

# CIRCULAR ECONOMY: PERCEPTION AMONG WINERIES OF THE REPUBLIC OF MOLDOVA

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## **Abstract:**

*The challenges facing humanity today such as: significant decline in limited natural resources, rapid deterioration of air, water, soil quality, intensification of the urbanization process, energy crisis, loss of biodiversity, climate change are largely the consequences of practicing the linear business model, a model based on the „take-produce-throw” principle.*

*So, the transition to a different economy is inevitable, an economy without waste of natural capital, regenerative and restorative at the same time, that is, a circular economy.*

*As a result, this study addresses the issue of circularity in the wine sector of the Republic of Moldova, having as objectives: estimating the level of knowledge and awareness of opportunities and the need to align with the principles of the circular economy among economic agents, and determining the behavior of wineries towards waste.*

*The questionnaire is used as a method of analysis and interpretation of the situation in this branch regarding the circular economy.*

**Key words:** circular economy, questionnaire, by-product, capitalization, awareness

**JEL classification:** Q01

## **INTRODUCTION**

Undoubtedly, awareness of the importance of the circular economy for society, economic growth and maintaining environmental balance is a fundamental issue.

From a legislative perspective, a strategic first step in the circular economy was taken in 2014, with the European Commission’s Communication “Towards a circular economy: a zero waste programme for Europe”.

A little later, in 2015, the “Closing the loop - an EU action plan for the circular economy” was approved at European level, and in 2019 the European Green Deal covering all sectors of the economy (agriculture, industry, transport, etc.) was presented, designed to encourage the efficient use of resources by moving to a circular economy.

Therefore, the Republic of Moldova, once it has signed the Association Agreement with the European Union, must harmonize its national legislation with the European one and at the same time ensure the integration of environmental protection provisions, rational use of resources in all sectors of national economy and social life.

Moreover, the national strategic documents Environmental Strategy for 2014-2023 and the Action Plan on its implementation (Government Decision no. 301/2014), focusing on environmental protection, sustainable development, development of the “green” economy and integration of principles of adaptation to climate change in all sectors of the national economy, and the Waste Management Strategy in the Republic of Moldova for 2013-2027 (Government Decision no. 248/2013), to which the association of the Republic of Moldova with the EU regional project for Eastern Partnership countries - The European Union for the Environment / “EU4Environment” is also added, reiterates its commitment and the importance of stepping up the process of decoupling economic growth from resource use and environmental degradation.

Therefore, the direction we need to take is becoming clearer. In this sense, the full mobilization of all economic sectors in order to align with the principles of the circular economy has not only environmental reasoning, but also provisions / legislative obligations.

A first step in identifying the premises for the transition to the circular economy of the national economy is to estimate the degree of education and awareness of economic agents in the field of the circular economy, as well as to assess their behavior towards waste.

Given the fact that the Food and Beverage Industry generates some of the largest amounts of waste in the Republic of Moldova, we considered that addressing the issue of the circular economy in the national wine sector would be a topic of great interest.

## METHODS

In order to outline a clear picture of the perception of the circular economy among the economic agents in the Moldovan wine industry, as well as to provide important answers to issues related to the de facto processing / separation / destination of waste generated by this sector, a questionnaire was developed.

This research was conducted in Republic of Moldova, target groups being wine companies. The theoretical-applied research consisted of the following stages:

- elaboration of the questionnaire;
- making the database, the representative sample and disseminating the questionnaire;
- analysis of the results obtained from statistical research and highlighting the conclusions.

The questionnaire consisted of 30 questions covering three distinct parts: - the first part with identification data, the second part is a set of general questions related to the circular economy, and the third part - questions specific to the business sector, especially regarding processing wine by-products.

In this context, an answer to the basic concerns was sought through the questionnaire:

1. What is the level of knowledge and awareness of the opportunities and the need to align with the principles of the circular economy among the economic agents in the wine sector of the Republic of Moldova?

2. What is the behavior of the economic agents in the field researched towards waste?

The completion of the questionnaire was possible online, the Russian and Romanian versions being available, and also its word version was sent electronically.

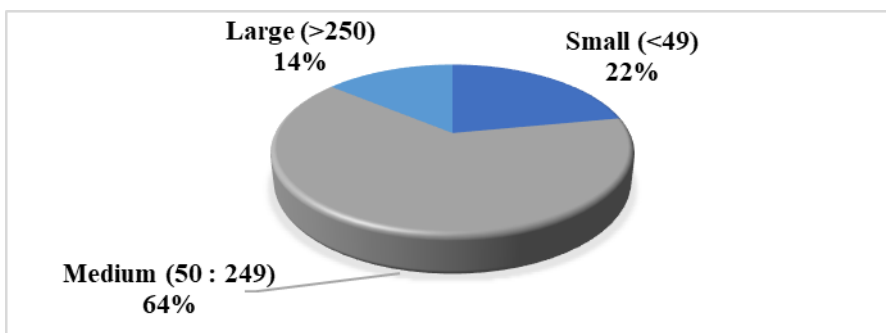
Following the information obtained on the basis of the questionnaire, the answers on groups of questions related to the same kind or have the same meaning of use are further analyzed.

Excel program was used for data processing.

## RESULTS AND DISCUSSION

As a result of the centralization of the answers, 14 valid questionnaires were operated, completed by companies in the researched field, which generate approximately 25-30% of the total by-products at the sector level.

According to Figure no. 1, the distribution depending on their size was as follows: most were in the category of medium-sized companies (64%), followed by the category of small companies (22%) and large companies (14%).



**Figure no. 1. The structure of the responding companies by size**

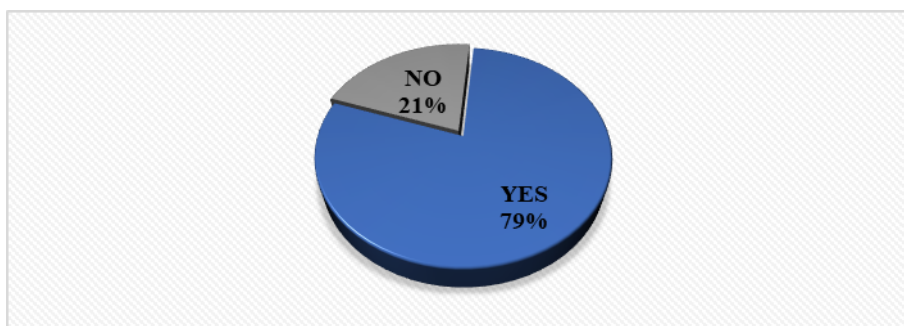
Over 92% of the responding companies have a complete production cycle, both primary and secondary vinification being specific to them.

The structure of the corresponding wine companies by production regions is presented below.

Thus, we notice that the responding companies cover 3 regions for the production of wine products with Protected Geographical Indication: Codru, Ștefan Vodă, Valul lui Traian, a higher share having the Center area „CODRU” of 57%.

In fact, most of the wine units are concentrated in the “Codru” region, due to the favorable conditions for growing vines.

To the question *Have you heard so far about the concept of circular economy?* 79% answered “YES” and 21% answered “NO”, which indicates that respondents are largely familiar with this term.

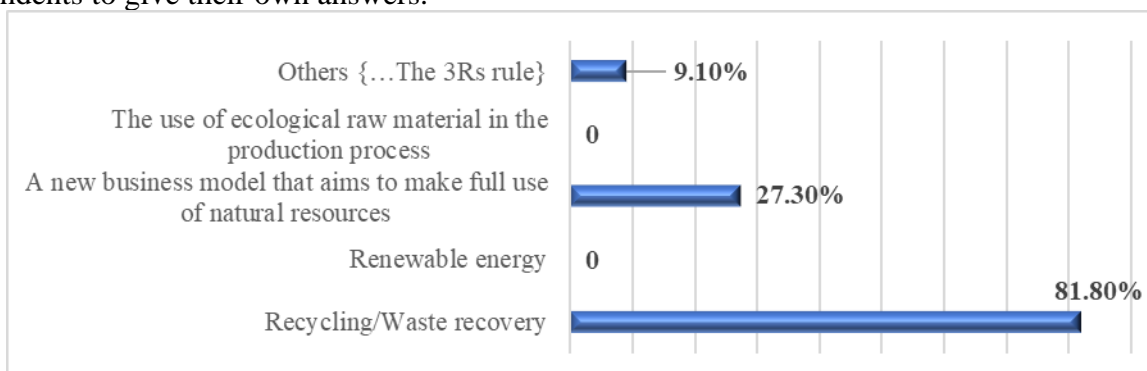


**Figure no. 2. The degree of familiarity with the term of circular economy**

We can consider that the 21% of the wine companies that gave the answer “We have not heard about the circular economy” is still quite high and indicates the lack of a national information strategy on this concept, its opportunities, but also legislative provisions in this regard.

In the case of companies familiar with this term, the next question was: *What would you associate the circular economy with?*

This question was accompanied by 5 answer variants, including the possibility for the respondents to give their own answers.



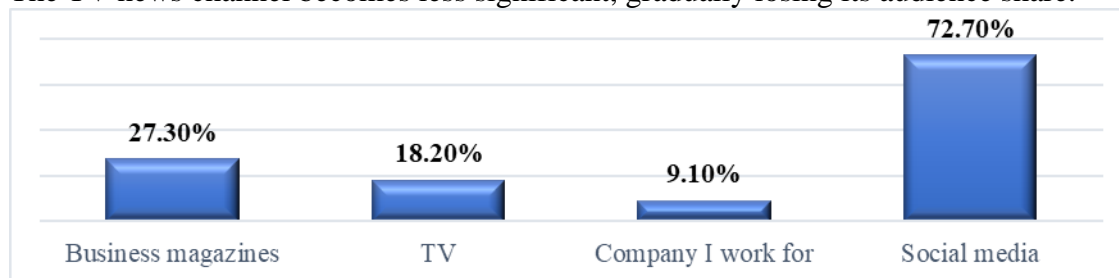
**Figure no. 3. The meaning of the term circular economy in the view of the respondents**

Thus, according to the information presented in Figure no. 3, we note that most respondents, over 80%, associated the circular economy with the answer option - *recycling / recovery of waste*, 27% of them - *with a business model that tends to the full use of natural resources* and 9% attributed the circular economy to the answer option “*other*” mentioning that the circular economy consists in the rule of “3R”.

Analyzing the answers to the question **Where did you hear about this concept?**, reflected in Figure no. 4, we conclude that the most important source of information is social media, with a share of over 70%.

Indeed, due to the speed with which information spreads on social media channels, they make this source of information one of the most preferred by citizens.

Business magazines are also a valuable source of information with a percentage of 27%. The TV news channel becomes less significant, gradually losing its audience share.

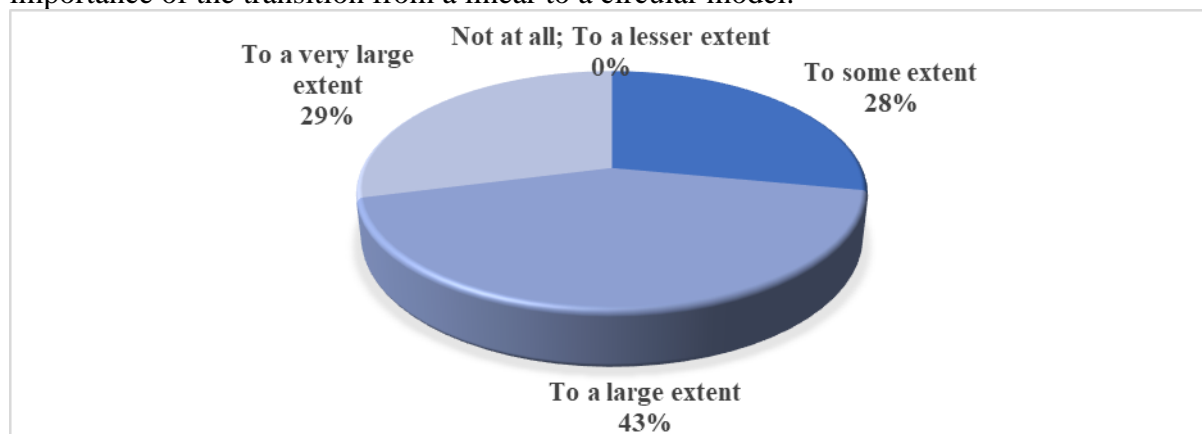


**Figure no. 4. The main sources of information on the circular economy**

**Do you think there is a link between the current linear business model and climate change?**

Analyzing the information in Figure no. 5, we find that the majority, almost 73% of wine companies, identifies a large and very large link between the current linear business model and climate change.

28% of respondents ticked the view that there was some connection between the linear model and climate change. These results tell us that companies in the wine industry are aware of the importance of the transition from a linear to a circular model.



**Figure no. 5. The interdependence between the linear model and climate change in the vision of wineries / wine companies**

Therefore, we consider it important that in the future we take action to implement this concept at the level of all companies, in order to facilitate the transition to a circular economy in the Republic of Moldova.

Another question included in the questionnaire was the identification by the respondents of the most important benefits of the company that implements the principles of the circular economy in its activity.

That question was accompanied by 6 answer variants, as follows:

1. Improving the company’s image
2. Increasing market competitiveness
3. Improving product quality
4. It is an advantage in identifying external partners
5. It does not bring benefits
6. Other (specify) - economic, environmental benefits

It should be noted that most of the interviewees (over 70%) do not know, or know to a small or some extent the arguments of the development of circular business.

**Table no. 1. Knowledge of the arguments for which we should develop circular business models**

Number of Answers:	14	100 %
At all	2	14
To a small extent	1	7
To some extent	7	50
To a large extent	3	22
To a very large extent	1	7

Respectively, it is found that a small number of only 29 % of the respondents *know to a large or a very large extent the arguments* for which we should develop circular business models.

This result indicates a superficial knowledge by the respondents of the significance of the circular economy, of the multiple opportunities it can offer, both economically, socially and environmentally.

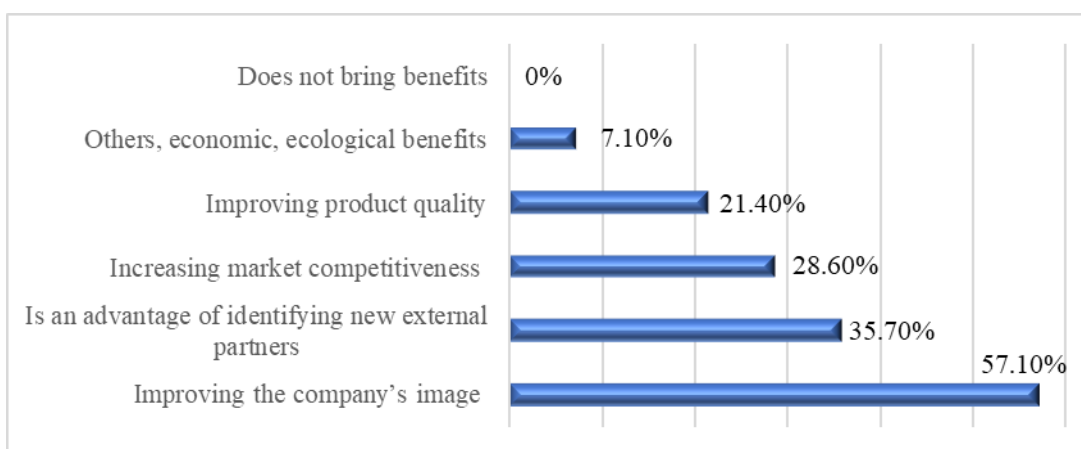
What is certain is that mass information on the benefits of the circular business model should be one of the next priorities of the competent institutions.

**In your opinion, what are the main benefits of a company that implements the principles of the Circular Economy?**

Summarizing the answers to this question, it is found that most companies believe that improving the company’s image is one of the most important benefits in the case of a conduct based on the principles of the circular economy, totaling 57.1%.

Another relevant benefit for the company that implements the principles of the circular economy in its business model, validated by 5 interviewees (35.7%), is the advantage of identifying new external partners.

Other important benefits ticked by respondents are: increasing market competitiveness (28.6%), improving product quality (21.4%).



**Figure no. 6. The main advantages for a company after aligning with the principles of the circular economy**

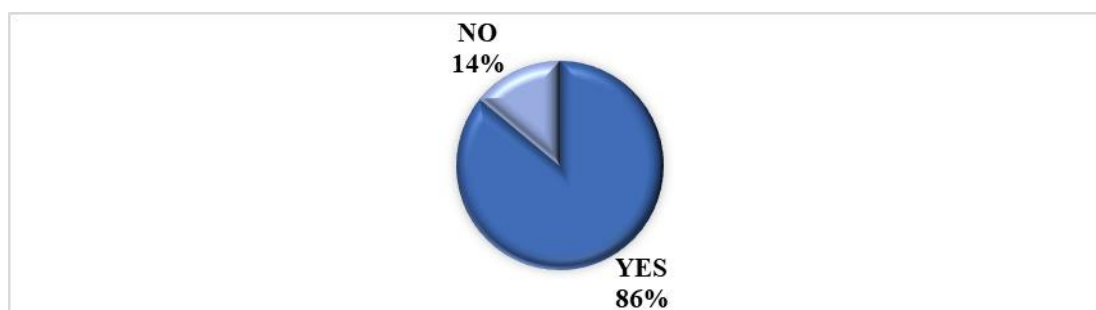
Another question included in the questionnaire was: *Do you consider the circular economy to be a topical issue in the sector, which needs urgent attention and involvement?*

The structure of the results obtained from the centralization of the answers to this question, highlight the topicality of the circular economy and the imminent importance for R.M. of the implementation of business models based on prevention, optimization, reduction of resource consumption.

Therefore, it is found that over 65% of the respondent companies consider the circular economy as a current and very current topic for the wine sector, which needs urgent attention and involvement, and 21% and 14% respectively claim that the circular economy is in some or all to a lesser extent a current topic.

The 65% share indicates that the topic is in the field of “today’s” concerns at the national, international, as well as at the branch, company level, circular economy representing an excellent economic opportunity that balances the economy, environment and society.

When asked whether *the transition from the current linear economy to the circular economy should be integrated / foreseen in the company’s strategic plan*, 86% answered affirmatively, and only 14% are still reserved on this subject.



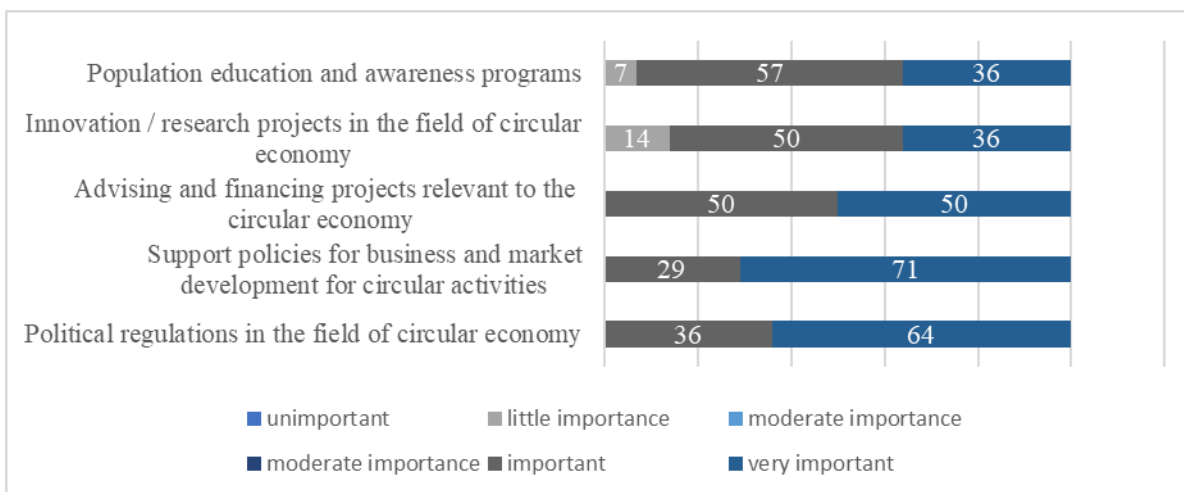
**Figure no. 7. Integrating the transition to a circular economy into the company’s strategy**

These results, presented in Figure no. 7, denote a high degree of awareness of economic and environmental risks if we continue with the linear approach to business development.

Implementing the circular economy approach requires profound changes in business production patterns, and most of them see this transition as a strategic need and opportunity for the company.

The attitude of the majority of the respondents is a rational, responsible one and they foresee the need to integrate the circular economy in the company strategy.

To the set of questions about the **main tools that can help facilitate the transition from the linear to the circular economy**, most respondents gave scores from 4 to 5, i.e. from important to very important to all the tools listed: innovation / research projects, programs for public education and awareness, support policies for business and market development for circular economic activities, tools for advising and financing projects relevant to the circular economy, (political) regulations in the field of circular economy.



**Figure no. 8. The degree of importance of the tools stated in the respondents' view**

Respondents believe that the most important tool **that can help facilitate the transition from a linear to a circular economy** is support policies for business and market development for circular activities.

This tool obtained an **average score of 4.71**, 10 respondents giving it a score of 5, i.e. they find it extremely important, and 4 respondents or 29% consider it an important tool giving it a score of 4.

In second place are the *political regulations in the field of circular economy* with an **average score of 4.64**, in the next third, fourth place there are *tools for advising and financing projects relevant to the circular economy* with an **average score of 4.5**, *population education and awareness programs with respect to EC* with an **average score of 4.2** and surprisingly the last place with an **average score of 4.07** is occupied by *innovation / research projects in the field of circular economy*.

Analyzing this ranking, we find that for wine companies the support policies from the state are crucial.

Another question that is of interest in this study is the way in which the **principles of environmental protection** are approached within the company.

We receive this answer by analyzing the information presented in table no. 2:

**Table no. 2. Set of questions on the principles of environmental protection**

Principles of environmental protection:	YES	NO	Partly	Did not answer
- are known by managers	5	1	6	2
- are part of the company's strategy	10	1	3	0
- are considered constraints	2	8	2	2
- are considered strategic development opportunities	7	1	5	1
- are an integral part of the company's policy and regulations with objectives, actions, commitments	5	2	6	1

Therefore, it is found that in wine companies the principles of environmental protection are known by 36% of managers, partially known - 43%, 7% do not know them, and 14% were reluctant to answer this question.

This situation warns, as ignorance of the principles of environmental protection would mean the application in business of offensive behavior towards nature as a whole.

However, it should be noted that the principles of environmental protection are still part of the strategy of over 71% of responding companies, and for the most part (57% of responses) they are not considered as constraints.

In fact, 50% of companies consider the principles of environmental protection as strategic development opportunities, and 57% do not consider them constraints in running their business.

When asked if the principles of environmental protection are an integral part of the company's policy and regulations with objectives, actions, commitments, 36% answered affirmatively, 14% negatively, 43% admit that they are partly part of the company's regulations, and 7% did not answer this question.

Another dimension analyzed was the identification of the degree of implementation of environmental management systems in companies.

The question was worded as follows: **Is there an Environmental Management System implemented in the company where you work?**



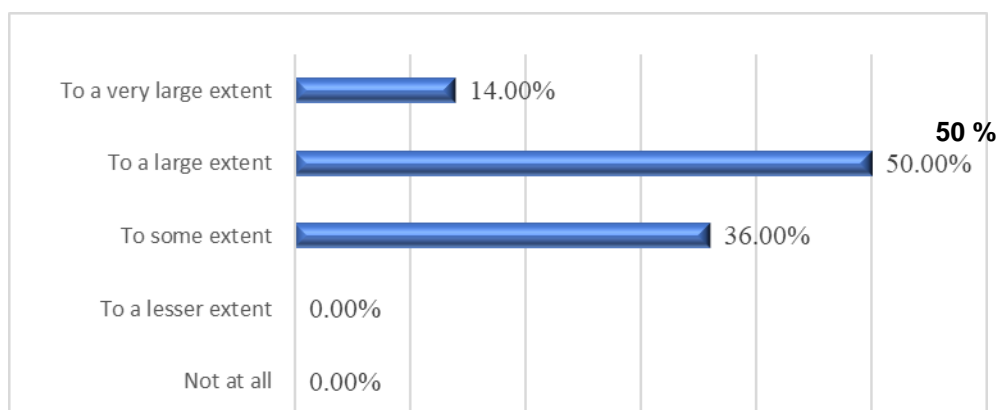
**Figure no. 9. Use of environmental management systems within companies**

Analyzing the data illustrated in Figure no. 9, we find that 64% of the responding wine companies have not yet implemented an Environmental Management System and only 29% have implemented such a management system.

Unfortunately, these results confirm that the practical attitude of companies towards the environment is still at a lower level, and the impact that their activity produces on the environment is uncontrollable.

When asked *if and to what extent the company separates industrial food waste*, 14% of respondents answered „to a very large extent”, 50% - to a large extent, and 36% to some extent.

Taking into account the legal framework (*Law on waste no. 209 of 29.07.2017, National Strategy for Waste Management in Moldova 2013-2027*) which expressly stipulates the obligation of a correct management of waste generated following the production process, we find that 36% of wineries / wine companies separating industrial waste to a certain extent is quite large.



**Figure no. 10. Degree of separation of waste within the responding companies**

According to the informations obtained, in the set of questions regarding the priority issues of transition and implementation of the circular business model within the company, we obtain the following ranking:



1. Lack of technological and technical solutions for the capitalization of wine by-products - 64%
2. Lack of adequate and clear information on circular economy opportunities - 43%
3. Lack of workforce and financial risks obtained equal scores, 14% each
4. Other transition and implementation issues not identified, 0%

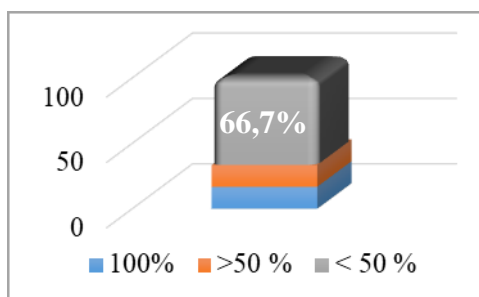
The next question in the questionnaire was to assess the behavior of economic agents towards by-products, obtained as a result of the winemaking process.

The question was worded as follows: **Are wine by-products processed in your company?**

In fact, some of the interviewees said that they are already using some of the wine by-products to get new products. However, 57% do not introduce these by-products into new industrial circuits for various reasons.

For a more in-depth analysis of the use of wine by-products, it is of particular interest to get an answer to the question ***In what proportions are they processed - 100%, > 50%, < 50%?***

Summarizing the answers to that question, it is found that of the 43% of companies that capitalize on wine waste, more than 66% actually process small quantities, below 50% of the total amount of by-products generated.



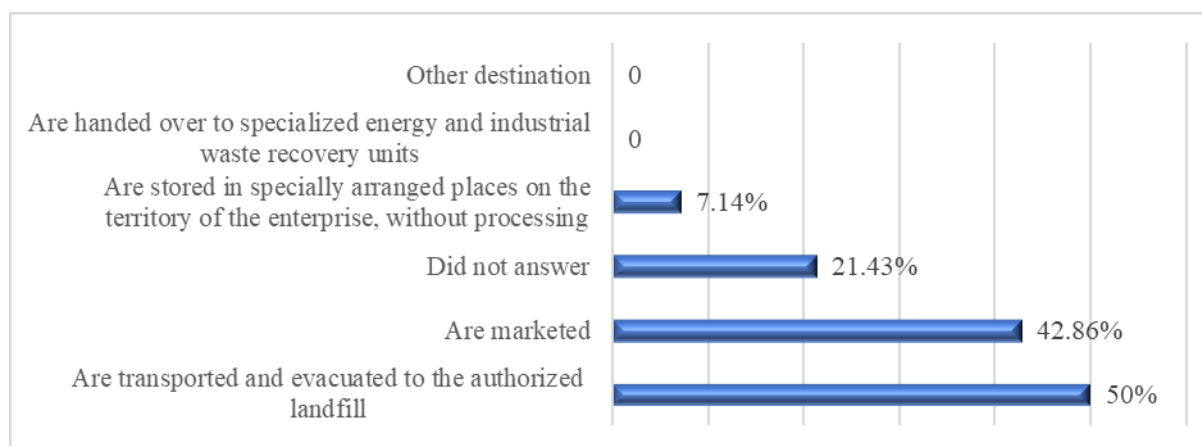
**Figure no. 11. Degree of capitalization of wine by-products**

The most used wine by-product is yeast, followed by bunches - alcohol, yeast biomass, fertilizers being obtained from them.

Surprisingly, the marc, which has the largest share of the total amount of wine by-products generated from the winemaking process, is processed by only one of the 14 companies surveyed.

These issues indicate that significant amounts of valuable by-products end up in landfills, with landfills causing major damage to the environment and at the same time economic losses.

To the question **what is the de facto destination of wine by-products in case of non-processing?**, we obtained the following answers, presented in Figure no. 12:



**Figure no. 12. Destination of wine by-products in case of non-processing**

Thus, there are two important destinations regarding the “fate” of wine by-products, namely:

1. They are transported and evacuated to the authorized landfill (50% of responses), or

2. They are marketed (43% of responses).

In case of their sale, the respondents indicate that they sell them to agricultural enterprises, Azurmet company, Romanian companies.

These issues signal to us that the issue of waste management in the wine sector must be a priority. A sustainable vision in this regard requires a strict, qualitative monitoring, in accordance with the principles of waste *prevention-reuse / recycling-recovery / recovery-disposal*.

Therefore, it is absolutely necessary to take coordinated action at local, regional, national level as well as to create partnerships between the private and state sectors in identifying the best solutions to the problems concerned.

Another question included in the questionnaire related to the appreciation by the wine companies of the degree of state intervention in the monitoring of the final destination of the wine by-products, being formulated as follows: **Rate from 1 to 5 the extent to which the state is taking sufficient action to monitor the destination of winemaking waste, where 1 - NOT enough actions are undertaken, 5 - MANY actions are undertaken.**

The recorded answers are included in Table no. 3, as follows:

**Table no. 3. Degree of state intervention in monitoring the destination of by-products**

	Score 1	Score 2	Score 3	Score 4	Score 5
Answers	6	4	1	3	0

The average score obtained for this question is 2.07, most of the respondents - 43% assigning a score of 1, which means that the state does not take enough action to monitor the destination of waste from winemaking.

The next question in the questionnaire related to the **assessment of the importance of capitalizing on wine by-products for the conservation of natural resources and the protection of the environment**, being given the following ratings: very important, important, not very important, not at all important.

More than 3 quarters (79%) of the respondents find a very close link between the use of by-products and the environment. Specifically, 43% rate the use of wine by-products for the conservation of natural resources and the protection of the environment as a „*very important*”, 36% „*important*” and 21% „*unimportant*” action.

Similar results were obtained when asked about the assessment of the economic importance of the capitalization on wine by-products.

This indicate that wine companies in the Republic of Moldova are largely aware of the economic / environmental opportunities / arguments for the transition to a circular economy.

Therefore, the direction in which they need to focus is becoming clearer.

## CONCLUSIONS

The aim of this research was to find an answer to two very important issues. The first aspect related to the identification of the level of education, knowledge and application of the principles of the circular economy within the companies in the wine industry of the Republic of Moldova. The second aspect aimed at assessing the behavior of economic agents towards waste and the degree of perception of economic and environmental arguments following the transition to a circular business model.

Therefore, by centralizing the answers to the questions in the questionnaire, there are positive concerns about the circular economy. Theoretically, wine companies are largely familiar with this concept, which aims at how they should interact economically and socially, without compromising the balance of nature, which is positively appreciated.

But, unfortunately, the practical attitude of companies towards the environment is still at a lower level, 64% of the responding wine companies have not yet implemented an Environmental Management System.

In fact, more than 57% of the responding companies do not capitalize on wine by-products, and the others, 43%, capitalize on less than 50%.

Therefore, we deduce that substantial quantities of by-products are converted into waste, reaching landfills.

On the one hand, their uncontrolled disposal has a detrimental impact on the environment, on the other hand, they do not take advantage of potential economic opportunities from the exploitation of wine by-products.

In this context, the need to take further action by the state to encourage companies to adopt „environmentally friendly” business practices becomes crucial.

Certainly undertaking coordinated actions at local, regional, national level, building constructive partnerships between the private and state sectors, applying various tools, innovative projects, relevant technologies, support policies etc., would facilitate, stimulate the transition to a circular economy, thus contributing to the implementation of the proposed circular economy agenda at state level.

## ACKNOWLEDGMENT

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## REFERENCES

1. European Commission’s Communication “Towards a circular economy: a zero waste programme for Europe”, European Commission, Brussels, 2.7.2014, COM(2014) 398 final
2. Closing the loop - an EU action plan for the circular economy, European Commission , Brussels, 2.12.2015, COM(2015) 614 final
3. European Green Deal, <https://errin.eu/tags/european-green-deal>
4. Environmental Strategy for 2014-2023, Government of the Republic of Moldova, March 29, 2014
5. Action Plan on Environmental Strategy for 2014-2023 implementation (Government Decision no. 301/2014), Government of the Republic of Moldova, 06.05.2014
6. Waste Management Strategy in the Republic of Moldova for 2013-2027 (Government Decision no. 248/2013), Government of the Republic of Moldova, 2013
7. Project EU4Environment, Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, Ukraine, Duration: 2019-2022, Action funded by the European Union