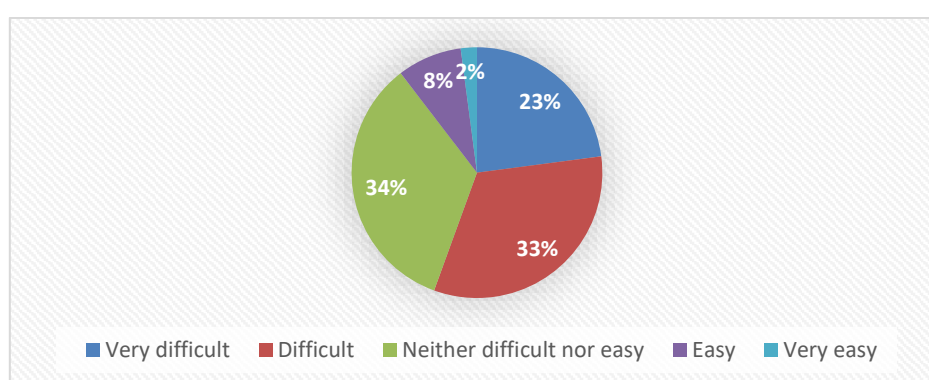


Figure 7. Responses of the surveyed individuals to the question: “How easy is it for you to find collection points?”

Using the semantic differential scale to evaluate the indicator and determine its mean value, a score of 2.34 was obtained. This average value is below the neutral point of the scale (3), indicating that, overall, respondents perceive the process as being rather difficult than easy. The results highlight the existence of significant barriers to consumer involvement in ecological reverse distribution, particularly from the perspective of accessibility and ease of participation. From a green marketing standpoint, these findings emphasize the need to simplify procedures, expand collection infrastructure, and increase the level of convenience so that consumer participation can be facilitated and encouraged.

Figure 8 presents the main barriers that hinder consumer involvement in the packaging return process, providing a clear perspective on the obstacles encountered within ecological reverse distribution systems.

The results show that the lack of collection points represents the principal barrier, being identified by 154 respondents (54%). This majority share highlights the fact that insufficiently developed infrastructure constitutes the main obstacle to consumer participation in packaging return activities.

In practice, even when there is willingness or intention to participate, the lack of access to collection points limits environmentally responsible behavior. The second major barrier is lack of time, mentioned by 66 respondents (23%). This result suggests that, within the context of a dynamic lifestyle, consumers are unwilling to make additional efforts to return

packaging, particularly when the process is not simplified or integrated into their daily routine. A smaller but still relevant proportion is represented by the lack of information (38 respondents – 13%), indicating that some consumers are not sufficiently informed about the methods of returning packaging or the benefits associated with this process.

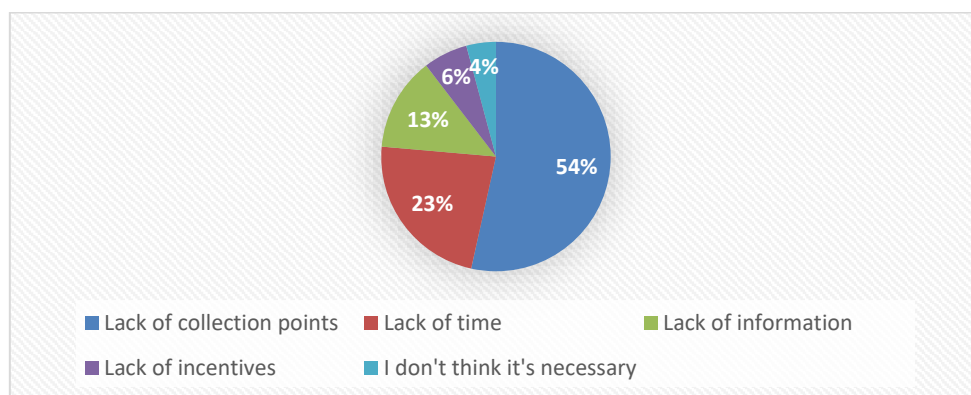


Figure 8. Responses of the surveyed individuals to the question: “What barriers do you encounter when returning packaging?”

This situation highlights the need to intensify communication and environmental education efforts. Regarding the lack of incentives, only 18 respondents (6%) identified this aspect as a barrier, while 12 respondents (4%) stated that they do not consider packaging return necessary. These relatively low percentages suggest that the main issue is not the absence of internal or external motivation, but rather logistical and organizational difficulties. The results demonstrate that structural barriers, particularly those related to infrastructure and accessibility, are considerably more important than attitudinal barriers. From the perspective of green marketing and reverse distribution, these findings emphasize the need to expand collection networks, optimize accessibility, and integrate return services into locations that are convenient for consumers, thereby transforming existing environmental intentions into actual behavior.

The analysis of the level of consumer involvement in the return of used products is presented in Figure 9, which highlights the motivations underlying this behavior and provides a coherent picture of the functioning of ecological reverse distribution systems.

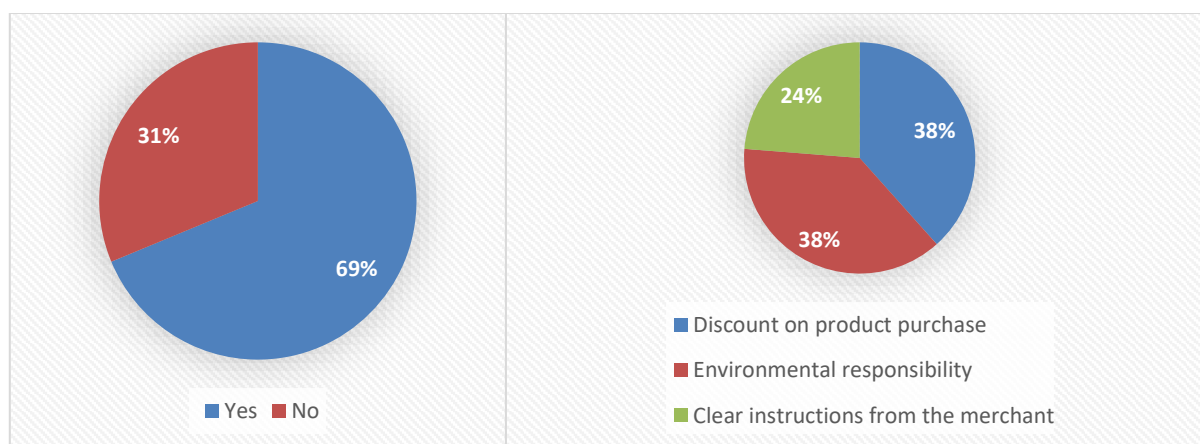


Figure 9. Responses of the surveyed individuals to the questions: “Have you ever returned used products for repair, recycling, or remanufacturing (electronics, household appliances, etc.)?” and “If YES, what motivated you to do so?”

The first chart shows that the majority of respondents, namely 198 individuals (69%), stated that they had returned used products for recycling, repair, or remanufacturing, while 90 respondents (31%) reported that they had not engaged in such behavior. This result indicates a relatively high level of participation in reverse channels, suggesting that a large proportion of consumers are already actively involved in product recovery processes. At the same time, the proportion of nearly one-third of respondents who do not participate highlights the existence of certain reservations or barriers that limit the broader adoption of this behavior.

The second chart provides a more detailed view of the motivations that encourage consumers to return used products. The results reveal a relatively balanced distribution among the main motivating factors. A discount on the purchase of a new product was indicated by 76 respondents (38%), making it the most frequently cited motivation and confirming the importance of economic incentives in influencing consumer behavior. Closely following this factor is environmental responsibility, mentioned by 75 respondents (38%), highlighting the fact that value-based motivations and personal convictions play a role that is equally important as financial benefits. This result reflects the growing maturity of consumer behavior, in which environmental protection considerations are becoming increasingly relevant. At the same time, clear instructions provided by the retailer were identified by 47 respondents (24%), emphasizing the essential role of communication and consumer guidance in facilitating the return process. The absence of clear information may limit consumer involvement, even when a favorable intention to participate already exists.

Thus, the results show that consumer participation in reverse distribution is supported by both economic factors and environmental motivations, while effective communication by retailers plays an important complementary role. From the perspective of green marketing, these findings highlight the need for an integrated approach that combines financial incentives with environmental education and clear information in order to increase the level of consumer involvement and reduce the proportion of passive consumers.

Figure 10 illustrates the level of trust that respondents place in a particular aspect of ecological reverse distribution (for example, the proper recycling of returned materials or the effectiveness of the system). The results indicate a predominantly moderate perception, although with noticeable tendencies toward skepticism.

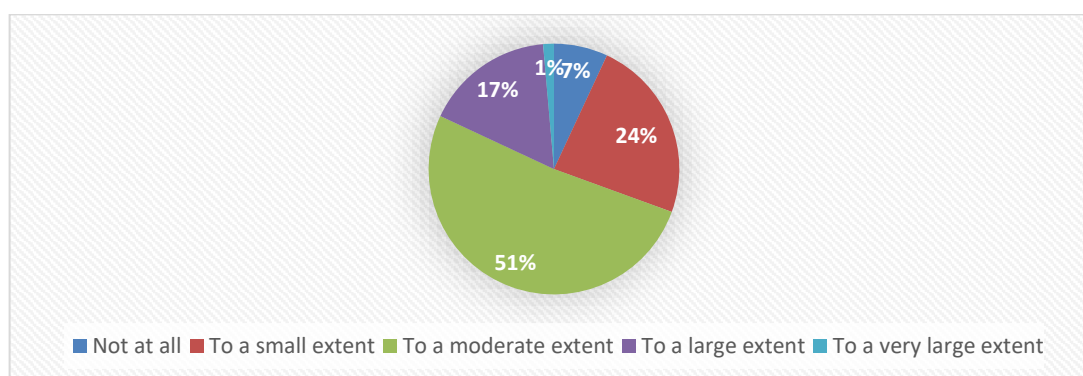


Figure 10. Responses of the surveyed individuals to the question: “How much confidence do you have that the collected products are recycled properly?”

The distribution of responses shows that the majority of respondents fall within the “to a moderate extent” category, comprising 148 individuals (51%), which suggests a relatively

balanced but not firmly established level of trust. This indicates that, although consumers do not reject the idea, they still have reservations regarding the efficiency or transparency of the process. A total of 68 respondents (24%) believe that this aspect is present “to a small extent,” while 20 respondents (7%) selected “not at all,” reflecting the existence of a significant segment of skeptical consumers. In contrast, only 48 respondents (17%) perceive the situation “to a large extent,” and 4 respondents (1%) “to a very large extent,” demonstrating that a high level of trust remains limited.

The calculation of the average level of consumer trust in the ecological reverse distribution process, based on the semantic differential scale, yielded a mean value of 2.82. This average score is positioned below the neutral point of the scale (3), indicating that, overall, respondents’ perceptions are slightly inclined toward distrust or reservation. The results suggest that, although there is a foundation of acceptance of ecological systems, the level of trust is not yet sufficiently consolidated to support consistent behavior. From the perspective of green marketing and reverse distribution, this finding highlights the need to increase the transparency of recycling processes, improve communication, and provide tangible evidence of benefits in order to transform moderate trust into a high and stable level of confidence.

Figure 11 highlights respondents’ perceptions regarding the importance of specific pollution prevention (P2) measures adopted by companies, with the results indicating a clearly positive attitude toward such initiatives.

In the case of reducing unnecessary packaging, the largest shares of responses are concentrated at the upper levels of the scale: 94 respondents indicated “very important” and 74 respondents selected “important,” demonstrating a high level of appreciation for this measure. The relatively small number of respondents who consider it “not important at all” (22) or “slightly important” (20) confirms the broad acceptance of this approach. For properly sized packaging, the distribution is similar, although with a slightly higher number of responses in the “slightly important” category (38). Nevertheless, the majority of respondents evaluate this measure as “important” (76) or “very important” (82), highlighting concerns regarding the efficient use of resources.

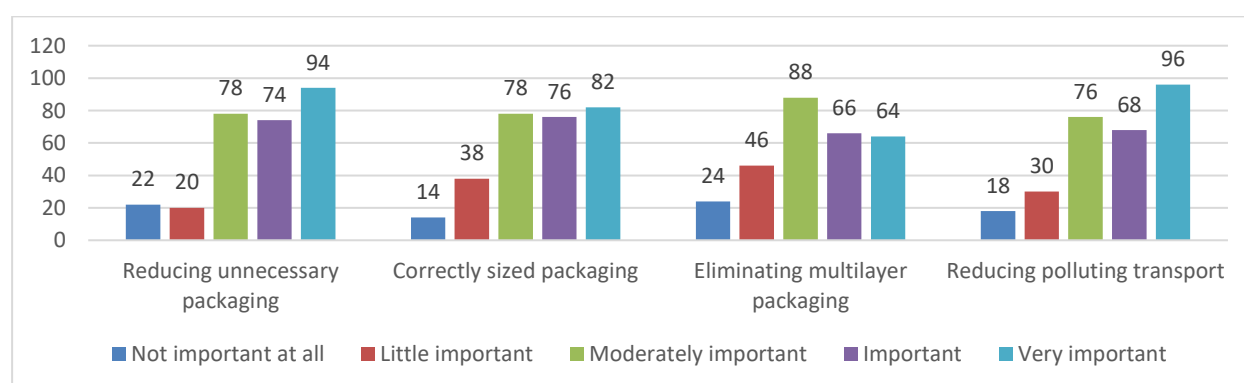


Figure 11. Responses of the surveyed individuals to the question: “How important are the following measures implemented by companies to you?”

With regard to the elimination of multilayer packaging, the largest share of responses is found in the “moderately important” category (88), followed by “important” (66) and “very important” (64). This distribution suggests that, although the measure is appreciated, the level of awareness or perception of its impact is lower compared to the other measures examined.

The reduction of polluting transportation is perceived as one of the most important actions, with 96 respondents indicating “very important” and 76 respondents selecting “important.” This result reflects a high degree of sensitivity to the environmental impact of transportation and strong support for measures aimed at reducing emissions. Overall, all the measures analyzed are evaluated predominantly within the “important” to “very important” range, indicating a high level of environmental awareness among consumers.

However, differences in intensity can be observed, with the most highly valued measures being the reduction of unnecessary packaging and polluting transportation, while the elimination of multilayer packaging is perceived somewhat more moderately. These results suggest that, from the perspective of green marketing, companies enjoy substantial consumer support for the implementation of pollution prevention strategies. Consequently, emphasis should be placed on clearly communicating the benefits of such measures and expanding initiatives with a visible environmental impact.

Figure 12 highlights respondents’ perceptions regarding responsibility for packaging collection, with the results clearly indicating a preference for a collective responsibility approach.

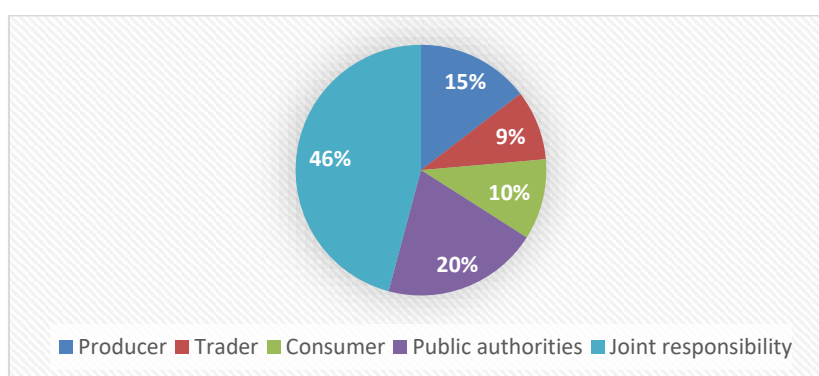


Figure 12. Responses of the surveyed individuals to the question: “Who should be primarily responsible for the collection of packaging?”

The largest share of responses was attributed to the “shared responsibility” option, selected by 132 respondents (46%). This result reflects a mature understanding of the issue, whereby consumers do not assign responsibility exclusively to a single actor but consider that involvement should be shared among all participants in the chain—producers, retailers, consumers, and public authorities. The second most frequently selected category is public authorities, indicated by 58 respondents (20%), suggesting significant expectations regarding the role of the state in organizing, regulating, and supporting collection infrastructure. This finding highlights the importance of public policies and the legislative framework for the efficient functioning of reverse distribution systems. Producers are considered responsible by 42 respondents (15%), reflecting recognition of their role in packaging design and the implementation of recovery systems. At the same time, consumers were mentioned by 30 respondents (10%), while retailers were identified by 26 respondents (9%). These relatively similar but lower percentages indicate that these actors are perceived more as secondary participants when responsibility is considered individually.

The results emphasize that the issue of packaging collection is perceived as a complex one, requiring the collaboration of all stakeholders involved. From the perspective of green

marketing and reverse distribution, this perception supports the need to develop integrated systems in which responsibilities are clearly allocated and coordinated, while cooperation between the public and private sectors becomes essential for the efficiency of the process.

The responses of the surveyed individuals to the question “Would you participate more actively in reverse distribution if stores offered:” are presented in Figure 13. These responses highlight the factors that could encourage more active consumer participation in reverse distribution, with the results clearly indicating the importance of practical facilities and incentives provided by retailers.

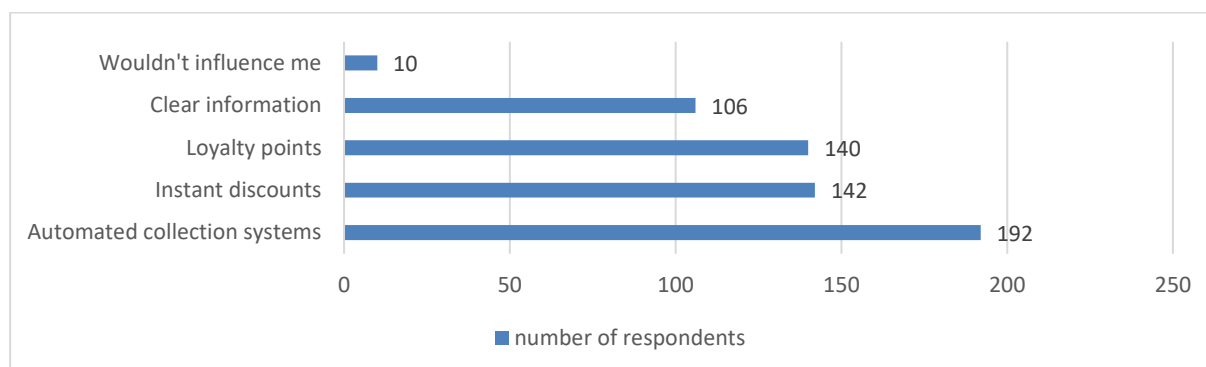


Figure 13. Diagram of respondents' answers to the question: “Would you participate more actively in reverse distribution if stores offered”

The highest share of responses was recorded for automated collection systems, which were indicated by 192 respondents, demonstrating that accessibility and ease of use represent the primary motivating factors. Consumers are more likely to participate when the required effort is minimal and the process is integrated into their daily routines. The next most frequently selected options are immediate discounts (142 respondents) and loyalty points (140 respondents), confirming the essential role of economic incentives in influencing consumer behavior. These results show that direct and measurable benefits are perceived as highly attractive and effective in changing consumption patterns. In addition, clear information was mentioned by 106 respondents, highlighting the fact that a significant proportion of consumers require guidance and effective communication in order to become actively involved in the return process. In contrast, only 10 respondents indicated that these measures would not influence them, suggesting that the overwhelming majority of consumers are open to change, provided that appropriate support mechanisms are available.

Overall, the results indicate that consumer participation in reverse distribution is not constrained by a lack of interest, but rather by the absence of favorable conditions. From the perspective of green marketing, these findings emphasize the need to implement integrated solutions that combine accessible infrastructure (such as automated collection systems), economic incentives, and effective communication in order to transform consumer willingness into active and consistent behavior.

Based on the responses provided to the open-ended question, respondents' opinions can be systematized and synthesized into several main courses of action, which clearly highlight consumers' expectations regarding producers and retailers.

First, the most frequently mentioned idea is the need to develop collection infrastructure. The majority of respondents emphasize the importance of establishing a larger number of

collection points located in accessible places, such as stores, shopping centers, and public spaces. Respondents also highlight the desire for each retailer to have its own collection facilities and for the systems to be easy to use, including through the introduction of automated return machines.

Second, economic incentives are considered to play an essential role. Numerous respondents believe that consumer involvement could be increased through the provision of bonuses, discounts, loyalty points, or even direct financial rewards. The implementation of deposit-return systems, whereby consumers receive money back for returned packaging, is also frequently mentioned.

Another important aspect concerns consumer information and education. Respondents emphasize the need for clearer and more visible information campaigns, particularly in highly frequented locations such as supermarkets and shopping malls, as well as through advertising and educational materials. The idea of early environmental education, including within schools, is also highlighted as a means of fostering responsible behavior over the long term.

In addition, the idea of simplifying the return process appears frequently, with consumers expressing a preference for procedures that are rapid, clear, and easy to understand. Respondents consider that reducing the effort required for returning products or packaging is essential for increasing participation.

Furthermore, some respondents emphasize the importance of the active involvement and example set by companies, through the use of environmentally friendly packaging, the reduction of polluting packaging materials, and the promotion of sustainable values. At the same time, the need for better organization of collection systems and greater transparency regarding recycling outcomes is frequently mentioned.

The overall assessment of responses to the open-ended question indicates that consumer involvement in ecological reverse distribution can be strengthened through a combination of three main factors: easy access (infrastructure), motivation (economic incentives), and awareness (information and education). This triad represents the essential strategic direction for the effective development of green marketing, reverse distribution systems, and the collection and processing of waste from all categories.

Analyzing the respondents' answers to the questionnaire, it can be noted that for 47% of respondents the environmental factor is relevant and very important, 26% prefer products packaged in environmentally friendly packaging, and 65% would, depending on the circumstances, be willing to pay a higher price for environmentally friendly products. With regard to the return of reusable packaging (bottles, containers, etc.), 31% of respondents fall within the "occasionally" category, 29% within the "rarely" category, and only 16% do so frequently. Respondents are motivated to return packaging primarily by bonuses and financial discounts (29%) and by personal environmental convictions (27%). The packaging materials most frequently returned by respondents are plastic packaging (70.8%) and glass packaging (52.1%). Regarding the difficulties encountered in returning packaging, two categories of responses stand out: "neither difficult nor easy" (34%) and "difficult" (33%). The study also revealed that 69% of respondents have returned used products for recycling, repair, or remanufacturing, while 31% have never engaged in such return activities.

Respondents are not fully confident that collected products are recycled properly. The majority of them, namely 51%, stated that they are confident only “to a moderate extent,” suggesting a relatively balanced but not firmly established level of trust. In the respondents’ opinion, responsibility for packaging collection should primarily be a “shared responsibility” (46%), while public authorities rank second, accounting for 20% of responses.

The analysis of the legislative framework, existing practices, and the findings of the empirical research demonstrates that the development of reverse distribution in the Republic of Moldova requires an integrated strategic approach focused on strengthening infrastructure, enhancing cooperation among stakeholders, and promoting the principles of the circular economy. In this context, the following strategic directions are proposed.

1. Strategy for the Development of the National Reverse Distribution Infrastructure. A fundamental prerequisite for the development of reverse distribution is the expansion of infrastructure for the collection, sorting, storage, and processing of waste. The research demonstrates that the lack of collection points represents the main barrier to consumer participation, being identified by more than half of the respondents. Therefore, it is necessary to develop a national network of regional collection centers, establish collection points within retail networks, and implement automated packaging return systems in order to make the process more accessible and convenient for the public.

2. Strategy for Strengthening the Value Chain and Partnerships. Enhancing the efficiency of reverse distribution requires the development of effective partnerships among producers, retailers, collection operators, recyclers, public authorities, and research institutions. The establishment of specialized clusters and the integration of logistics flows will reduce collection and processing costs, increase the volume of recovered materials, and create value chains capable of generating higher added value for the national economy.

3. Strategy for Developing Local Processing and Resource Recovery Capacities. At present, a substantial share of collected waste is exported for recycling due to insufficient domestic industrial capacity. The development of modern recycling, remanufacturing, and secondary raw material recovery facilities will reduce dependence on foreign markets, create new employment opportunities, and contribute to increasing added value within the economy of the Republic of Moldova. Furthermore, investments in advanced processing technologies will enable the recovery of a broader range of waste streams.

4. Strategy for Stimulating Consumer Participation. The research findings indicate that economic incentives are the primary factor motivating consumers to participate in reverse distribution activities. Accordingly, the implementation of deposit-return systems, commercial discounts, loyalty programs, and other financial incentives for individuals returning packaging or used products is recommended. These instruments can transform occasional participation into consistent behavior and contribute to increasing the volume of recovered materials.

5. Strategy for Consumer Education and Environmental Responsibility. The development of reverse distribution should be supported through continuous environmental education programs and public awareness campaigns highlighting the benefits of recycling and product reuse. The study demonstrates that environmental responsibility is one of the main motivational factors influencing consumer behavior, while strengthening environmental awareness can further increase voluntary participation in collection systems. Education for

sustainable development should therefore be integrated into both the formal education system and corporate communication strategies.

6. Strategy for the Digitalization of Reverse Distribution Systems. Improving the efficiency of reverse distribution requires the adoption of digital technologies for monitoring returned product flows, ensuring the traceability of recycled materials, and optimizing logistics operations. The implementation of digital platforms, mobile applications for locating collection points, and the use of artificial intelligence in logistics planning can reduce operational costs while increasing the transparency and efficiency of the entire system.

7. Strategy for Developing Markets for Recycled Products. An effective reverse distribution system should be complemented by measures aimed at stimulating demand for products manufactured from recycled materials. To this end, it is recommended to promote green public procurement, develop eco-labels, facilitate the certification of recycled products, and support their export to European Union markets. The development of stable markets for secondary raw materials will contribute to the long-term economic sustainability of the entire system.

8. Strategy for Strengthening the Institutional Framework and Extended Producer Responsibility. The effective implementation of reverse distribution requires stronger institutional mechanisms and the consistent application of the principle of extended producer responsibility. This involves improving the regulatory framework, developing monitoring and enforcement mechanisms, and encouraging private investment in collection and recycling infrastructure. At the same time, cooperation among public authorities, the business sector, and producer responsibility organizations should be strengthened to ensure the efficient functioning of the entire system.

The implementation of these strategies would transform reverse distribution from an activity focused primarily on waste management into a strategic instrument of the circular economy capable of generating economic, social, and environmental benefits. The development of infrastructure, modernization of processing capacities, digitalization of logistics flows, stimulation of consumer participation, and strengthening of partnerships between the public and private sectors can contribute to enhancing the competitiveness of the Republic of Moldova's economy, reducing the consumption of natural resources, and accelerating the transition toward a sustainable development model.

5. Conclusions

The conducted research confirms that reverse distribution represents one of the fundamental components of the circular economy and sustainable development, contributing simultaneously to the efficient use of natural resources, the reduction of waste generation, the mitigation of environmental impacts, and the increase of added value within the economy. The analysis of the relevant literature demonstrates that reverse distribution has evolved from a simple mechanism for managing product returns and packaging into a complex system for managing reverse material flows based on the principles of recovery, reuse, recycling, and remanufacturing. In this context, the development of reverse distribution has become an indispensable prerequisite for the implementation of the circular economy and for achieving the sustainable development objectives assumed by the Republic of Moldova in the process of European integration.

The analysis of the current situation indicates that the Republic of Moldova already possesses a favorable legislative framework and the first organizational structures involved in waste collection and recovery. However, the existing infrastructure remains insufficiently developed to meet the requirements of a modern circular economy. The lack of regional collection and sorting centers, limited domestic processing capacities, insufficient cooperation among producers, retailers, and recycling operators, together with the dependence on exporting a substantial proportion of collected waste for processing, reduce the economic efficiency of the system and limit the domestic utilization of recoverable resources. These findings demonstrate that the development of reverse distribution should be approached as a national economic policy rather than solely as an environmental protection issue.

The results of the sociological survey confirm the existence of favorable conditions for the development of reverse distribution. The majority of respondents demonstrate a positive attitude toward environmental protection and support measures aimed at reducing pollution, recycling products, and using environmentally friendly packaging. At the same time, the study shows that consumers' willingness to participate actively in reverse distribution systems depends primarily on the availability of accessible infrastructure and economic incentive mechanisms. The lack of collection points constitutes the most significant barrier identified by respondents, followed by the time required for returning products and insufficient information regarding the operation of recycling systems. At the same time, financial incentives, automated collection systems, and loyalty programs represent the factors with the greatest potential to influence consumer behavior.

One of the most important findings of the study is the identification of a discrepancy between favorable attitudes toward environmental protection and consumers' actual behavior. Although the majority of respondents state that they value environmental measures and recognize the importance of recycling, consistent participation in return and collection activities remains relatively limited. This finding confirms that the development of reverse distribution depends not only on the level of environmental awareness but, more importantly, on the existence of institutional and economic mechanisms capable of transforming consumer intentions into sustained behavioral practices. From this perspective, investments in infrastructure and economic incentives are likely to produce more immediate effects than isolated awareness campaigns.

Based on the research findings, the implementation of a National Reverse Distribution Development Program is recommended, built upon several priority directions.

First, it is necessary to develop a modern collection and sorting infrastructure through the establishment of permanent collection points within retail networks, the expansion of regional recycling centers, and the large-scale implementation of Reverse Vending Machine systems for recyclable packaging.

Second, investments in the national recycling and remanufacturing industry should be encouraged through fiscal incentives, investment grants, and support programs for enterprises utilizing secondary raw materials. The development of these capacities will reduce waste exports while increasing the added value generated within the national economy.

Another priority concerns strengthening Extended Producer Responsibility through the development of collective producer responsibility organizations, the establishment of

progressively increasing collection and recycling targets, and the digital monitoring of product and waste flows.

Furthermore, the research demonstrates the necessity of developing stable partnerships among public authorities, the business sector, research institutions, and non-governmental organizations in order to establish regional clusters specializing in the circular economy. Such structures would facilitate the integration of collection, sorting, processing, certification, and commercialization processes for products derived from recycled materials.

Particular importance should also be assigned to the digitalization of reverse distribution through the implementation of information platforms for monitoring logistics flows, ensuring the traceability of recycled products, and informing consumers about collection points and the economic benefits associated with participation in the system.

At the same time, continuous environmental education programs and responsible consumption promotion campaigns should be integrated into both the educational system and corporate social responsibility strategies. The research findings indicate that education and effective communication complement economic incentives and contribute significantly to strengthening consumer confidence in recycling systems.

From the perspective of economic policy, reverse distribution should be incorporated into national competitiveness and industrialization strategies, as it has the potential to generate significant economic benefits through reducing dependence on imported raw materials, creating new industrial sectors, generating green employment opportunities, and enhancing the competitiveness of Moldovan exports within the European Union market.

The study also presents certain methodological limitations. The exploratory nature of the research, the use of a non-probability sample, and the predominance of young respondents with higher education limit the possibility of generalizing the findings to the entire population. Consequently, future studies based on representative probability samples are recommended, together with the development of econometric models capable of assessing the impact of reverse distribution on economic competitiveness, resource-use efficiency, and carbon emission reduction.

Overall, reverse distribution should be regarded as a strategic pillar of sustainable development and the circular economy, capable of transforming waste into valuable economic resources, stimulating innovation and investment, strengthening business competitiveness, and enhancing the resilience of the Republic of Moldova's economy. The coordinated implementation of the proposed strategies would enable the development of a modern reverse distribution system compatible with European Union standards and oriented toward the efficient utilization of resources, environmental protection, and the improvement of economic and social well-being.

REFERENCES

1. ALLEN J., FULLER D., GLASER M. Materials Recycling and Reverse Channel Network: The Public Policy Challenge. In: *Journal of Macromarketing*. Volume 16, Issue 1, 1996, p. 52-72. <https://doi.org/10.1177/027614679601600104>
2. CHIȘ, S. (2024). *Fundamente și strategii pentru promovarea dezvoltării durabile. O analiză a economiei circulare și a educației pentru sustenabilitate*. București: Pro Universitaria, 162 p. ISBN 978-606-26-1904-6.
3. DANCIU V. *Marketing ecologic. Etica verde a producției și consumului*. București: Editura Economică, 2006, 240 p. ISBN 973-709-254-6

4. FLORESCU C., MĂLCOMETE P., POP N. Al. Marketing. București: Editura Expert, 1992. 354 p. ISBN: 973-575-366-9
5. FULLER D. Sustainable Marketing. Managerial Ecological Issues. California: Sage Publications, 1999. 395 p. ISBN 978-076-191-219-4
6. KOTLER Ph. Managementul marketingului. București: Editura Teora, 1999. 1040 p. ISBN 973-601-365-0
7. KOTLER Ph., SAUNDERS J., ARMSTRONG G., WONG V. Principiile Marketingului. București: Editura Teora, 1999. 994 p. ISBN 973-601-816-4
8. ROSS DAVID. Distribution Planning and Control, New York: Chapman & Hall, 2004. 165 p. ISBN: 1-4020-7686-X
9. Salas-Navarro, K. et al.. Reverse logistics and sustainability: a bibliometric analysis. In: Sustainability, 16(13), 2024. 30 p. <https://doi.org/10.3390/su16135279>
10. Legea Republicii Moldova nr.209/2016 Privind deșeurile, cu modificările ulterioare. Disponibil: https://www.legis.md/cautare/getResults?doc_id=125234&lang=ro
11. Hotărârea Guvernului Republicii Moldova nr.939/2023 Regulamentului privind depozitarea deșeurilor. Disponibil: <https://monitorul.fisc.md/regulamentul-privind-depozitarea-deseurilor-a-intrat-in-vigoare/>
12. Legea Republicii Moldova nr.237 Privind producția ecologică și etichetarea produselor ecologice. https://www.legis.md/cautare/getResults?doc_id=138891&lang=ro
13. Serviciului de gestionare a deșeurilor municipale. <https://proiecte.chisinau.md/ro/pv-894-gestionarea-deseurilor-municipale>
14. Asociația pentru Reciclare a deșeurilor – MoldRec Group SRL. <https://moldrec.md/>
15. Gestionarea deșeurilor în Republica Moldova – Asociația Patronală Moldcontrol, <https://www.moldcontrol.md/>
16. Responsabilitatea Extinsă a Producătorului – AO Prorep UP. <https://prorep.md/>
17. Sistemul colectiv care facilitează reciclarea într-un mod prietenos cu mediul – Eco Save SRL. <https://ecosave.md/pagina-principala#despre-noi>
18. Proiectarea și construcția liniilor tehnologice de procesare a subproduselor de origine animală – Terafix SRL. <https://terafix.md/ro/acasa/>
19. Chestionar de cercetare. https://docs.google.com/forms/d/e/1FAIpQLSdb_qEZRpN0Lwm01wvt_B-23IMNdIZ98Y9qM3E59Tyq16ik5g/viewform

Rezumat

Începutul secolului XXI este marcat de dezvoltarea accelerată a activităților industriale și de creșterea continuă a consumului de bunuri și servicii. Intensificarea consumului de produse alimentare și nealimentare generează volume tot mai mari de deșeuri, care exercită o presiune semnificativă asupra mediului înconjurător și contribuie la diminuarea resurselor naturale. În aceste condiții, tranziția către o economie durabilă, bazată pe utilizarea eficientă a resurselor și reducerea impactului negativ asupra mediului, devine o necesitate strategică.

Scopul lucrării constă în identificarea și fundamentarea unor direcții și strategii de dezvoltare a distribuției inverse, prin optimizarea proceselor de colectare, procesare, reciclare și valorificare a deșeurilor. Cercetarea urmărește evidențierea modalităților prin care produsele uzate, defecte sau moral învechite, ambalajele reutilizabile și deșeurile rezultate din procesele de producție pot fi reintegrate în circuitul economic, contribuind la reducerea poluării și la diminuarea consumului de resurse naturale.

Rezultatele cercetării demonstrează că dezvoltarea distribuției inverse are un impact strategic multidimensional, contribuind la modernizarea proceselor industriale și comerciale, la creșterea competitivității economice și la consolidarea rezilienței ecologice și sociale. Distribuția inversă reprezintă una dintre componentele esențiale ale marketingului ecologic și ale economiei circulare, oferind oportunități reale pentru valorificarea eficientă a resurselor și reducerea deșeurilor.

În baza analizelor efectuate, au fost formulate concluzii și recomandări privind dezvoltarea unor lanțuri eficiente de distribuție inversă, care să integreze producătorii, întreprinderile agricole, rețelele comerciale, procesatorii, prestatorii de servicii și autoritățile publice. Implementarea unor asemenea mecanisme poate contribui semnificativ la promovarea dezvoltării durabile și la creșterea performanței economice și ecologice a societății.

Cuvinte-cheie: distribuție inversă, strategie, resurse naturale, lanț de distribuție, deșeuri, ecologie, marketing ecologic, economie durabilă

Аннотация

Начало XXI века характеризуется ускоренным развитием промышленной деятельности и постоянным ростом потребления товаров и услуг. Увеличение потребления продовольственных и непродовольственных товаров приводит к образованию всё больших объёмов отходов, которые оказывают значительное воздействие на окружающую среду и способствуют истощению природных ресурсов. В этих условиях переход к устойчивой экономике, основанной на рациональном использовании ресурсов и снижении негативного воздействия на окружающую среду, становится стратегической необходимостью.

Цель работы заключается в выявлении и обосновании направлений и стратегий развития обратного распределения посредством оптимизации процессов сбора, переработки, рециклинга и утилизации отходов. Исследование направлено на определение способов, посредством которых использованная, дефектная или морально устаревшая продукция, многооборотная упаковка и отходы, образующиеся в процессе производства, могут быть возвращены в экономический оборот, способствуя снижению уровня загрязнения окружающей среды и сокращению потребления природных ресурсов.

Результаты исследования показывают, что развитие обратного распределения оказывает многогранное стратегическое воздействие, способствуя модернизации промышленных и коммерческих процессов, повышению экономической конкурентоспособности и укреплению экологической и социальной устойчивости. Обратное распределение является одной из ключевых составляющих экологического маркетинга и циркулярной экономики, предоставляя реальные возможности для эффективного использования ресурсов и сокращения объёмов отходов.

На основе проведённого анализа были сформулированы выводы и рекомендации по развитию эффективных цепей обратного распределения, объединяющих производителей, сельскохозяйственные предприятия, торговые сети, перерабатывающие предприятия, поставщиков услуг и органы государственной власти. Внедрение подобных механизмов способно существенно способствовать продвижению принципов устойчивого развития и повышению экономической и экологической эффективности общества.

Ключевые слова: обратное распределение, стратегия, природные ресурсы, распределительная цепь, отходы, экология, экологический маркетинг, устойчивая экономика