

# Competitiveness of Moldova's Agri-food Trade: Challenges and Perspectives

*Gheorghe Duca*<sup>1</sup>, *Alexandru Stratan*<sup>2,\*</sup>, and *Tatiana Gutium*<sup>3</sup>

<sup>1</sup>Academy of Sciences of Moldova, Chisinau, MD-2001, Republic of Moldova

<sup>2</sup>Academy of Economic Studies of Moldova (University), Chisinau MD-2005, Republic of Moldova

<sup>3</sup>National Institute for Economic Research, Chisinau MD-2064, Republic of Moldova

**Abstract.** One of the conditions for increasing the competitiveness of the national economy of Moldova is the promotion of the export of competitive goods. Considering that the Republic of Moldova is mainly relying on its agri-food sector, and it was granted the status of a candidate country for accession to the European Union, the object of research is the Competitiveness of Moldova's Agrifood Trade. The principal purpose of this study is to determine the directions for modernizing the structure of the agri-food complex to increase its competitiveness in the context of deepening the integration processes in the European space. The authors assessed the trends and prospects for the trade of food products and agricultural raw materials between Moldova and European Union countries. In this aim statistical and econometric methods were applied. The results of the study showed that a promising direction in the development of economic relations between Moldova and the European Union was the formation of clusters with a high potential for competitiveness. For a better integration into the European food products market with minimal loss, there is a strong need in establishing direct economic links and implementation of joint investment projects. **Keywords:** Competitiveness, Agricultural products, Trade, Export and Import.

## 1 Introduction

The economic development of Moldova is under the strong influence of the cataclysms of the world economy, the energy crisis, the inflationary process, and geopolitical crises. In Moldova, this led to a decline in its competitive state in world markets, as a weakening of the position of domestic goods in external markets. In the current period, increasing the competitiveness of goods and adapting to a constantly changing market is becoming an increasingly important and urgent task. The subject of the study is the competitiveness of agri-food products. The principal purpose of the research is to develop proposals for increasing the foreign trade turnover of Moldovan agri-food products.

In the field of competitiveness assessment, in most scientific works, the competitiveness of an enterprise, but not of a product, is assessed. In the scientific literature, there is very little research dedicated to the methods of evaluating the competitiveness of goods. But in recent years, new methods have been developed for assessing the competitiveness of an enterprise,

---

\*e-mail: alex\_stratan@yahoo.com

which take into account more and more factors. Therefore, before reaching the main goal - to develop proposals for increasing the foreign trade turnover of agri-food products, the authors set themselves the task of elaborating a new integral indicator of competitiveness.

Theoretical novelty is the systematization of the most frequently used methods for assessing the competitiveness of goods according to the criteria of “increasing the complexity of applying the method” and “eliminating the deficiencies of the previous method”. The practical significance of the study consists in identifying the main characteristics of the competitiveness of agri-food products and developing recommendations for increasing the competitiveness of domestic products.

*The scientific novelty and originality of this work are the elaboration of the new integral index to the evaluation of the competitiveness of agri-food goods, taking into account the degree of technological intensity applied to the manufacture of a product.*

## **2 Theoretical and Methodological Foundations of the Study**

The theoretical and methodological basis of the research was scientific works and publications, the main object of which is methods for assessing competitiveness, the studies of such scientists as J. Li, A. Lakzi [1], S. Grabowska, S. Saniuk [2], A. Olyanga, I. Shinyekwa [3], M. Peneder [4], K. Al-Shuaibi, M. Zain, N. Kassi [5], A. Sujová, P. Hlaváčková, K. Marcinekova [6], S. Thazhugal Govindan Nair [7], and A. Barattieri [8]. This investigation is a continuation of previous research, “Methodological approach to the elaboration of indicators for quantifying the competitiveness of goods.” [9]

The issues of forming a strategy for increasing competitiveness were considered in the works of F. Šproch, J. Nevima [10], M. Andjelković-Pešić, V. Janković-Milić, J. Stanković [11], M. Maris [12], S. Farhikhteh, A. Kazemi, A. Shahin, M. Shafiee [13], A. Costinot, D. Donaldson, I. Komunjer [14], N. Soewarno, B. Tjahjadi [15], D. Zhu, J. Westphal [16], and others. Various aspects of the competitiveness of the agro-industrial complex are covered by authors known to the academic community, among them I. Sheldon [17], F. Achmad, E. Roosganda, H. Delima [18], I. Baierle et al. [19], A. Nowak, and M. Rózaska-Boczula [20].

### **2.1 Methods for Assessing Competitiveness of Goods and Features of Their Application**

The evaluation of the competitiveness of goods consists of performing a series of operations:

- the choice of parameters or factors which will be taken into account in the estimation,
- the selection of competitiveness assessment criteria,
- the choice of indicators,
- the establishment of the value of the chosen indicators,
- the performance of the comparative analysis of the values obtained for the analyzed good and for the analog good produced by competitors (indigenous or foreign).

In the case of evaluating the competitiveness of the domestic good, the basis is the comparative analysis between the analyzed good and the analogous import good concerning the factors of competitiveness.

The classification of competitiveness assessment methods involves dividing them into groups according to a particular criterion. Although there are various methods for assessing competitiveness, there is still no universal classification recognized by the academic community. Even in cases where the same systematization criterion is used, the set of listed methods differs from one author to another.

**Table 1.** The methods of evaluating the competitiveness of goods

Method	Description of the method	Advantages of the method	Disadvantages of the method
Differential method	Competitiveness is assessed by comparing the parameter of analyzed goods and the commodity taken as a basis for comparison.	Ease of use.	The method does not give an objective assessment, as it is limited to considering particular parameters of the goods without their relationship.
Comprehensive method	This method consists of calculating group indicators for various parameters (regulatory, technical, economic) and so an integral indicator of the competitiveness of a product.	The comprehensive method makes it possible to compare several parameters of the good.	Consumer preferences are not taken into account by this method. Combining multidirectional indicators into a single group index is not reasonable because it causes uncertainty in the economic content of an integral index.
Comparative method	The comparative method is based on the cost and parametric methods and consists of the comparative evaluation of two goods in terms of utility and costs.	This method takes into account consumer preferences.	The disadvantage of this method is the difficulty of choosing the best sample of commodity as a basis for comparison. Since one product is better in one parameter, and the other commodity in another.
Difference method	The difference method consists in determining the difference between the values of the technical and economic parameters of the analyzed goods and a commodity considered "ideal". The benchmark product is not an existing product but a "target" commodity, the technical and economic parameters of which are formed by the maximum (for direct indicators) and minimum (for inverse indicators) values of the parameters of competitors' analog goods.	This method makes it possible to evaluate the competitiveness of the goods in the absence of the best sample of commodity as a basis for comparison.	The difference method is complicated to implement because it requires complex information about the technical and economic parameters of competitors' analog goods.

Source: systematized by the authors [21].

In this study, we will focus on the frequently used methods. As we see from table 1, each following method has the advantage of overcoming the shortcomings of the previous method.

The simplest calculation method is the differential method. As a parameter can be used: the price of the commodity, the cost of production and sale of goods, reliability, durability of the goods, and others. But this method also contains shortcomings. The lack of the differential method resides in the fact that the assessment of competitiveness concerning a single parameter is not representative. Therefore, it is necessary to use this method in tandem with other methods.

The most difficult method to apply is the Difference Method. The main difficulty lies in the collection of information about the technical and economic parameters of similar products of competitors. When applying the method of differences, the Weight Coefficients for groups of indicators are determined by Saaty method (the Analytic Hierarchy Process).

## 2.2 Adapting the Integral Index to Estimate the Competitiveness of Agri-food Products

One of the objectives established by the authors is the adaptation of the integral index for assessing the competitiveness of agri-food goods. The factors that were taken into account are *the price*, *the quality*, and *the degree of technological intensity*. The calculation formula is as follows:

$$I_C = \sum_{i=1}^n (b_i \times C_i). \tag{1}$$

and

$$\sum_{i=1}^n b_i = 1. \tag{2}$$

where:

- $I_C$  - integral index of the competitiveness of goods,
- $b_i$  - significance ratio of the factor of influence (indicator),
- $C_i$  - the competitiveness of goods according to the factor of influence (indicator),
- $n$  - number of the factor of influence (indicator).

if

$$b_1 = b_2 = \dots = b_n. \tag{3}$$

then

$$I_C = \frac{\sum_{i=1}^n C_i}{n}. \tag{4}$$

*The competitiveness of goods according to price ( $C_p$ )* is calculated as the ratio between the price of the competitor's good (the price of the imported commodity) ( $p^m$ ) and the price of the domestic product ( $p^d$ ):

$$C_p = p^m / p^d. \tag{5}$$

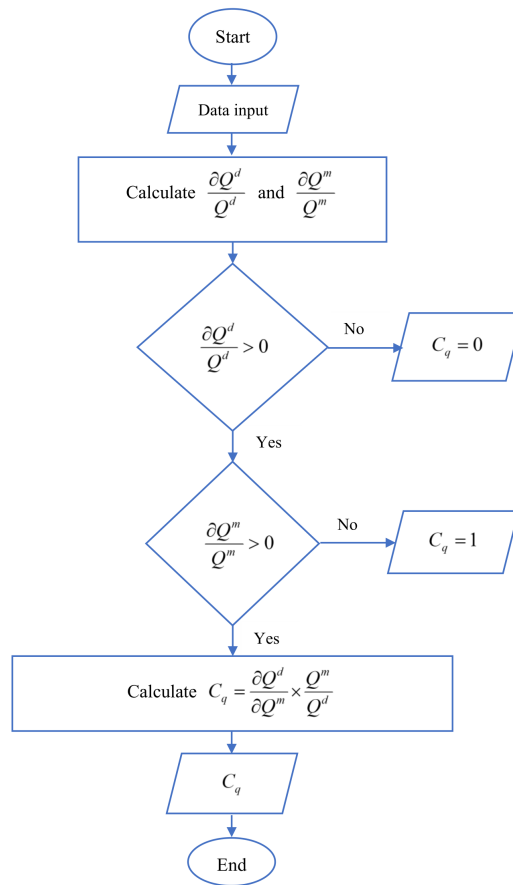
*In estimating the competitiveness of goods according to quality ( $C_q$ )*, the authors took into account the following relationship: the higher quality of a commodity, the more elastic the demand according to income. Therefore, this indicator can be calculated as the ratio between the income elasticity of demand for domestic goods and the income elasticity of demand for imported ones [9, p.81]:

$$C_q = \frac{\frac{\partial Q^d}{Q^d}}{\frac{\partial Q^m}{Q^m}} = \frac{\partial Q^d}{Q^d} \times \frac{Q^m}{\partial Q^m}. \tag{6}$$

where:

- $Q^d$  - the volume of the domestic product,
- $Q^m$  - the volume of the imported commodity.

Parts of Equation 6 can be either positive or negative, so the calculation of the competitiveness of goods according to quality is carried out according to the flowchart described in figure 1.



**Figure 1.** Flowchart of estimating the competitiveness of goods according to quality  
 Source: elaborated by the authors.

The third indicator in evaluating the integral index of the good is the degree of technological intensity ( $G_T$ ). This indicator can be determined using the Expert Judgment Method. If there is only one expert, the authors propose to apply the following principle: to divide the products according to the level of processing. According to this principle, goods can be divided into: unprocessed primary products, semi-processed products, processed products, and high technology products.

If we take the analogy of the classification of goods based on the income elasticity of demand, each group of goods can be given an estimate shown in table 2.

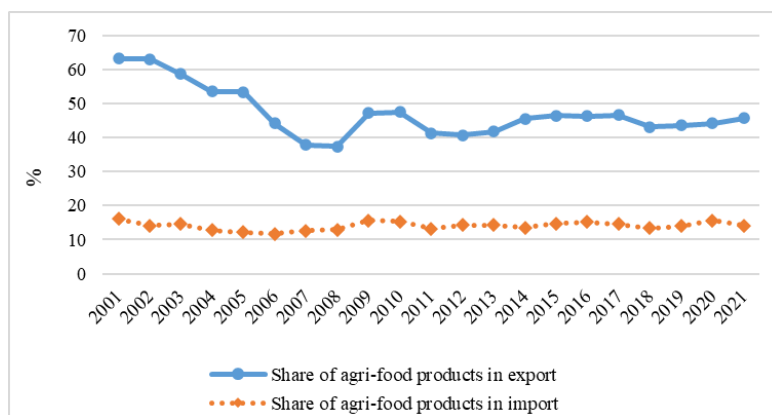
### 3 Foreign Trade in Agri-food Products of the Republic of Moldova

Foreign trade is a significant and intensively developing form of international economic relations. Both the state and business are interested in expanding foreign trade since the acquisition of technology, equipment, and goods that are not produced in the country requires money that can be earned by exporting goods and services. The Republic of Moldova is an agrarian state. In recent years, around half of Moldovan exports are agri-food products.

**Table 2.** The degree of technological intensity

Type of product	Gt
Unprocessed primary products (live animals, cereals, live trees, fruit, vegetables)	0.5
Semi-processed products (animal fats, vegetable oils, flour, starch)	1
Processed products (cheese, wine, canned meat, juices)	1.5
High technology products (fertile hatching chicken eggs, sowing seeds)	2

Source: [9] P.83



**Figure 2.** Share of agri-food products in export and import of Moldova

Source: elaborated using data from statistical databank offered by National Bureau of Statistics of Moldova.

In 2001-2021, the export share of agri-food products decreased by 17.44 percentage points (figure 2) because the re-export of goods after processing (“export in lohn”) increased.

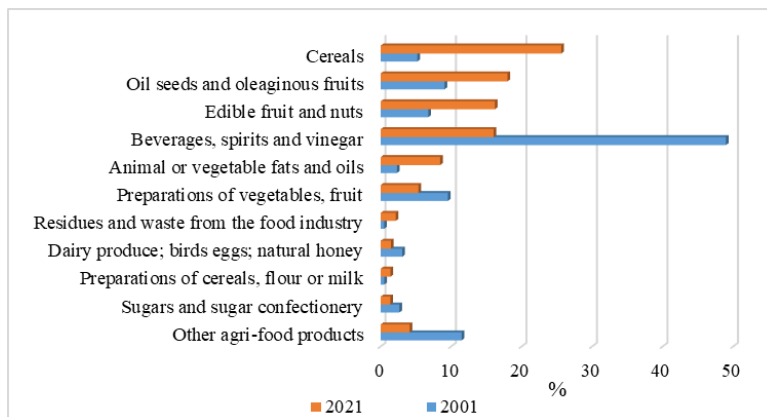
An analysis of the structure of agri-food products’ exports by sections and chapters, according to Combined Nomenclature of Goods (CNG), showed that significant changes took place in 2001-2021 (figure 3). The share of vegetable products in exports of agri-food products increased by 38.50 percentage points, and the share of prepared foodstuffs fell by 42.07 percentage points.

In 2021, the top export by section was cereals (25.61%), followed by oil seeds and oleaginous fruits (17.98%), edible fruit, and nuts (16.19%). While in 2001, the highest share belonged to beverages, spirits, vinegar (48.96%), and preparations of vegetables and fruit (9.54%). Thus, the share of processed products in exports decreased, and *the share of unprocessed primary products rose*.

Analyzing the commodity structure of Moldovan imports, we can note that the highest share was registered by miscellaneous edible preparations (9.20%) in 2021. In the second place of this structure were dairy produce, bird eggs, and natural honey (9.10%) (figure 4).

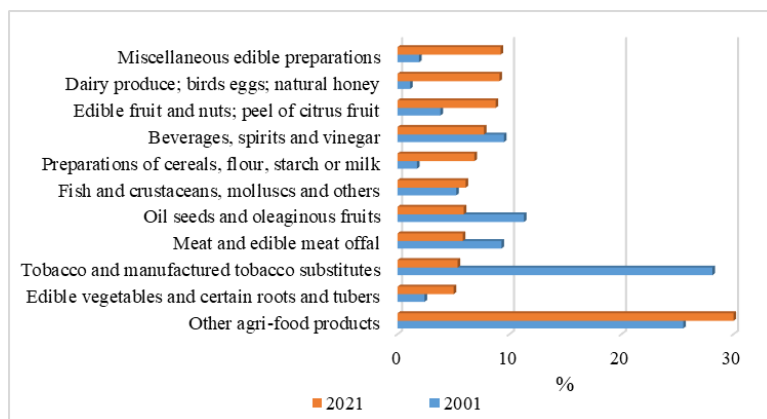
In the current difficult period, from an economic and political point of view, it is of interest to analyze the geographical distribution of the export of Moldovan agri-food goods. Figure 5 provides information on the top ten foreign trade partners of Moldova in terms of exports of agri-food products in 2021 and 2001.

The largest trading partner of Moldova in exports of agri-food products in 2021 was Romania (16.02%), which displaced the Russian Federation from the leadership position. The Russian Federation occupied first place in 2001 (58.01%), but is now - the third place.



**Figure 3.** Export of agri-food products structured by chapters, according Combined Nomenclature of Goods

Source: elaborated using data from statistical databank offered by National Bureau of Statistics of Moldova.



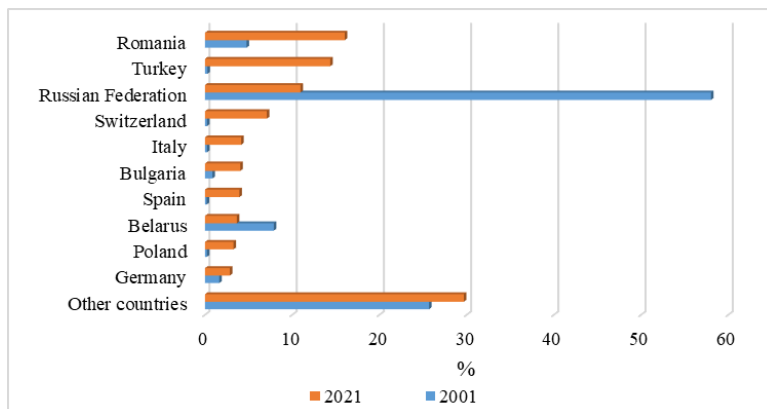
**Figure 4.** Import of agri-food products structured by chapters, according Combined Nomenclature of Goods

Source: elaborated using data from statistical databank offered by National Bureau of Statistics of Moldova.

Turkey is the second largest trading partner in exports of agri-food products. In 2021, \$113.9 million in grain was exported to Turkey.

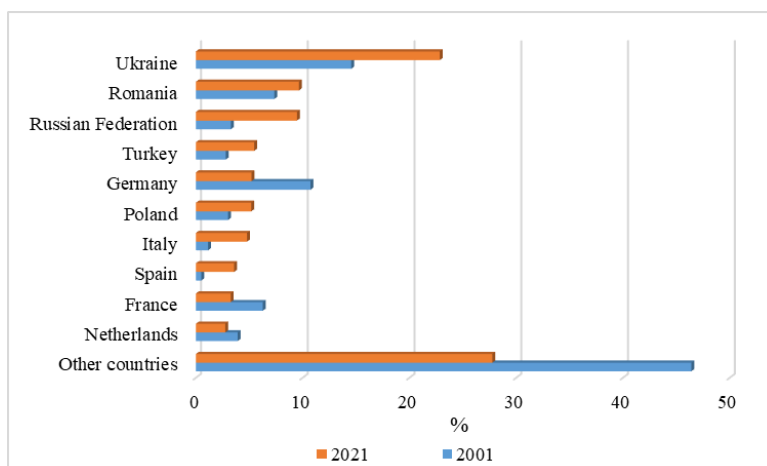
Ukraine has been the largest trading partner of Moldova in imports of agri-food products over the past years. In 2001, the share of Ukraine in Moldova’s imports was 14.56%, and in 2021 it is already 22.84%. Romania and the Russian Federation were in second and third place in 2021; their shares were 9.66% and 9.47% (figure 6).

Based on the analysis of the trade evolution for the period from 2001 to 2021, we could identify that neither agriculture nor the food industry is a stable development sector. Agriculture is subject to climatic cataclysms, and commodities of the food industry are losing sales markets, which indicates a decrease in the competitiveness of Moldovan agri-food products.



**Figure 5.** Export of Moldovan agri-food products by countries

Source: elaborated using data from statistical databank offered by National Bureau of Statistics of Moldova.



**Figure 6.** Import of Moldovan agri-food products by countries

Source: elaborated using data from statistical databank offered by National Bureau of Statistics of Moldova.

## 4 The Competitiveness of Moldovan Agri-food Products

The study of the competitiveness of Moldovan goods is an important task and is of theoretical and practical value, especially when Moldova was granted European Union candidate status. Free market relations are inextricably linked with the struggle of commodity producers for markets. The change in the vector of development towards the European Union led to the loss of the largest market of the Russian Federation by Moldova; 58% of Moldovan agri-food products were exported to this market (2001). Under the current conditions, it is necessary to increase the competitiveness of Moldovan goods to meet the quality requirements of goods in European markets. It is possible to attract a European buyer at a low price, especially in the period of decreasing solvency of the European consumer in the conditions of the energy



**Table 3.** The integral index of the competitiveness of Moldovan agri-food products

HS Codes		2017	2018	2019	2020	2021
102	Live bovine animals	1.44	1.26	1	0.52	0.48
104	Live sheep and goats	1.87	2.96	2.63	1.74	1.78
202	Meat of bovine animals, frozen	0.63	0.67	0.69	0.74	0.95
204	Meat of sheep or goats, fresh, chilled or frozen	3.38	3.5	0.6	1.12	1.41
207	Meat and edible offal	0.28	1.26	1.08	0.85	0.82
402	Milk and cream, concentrated or containing added sugar	0.93	0.54	0.74	0.57	0.68
405	Butter and other fats and oils derived from milk; dairy spreads	0.67	0.65	0	0	0
406	Cheese and curd	1.01	0.95	0.67	0.97	0.69
409	Natural honey	0.69	0.69	0.68	0.77	1.04
701	Potatoes, fresh or chilled	0.74	0.27	0.9	1.24	0.98
702	Tomatoes, fresh or chilled	0.88	0.84	0	0	0
703	Onions, shallots, garlic, leeks and other alliaceous vegetables, fresh or chilled	1.72	0.54	1.09	1.1	1.99
704	Cabbages, cauliflower, kohlrabi, kale and similar edible brassicas	1.89	0.65	1.16	1.07	1.69
706	Carrots, turnips, salad beetroot, salsify, celeriac, radishes and similar edible roots, fresh or chilled	1.04	1.05	1.19	0.73	1.02
707	Cucumbers and gherkins, fresh or chilled	2.14	2.46	2.19	0	2.43
1001	Wheat and meslin	1.26	1.3	1.49	0.6	1.36
1003	Barley	1.91	0.83	1.35	0.57	0.83
1005	Maize (corn)	7.71	4.4	8.7	1.56	3.77
1101	Wheat or meslin flour	1.03	1.02	1.06	0.7	0.77
1102	Cereal flours other than of wheat or meslin	0.46	0.85	0.93	0.48	0.42
1104	Cereal grains otherwise worked (for example, hulled, rolled, flaked, pearled, sliced or kibbled)	1.02	0.69	0.55	0.9	0.97
1106	Flour, meal and powder of the dried leguminous vegetables	3.94	2.9	7.36	7.84	6.9
1512	Sunflower-seed, safflower or cotton-seed oil	0.78	1.11	1.14	1.14	0.72
1701	Cane or beet sugar and chemically pure sucrose, in solid form	0.62	0.67	0.66	0.88	0.98

Source: elaborated by the authors.

crisis [22]. The results of estimating the integral index of the competitiveness of Moldovan agri-food products for 2017-2021 are presented in table 3. If this index takes values lower than 1, then the analyzed good is not competitiveness. The higher the value of the integral index of competitiveness, the more competitiveness the good.

The research results showed that the competitiveness of wheat and meslin decreased in 2020. This year is the year of a significant natural cataclysm (drought), which led to a reduction in Moldovan agricultural production by 27.2%. In 2020, when Moldovan wheat became uncompetitive, wheat imports increased 3.8 times. A similar situation has been reported for the following products: barley, carrots, turnips, salad beetroot, salsify, celeriac, radishes and similar edible roots, cucumbers and gherkins, others.

The integral index of the competitiveness of barley decreased significantly in 2018, and the export of this product decreased by 1.75 times. The competitiveness of flour, meal

and powder of the dried leguminous vegetables increased in 2019 because the export price dropped considerably by 2.4 times this year. Romania is the largest export destination for Moldovan flour exports. In 2021, the flour export to Romania constituted 99.25% of the total export of Moldovan flour. The competitiveness of meat and edible offal, of the poultry of heading 0105, fresh, chilled or frozen increased in 2018 because the export price decreased by 7.0 times.

Live bovine animals' competitiveness decreased in 2018-2021. The principal cause is the increase in the price of domestic goods because the cost of production has risen. In 2019 the import price of live bovine animals was 2.5 times higher than the export price, and after two years, the export price of this product was higher than the import price (by 10%). As most animal products become increasingly uncompetitive, as a result, animal production decreased by 6.0% in 2019, by 4.5% in 2020, and by 3.6% in 2021 compared to the previous year. There is a similar tendency in the case of meat and edible offal. The integral index of the competitiveness of this commodity fell in 2019-2021. The import price of meat and edible offal was 2.3 times higher than the export price in 2018 and 1,7 higher in 2019. In 2021, the export price of this goods was higher than the import one (by 5%).

The study results showed that only a part of domestic goods is competitive in the price: live sheep and goats; meat of bovine animals, frozen; meat of sheep or goats, fresh, chilled or frozen; natural honey; onions, shallots, garlic, leeks and other alliaceous vegetables, fresh or chilled; cabbages, cauliflower, kohlrabi, kale and similar edible brassicas; wheat and meslin; barley; maize (corn). Competitive in the market are predominantly unprocessed primary products. Most processed products ("value-added" products) are not competitive.

## 5 Conclusion and Recommendations

The research results demonstrated that:

- the economy of the Republic of Moldova is vulnerable to the neighboring countries and the main commercial partners,
- the Republic of Moldova faces technological and economic gaps compared to developed countries,
- most competitiveness goods are unprocessed once or products processed under the *lohn* regime,
- most domestic goods do not conform to European standards and, because of this, are not competitive in terms of quality in the EU market,
- the degree of export diversification and regional diversification is low.

The results of the diagnosis of the competitiveness of domestic goods demonstrate the need to develop proposals both for improving the commercial policy and reducing the cost of production, including the expenditure of energy resources in the context of increasing the competitiveness of domestic goods. One way to ensure increasing the competitiveness of the Moldovan economy is to promote innovation and advanced technologies. Thus, it is necessary to develop all clusters of competitiveness, science, and education, promote multilateral cooperation and export diversification, and change the structure of exports.

It is necessary to restructure the economy of the Republic of Moldova to reorient the national economy towards sustainable development. In this context, the structure of production factors has to be taken into account. Resources have to be directed to industries with export potential. These sectors from the agri-food branch are the food industry and the breeding sector.

To improve the trade policy of the Republic of Moldova, the authors propose to develop and implement strategies that would include the following four goals:

- Maintaining the growth of export potential;
- Improving the quality of domestic goods;
- Increasing the efficiency of logistics and improving the quality of the infrastructure;
- Development of electronic commerce.

Acknowledge the National Bureau of Statistics of the Republic of Moldova for providing information on exports and imports structured by goods and their countries of origin. The paper has been developed within the State Program "Development of new economic instruments for assessing and stimulating the competitiveness of agriculture of the Republic of Moldova for the years 2020 - 2023" (code - 20.80009.0807.16), financed from the state budget of the Republic of Moldova through the National Agency for Research and Development.

## References

- [1] J. Li, A. Lakzi, *Kybernetes* **51**, 77 (2022)
- [2] S. Grabowska, S. Saniuk, *Journal of Open Innovation: Technology, Market, and Complexity* **8**, 57 (2022)
- [3] A.M. Olyanga, I.M. Shinyekwa, et al., *Modern Supply Chain Research and Applications* (2022)
- [4] M. Peneder, *Cambridge Journal of Economics* **41**, 829 (2017)
- [5] K. Al-Shuaibi, M. Zain, et al., *International Business Research* **9**, 99 (2016)
- [6] A. Sujová, P. Hlaváčková, et al., *Drvna industrija* **66**, 281 (2015)
- [7] S.T.G. Nair, *Competitiveness Review: An International Business Journal* **30**, 577 (2020)
- [8] A. Barattieri, *Journal of International Economics* **92**, 1 (2014)
- [9] T. Gutium, *Economie și Sociologie* pp. 74–85 (2020)
- [10] F. Šproch, J. Nevima, *Advances in Science and Technology. Research Journal* **15**, 110 (2021)
- [11] M. Andjelković-Pešić, V. Janković-Milić, et al., *Serbian Journal of Management* **7**, 149 (2012)
- [12] M. Maris, *Marketing i menedžment inovacij* pp. 110–120 (2022)
- [13] S. Farhikhteh, A. Kazemi, et al., *Competitiveness Review: An International Business Journal* **30**, 315 (2020)
- [14] A. Costinot, D. Donaldson, et al., *The Review of economic studies* **79**, 581 (2012)
- [15] N. Soewarno, B. Tjahjadi, *Benchmarking: An International Journal* **27**, 1743 (2020)
- [16] D.H. Zhu, J.D. Westphal, *Strategic Management Journal* **42**, 624 (2021)
- [17] I.M. Sheldon, *Journal of agricultural and applied economics* **49**, 1 (2017)
- [18] A. Faqih, *International Journal of Energy Economics and Policy* (2020)
- [19] I.C. Baierle, F.T. da Silva, et al., *Sustainability* **14**, 11779 (2022)
- [20] A. Nowak, M. Róžańska-Boczula, *Agriculture* **12**, 28 (2022)
- [21] T. Gutium, *Managementul evaluării competitivității bunurilor în contextul perfecționării politicii comerciale* (2022)
- [22] T. Gutium, *Gas pricing mechanisms: overview, comparative analysis and recommendations*, in *2021 International Conference on Electromechanical and Energy Systems (SIELMEN)* (IEEE, 2021), pp. 045–050