

THE WINEMAKING SECTOR IN THE REPUBLIC OF MOLDOVA- ANALYSIS AND PERSPECTIVES

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Abstract

This paper analyses the winemaking sector in the Republic of Moldova using econometric models. The use of econometric models in agriculture involves the application of statistical methods and economic theory to analyze and model relationships in the agricultural sector. These models help researchers, policy makers and practitioners to understand the factors that influence agricultural outcomes and make informed decisions. The article presents the results of regression estimations in which the endogenous factor is the volume of overall production in agriculture, but also the volume of production in the wine sector. On the basis of official statistical data of the Republic of Moldova, the Cobb-Douglas production function was estimated, whereas exogenous factors are labor and capital used in agriculture, but also technical and scientific progress observed in agriculture. The function is used for both short-term and long-term forecasts.

Key words: agricultural sector, winemaking sector, econometric models, Cobb-Douglas production function, forecast scenarios

INTRODUCTION

Economic development is a concept that characterises the direct or indirect economic effects at the level of a national economy or a single sector (e.g. the wine sector) as a result of the quantitative, structural and qualitative modernisation and transformation taking place in the economic activity of an entity, a country, over a specific period of time under the influence of a set of factors [18].

Economic development is the qualitative change of production results through the application and influence of the technological process [16]. In the view of the authors Timofti E. and Sargo A., "economic growth is a long-term process of quantitative and qualitative increase of production activity and maximization of their results through the efficient use of intensive factors and boosting investment processes provided that it is environmentally friendly" [19].

The most important part of the agriculture and food sector is the wine sector, generating about 16% of the total value produced in

agriculture each year. Moldovan wine exports contributed more than \$111 million in revenue in 2023, an increase of almost 9% compared to the previous year. Wine is also strategically important for Moldova's positioning as a country. This is the main reason why tourists visit the country, and recently Moldova's wines have attracted positive international media attention. The image and position of Moldovan wine on foreign markets can help shape the way Moldova is perceived in the world.

In order to promote the image of grape and wine products in the country and abroad and following the model of similar wine-making institutions in the leading wine-producing countries of the world, the National Office of Vine and Wine (ONVV) was organized in 2013 according to Government Decision No. 725 from 16 September 2013. This organization functions as a public-private partnership under the Ministry of Agriculture and Food Industry and implements policies in the wine sector. The aim of this organization is to promote quality Moldovan wine abroad.

According to the latest data from the ONVV reports, vineyards occupy 7% of the total moldovan agricultural area and 3.8% of the total territory of the country, revealing that Moldova has the highest density of vineyards per capita compared to the total agricultural area. The main economic indicators characterizing this sector are as follows, 50 thousand farmers and winemakers, 250 agricultural enterprises, 181 wineries, 10 agricultural cooperatives, 150 thousand people or 10% of the total labor force of the country are directly or indirectly involved in the wine industry, i.e. every fourth economically active citizen of the country [8,12,13].

In 2002, "The program for the restoration and development of viticulture and winemaking in the period 2002-2020" was approved by Government Decision no. 1313. The purpose of this Program being the restoration and consolidation of an efficient industry producing high quality wine products, competitive on the markets and with increased economic efficiency. During the implementation period, this program had a positive impact on the sector, namely stopping the decline of the wine industry.

The "Moldova Wine 2030" strategy, which is currently under discussion, aims to identify the actions that must be taken to influence state policies in the wine sector, but also to attract the necessary investments to give a new boost to the sector. Thus, the purpose of this paper is to analyze the wine sector in the Republic of Moldova and to develop the forecast for its future development using econometric modeling.

MATERIALS AND METHODS

The purpose of the paper is to analyze the winemaking sector in the Republic of Moldova and to elaborate the forecast for its future development using the econometric modelling.

The following research methods were used in this scientific work: induction and deduction, synthesis, logical, monographic, comparative, economic analysis of statistical data, econometric modelling, etc.

The method of econometric analysis that we used in this research work, we required to examine the cause-and-effect relationships between economic variables. This method is usually used to verify economic theories using statistical and other mathematical methods and models, to make forecasts and to understand the behavior of economic systems. The information base of the research was provided by data from the:

- national and international scientific reports and publications [16, 17],
- statistical reports from the National Bureau of Statistics of the Republic of Moldova,
- reports from the Ministry of Agriculture and Food Industry,
- reports from the National Office of Vine and Wine (ONVV).

For the practical implementation of the methods used in the work the following Softwares were used:

- MS Word - for text processing,
- MS Excel - for spreadsheet processing,
- EViews statistical package - for data managing, econometric and statistical analysis performing, forecasts or model simulations generating.

RESULTS AND DISCUSSIONS

One of the objectives of the current analysis is to determine the interdependence between macroeconomic indicators concerning the agricultural sector, taking into account the availability of statistical data and the specific economic development of the Republic of Moldova. An important factor for the development of a country with a small economy, typical for the Republic of Moldova, is its openness to foreign trade. One of the factors that will influence the development of the agricultural sector will be the ability of producers to export goods to the EU markets. Favourable opportunities for this objective are the following:

- the European Council has opened of the negotiations on Moldova's accession to EU in December 2023;
- the National Bank of Moldova (NBM) has signed an agreement to join the Single Euro

Payments Area (SEPA) at the end of January 2024;

-import duties and quotas on Moldovan agricultural exports have been suspended.

In this work, an econometric model with recursive equations was carried out, in order to have a picture of the evolution of the agricultural sector with an emphasis on the wine sector. The econometric model contains the following variables:

-PROD_AGR - volume of agricultural production (million MDL, 2000 prices),

-P_PROD_AGR - price index for the sale of agricultural production by agricultural enterprises on the local market (year 2000=100),

-EXP_FOODR - export of food products (thousands USD, 2000 prices).

Logarithmizing for model's equations was applied for standardization, convenience of comparison and analysis of coefficients. Due to different units of variables measurement (they may be asymmetric) and different kinds of distributions, after logarithmization the distributions will tend to normal.

Student's t-test is used to determine the statistical significance of differences in mean values. We indicated the t-Student statistic under each coefficient:

$$\ln(P_{PROD_{AGR}}) = \frac{9.51}{(5.28)} - \frac{0.39}{(-2.38)} \ln(PROD_{AGR}) + \frac{0.92}{(18.5)} AR(1)$$

$$R^2 = 0.92, \quad F = 156.84, \quad n = 28$$

$$\ln(PROD_{AGR}) = \frac{7.19}{(115.23)} + \frac{0.21}{(3.97)} \ln(EXP_{FOOD} * 12.43) + \frac{0.015}{(5.08)} TREND$$

$$R^2 = 0.73, \quad F = 24.6, \quad n = 28$$

$$\ln(EXP_{FOODR}) = \frac{0.87}{(2.33)} + \frac{0.85}{(13.34)} \ln(EXP_{FOODR}(-1)) - \frac{0.87}{(-5.19)} D99$$

$$R^2 = 0.88, \quad F = 83.17, \quad n = 28$$

In order to elaborate the econometric model, a period of 30 years, from 1994 to 2022, was

analyzed. And the equations included in this econometric model were developed and estimated using the least squares method (LSM) that contained the food export variables.

The inclusion of food export variables in the analysis is due to the importance of sales in the foreign market, as the domestic market is small and cannot absorb the entire volume. The main factors that contributed to the improvement of the balance of payments of the Republic of Moldova are exports of agricultural products, especially wine production. For the significance of exogenous factors, absence of autocorrelation of errors, normality of residual coefficient and homoscedasticity of variance, regressions were tested econometrically.

$$D99 = \begin{cases} 1, & \text{for 1999} \\ 0, & \text{other years} \end{cases}$$

To emphasize the last year of recession at the beginning of the recovery of agri-food exports in the equations a dummy variable D99 was introduced.

Regression analysis explains the interdependence of the macroeconomic variables analysed. The lack of price regulation of agri-food products, including wine, on the domestic market causes the negative dependence (1) between the volume of agricultural production and its price. According to this regression, if the volume of production increases by 1%, then the selling price of agricultural production by agricultural enterprises on the local market decreases by 0.39%. This is the problem faced by farmers in the Republic of Moldova year after year: a good agricultural year does not necessarily bring significant income, as prices in these years are low due to high supply and low demand on the domestic market. This statement is complemented by model 2, which shows that the export of agri-food products has a positive influence on the volume of agri-food production, i.e. a one percent increase in export volume leads to a 0.21% increase in production volume. Export of agricultural production will reduce the pressure on the domestic market from the supply side. The

TREND variable included in the model demonstrates the positive influence in the agricultural sector of technological changes, the use of drought-resistant varieties and other technical and scientific innovations.

The positive trend in exports of agri-food production is shown in both the short-term and long-term. Thus, if in the short term the average annual export growth is 0.87%, then in the long term this indicator can reach 6%. The result can be explained by the fact that the external market is open for exports from the Republic of Moldova. The factors that can influence this development are mostly internal, namely the compliance with the requirements imposed by the European Union. The analysis of this model is like an equation system emphasizing the cause-effect relationship:

$$EXP_FOODR \Rightarrow PROD_AGR \Rightarrow P_PROD_AGR$$

On the basis of this analysis it can be concluded that the primary focus at the moment is to occupy new foreign market segments and this will lead to the propulsion of the agricultural sector, as the dependence between these variables is positive. At the same time, centralized regulations in the form of subsidies, purchases are needed to regulate prices on the internal market.

The wine sector is a strategic pillar for the national economy of the Republic of Moldova. It contributes to the formation of the main indicators of the national economy, but also to the development of the regions by attracting investments and maintaining jobs. The sector has strong related and supportive connections with other sectors of the economy through the value chain, and the traditions and regional and international recognition of wines and grapes are incontestable arguments that underline the major importance of this sector. Similarly, the added value of wine products is one of the landmarks that attracts investors to this important sector.

Viticulture represents a stable source of income for the population in rural areas, being a reason for their retention in rural areas, providing an incentive for their professional training oriented towards the initiation and

development of the business in the field of viticulture or associated with it. This sector contributes to the socio-economic profile of the country, being attractive from several perspectives, including business development through investment.

State policy on wine quality has been based on the system of geographical indications and protected designations of origin. In accordance with the requirements of European Regulations, such as:

- EU Regulation, No. 492/2009;
- EU Regulation, No. 607/2009 [14; 15].

At the beginning of the 20th century, 4 soil-climatic zones were defined in the country. Then, in the 1960s, Moldovan scientists identified 23 production areas and united them into 4 regions - Northern, Central, Southern and left bank of the Dniester River (Transnistria) [22].

In 2006, the Government of the Republic of Moldova approved the division of grape-growing areas into regions, centers and districts intended for commercial production.

In April 2012, the Ministry of Agriculture and Food Industry by its Decree approved the division of grape and wine growing areas into "Valul lui Traian" in the South region, "Stefan Voda" in the South-East region and "Codru" in the Centre region and the PGI region "Divin".



Fig. 1 Wine-growing area of the Republic of Moldova
Source: <https://wineofmoldova.com/ro/vin-in-moldova-acum/>, Accessed on January 10, 2024 [22].

The wine sector was the first to implement the system of protected geographical indications. The PGI regulatory framework for the wine industry was finalized in 2015. PGI is usually represented by an association or group of producers. In some exceptional cases, there may be only one producer if there is only one producer of the product concerned in a certain region. Currently, there are three wine associations and one association of divine's and brandy producers in Moldova. These associations have developed technical specifications describing the rules for the production of wines with PGI, which, incidentally, are stricter than the general rules provided for other producers. This is the value of PGI products, which comply with the stricter production rules, guaranteeing compliance with the rules established directly by the producers [10].

At the same time, within each region there are a number of wine-growing areas and centres with their own specificities. Each of these has its own unique characteristics and produces grapes and wines of superior quality, recognised internationally. Since 2016, economic agents from the four wine-growing regions have started producing wines under quality labels - Wine of Moldova (WoM), Protected Geographical Indication (PGI), Protected Designation of Origin (PDO). The Moldovan wine industry is export-oriented - 85% of the wine produced is destined for international markets and only 15% is consumed on the domestic market. Strategic changes in the sector are creating a new socio-professional environment, which is contributing to an increase in demand and in the skill level requirements of future wine industry specialists: the involvement of winemakers in the production of PGI/PDO wines, the high degree of automation of agro-technical operations in viticulture, the complexity of the sector's regulatory framework, the diversification of markets, the development of direct sales and wine tourism, etc.

Vineyards are the most valuable asset of the wine heritage of the Republic of Moldova. The fertile soil and suitable climatic conditions in the country, the size of vineyard

areas, traditions, low input and operating costs are advantageous factors compared to many other wine-growing countries. Viticulture in the Republic of Moldova has a high level of agricultural land use [3]. From the above we observe that the areas of vineyards and grape production volumes are not stable, being influenced by a number of factors (small vineyards, old plantations, unproductive varieties, low quality wines, excess stocks, poorly developed marketing). Thus, it is expected that by 2030, due to the current rate of decline, the area of vineyards planted with technical varieties for wine production will decrease to 52,400 hectares.



Fig. 2. Dynamics of vineyard areas in the Republic of Moldova, 2010 -2021, thousand ha
 Source: elaborated by authors [1, 2, 9, 16].

Over the years, due to climatic conditions in the geographical territory of the Republic of Moldova, the overall grape production varies and the grape harvest per unit area -1 ha (Fig. 3).

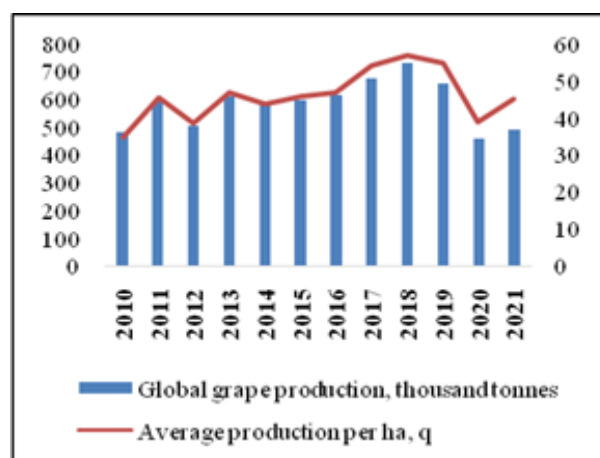


Fig. 3. Global grape production and average production per hectare, 2006-2021
 Source: elaborated by authors [1, 2, 11].

Vineyard plantations in all categories of households, following the analysis of productivity per 1 ha, showed an increase in harvest from 34.9 q/ha in 2010 to 45.4 q/ha in 2021. Overall grape production (Fig. 3) varied between 482 thousand tonnes in 2010 and 491 thousand tonnes in 2021 [11, 13]. The wine sector has been growing recently, due to the sector's improvement policies, the increase in wine quality and expansion into new markets. According to ONVV [12] data in 2021 about 255 thousand tons of grapes were processed, which is 60% more than in 2020. From the processed quantity a quantity of wine of more than 14 mil. dal was produced, which is 58% more than in 2020. Following the analysis carried out we observe that the production is equivalent to the average of the years 2011-2021 which is 14.8 mil. dal of wine. Thus, in 2021 about 14.4 mil dal of wine were produced. The largest volume of PGI certified wines was recorded in the PGI Region "Valul lui Traian" - 469 thousand dal, followed by the PGI Region "Stefan Voda" - 243 thousand dal and the PGI Region "Codru" - 156 thousand dal [5, 6, 12].

Moldovan wine sector was affected by two shocks in 2006 and 2013, following the Russian Federation's decision to impose an embargo on wine imports, which had a significant impact on the sector. These embargoes highlighted the key problem of the Republic of Moldova - the dependence of wine sales on the low price category of the Russian market [6]. Despite the difficulties created by the embargo in 2006 and 2013, they also served as an impetus for the modernisation process of the sector.

Thus, following the analysis performed, we observe that the wine sector has experienced growth, which was due to the improvement policies in the sector, the increase in wine quality and the expansion into new markets. In 2021, the volume of wine produced amounted to 14.4 million decalitres, which is an increase of about 58% compared to 2020, with wine production being equivalent to the average of the years 2011-2021 which is 14.8 million dal of wine. In terms of exports, Moldovan wines in 2021 recorded a slight decrease of about 12% compared to 2020,

thus, in 2021 the total volume of exported wine amounted to 12.1 million liters with a value of \$169 million. Also, in 2021, the price per litre of exported wine recorded a slight increase, increasing by 14% (Figure 4).

The analysis revealed that there are several problems in the wine sector, but the most acute of them is the presence of small areas of 0.5 ha for wine plantations and old wine plantations with low quality grapes and low productivity. At the same time, it was concluded that the last 7 years, the commercial offer of wine on the domestic market (harvest + stocks) varied between 2.4 - 3.5 times higher than actual sales. The Republic of Moldova, after the first embargo introduced by the Russian Federation, sold more wine than it produced. Thus, the significant wine reserves are registered.

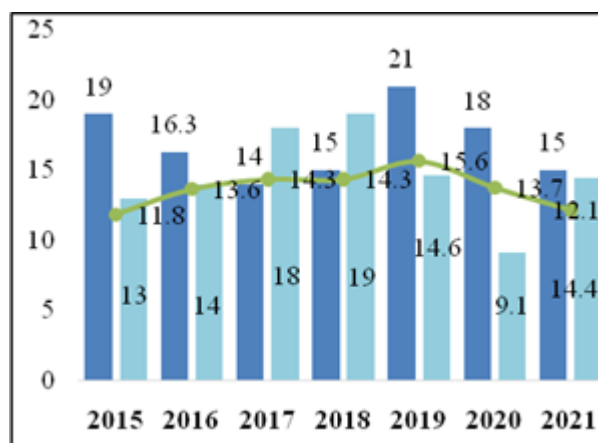


Fig. 4. Evolution of demand and supply of Moldovan wine

Source: elaborated by authors [6, 7, 12].

The Republic of Moldova has recently registered a diversification of the markets. If until 2006 the main market where wine products were exported was the Russian Federation, in 2021 Moldovan wines were exported to 71 countries of the world. The wine export volume constituted about 81% of the total wine produced. The main partners of the Republic of Moldova in the export of wine bottled in 2021 were: Romania - 428.4 million MDL; Russia - 295.1 million MDL; Poland - 176.1 million MDL. In the analysed period, especially in 2021, the total value of exported wine was about 169 million dollars, increasing by 7.6% compared to 2020.

Exports of bottled wine during this period amounted to 51.2 million litres of wine, which is about 69.3 million bottles. Also in 2021, the price per litre of exported wine increased slightly, rising by 14%. At the same time due to the dry weather, the Republic of Moldova imported bulk raw material in the volume of 4,751,427 liters, which increased compared to 2020. At the same time, the value of exported wine and divin increased compared to 2020 by 10% and amounted to 2.99 billion MDL. (Figure 5).

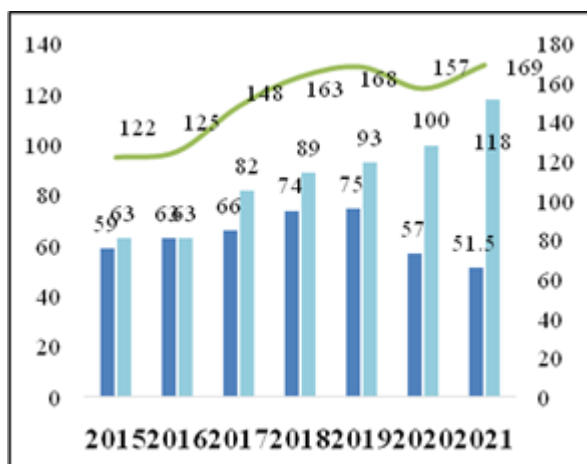


Fig. 5. Value of wine exports from the Republic of Moldova in 2015-2021
 Source: elaborated by authors [6, 7, 12].

As for the last year, due to the fact that in 2023, the grape-growing countries of Central Asia were severely affected by spring frosts and little production was harvested there, the grape segment of Moldovan grapes and grape products was competitive on the CIS market. Wines from the Republic of Moldova are becoming more and more known and demanded by foreign consumers on international markets. About 83% of the wine produced was exported by the 105 active exporters to 71 countries. The Republic of Moldova continued an increasing trend in bottled wine exports to the majority of countries except China. At the same time, the highest increase in demand for bottled wine was recorded by Turkey with 103.7% (the value of which amounted to 50.4 million MDL), followed by the USA with an increase of 64.6% or 70.3 million MDL, with Romania recording an increase of 29.2%. Top 10 partner countries of the Republic of Moldova

for the export of bottled products in 2021, Figure 6.

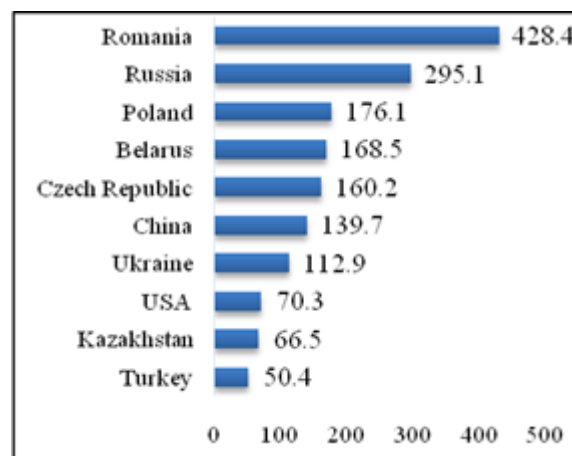


Fig. 6. Top 10 countries by bottled wine export, 2021, million MDL
 Source: elaborated by authors [6, 7, 12].

The main centres of growth in wine exports by volume were Romania - 5%, the Russian Federation - 31%, the USA - 42%, Turkey - 85.3% and the UK - 25.6%. In terms of export value, Romania - 29.2%, the Russian Federation - 54.5%, the USA - 64.4%, Turkey - 103% and the UK - 55.5% [5, 6, 21].

Over the last few years, the geography of wine exports has increased significantly. The geographical shift in exports has been due to a number of opportunities, but also to constraints. Until 2006, the Russian Federation was the main export market for Moldovan wines. Nowadays, wine producers are paying more attention to the quality of their wines and the diversification of their markets, with significant quantities of wine products being exported to other countries on various continents.

The analysis reveals that an export-oriented approach to development would allow wine growers to make better use of both the country's natural advantages and the new opportunities offered by bilateral and multilateral trade agreements to which Moldova is a party. The level of product quality is an important criterion for the development of the wine sector, the 'visiting card' of the Republic of Moldova that brings fame to products abroad, but also the possibility of expansion/diversification of exports [16]. To achieve this goal, it is

necessary to implement new technologies, innovations, mechanisms and international practices.

Thus, in recent times, foreign trade between the Republic of Moldova and the EU has steadily increased. The EU has consolidated its position as Moldova's main trading partner, with almost 60% of exports going to the European market. The implementation of the DCFTA [20], part of the Moldova-EU Association Agreement, has contributed to the country's economic growth, generated by increased trade volumes, product diversification, competitiveness and management [22]. Thus, we can mention that within the framework of this agreement about 16.2 thousand tons of table grapes were exported to the EU market in 2021, 81% of the established quota of 20 thousand tons. The DCFTA created by the Republic of Moldova with the EU provides access to a market of over 500 million consumers, and the multilateral free trade agreement within the Commonwealth of Independent States provides the country with another important outlet, which includes almost 280 million consumers.

The signing of the Free Trade Agreement with Turkey has resulted, with its implementation, in the reduction of customs tariffs on the most protected market for Moldovan exports - the average Most Favoured Nation tariff applied by Turkey for agricultural and food products is 42.2% (for some products exceeding 200%), and for non-agricultural products 5.4%. However, experience shows that access of Moldovan products to foreign markets is determined by non-tariff barriers rather than tariff barriers, in particular embargoes (Russian Federation) and high phytosanitary and trade standards (EU) [20, 21].

CONCLUSIONS

According to the analysis performed in this work, using the elaborated econometric model, it can be assumed that the main direction is to occupy new segments of the external market, which will lead to the stimulation of the agricultural sector.

In recent years, the total Moldovan horticultural sector, including viticulture, has been reorienting quite rapidly due to changing political-economic, logistical, climatic, social and other conditions.

Last year, 2023, due to frosts, floods and droughts, the grape harvest was relatively small in many European countries, which explains the high demand for Moldovan table grapes. However, in the future, all agrarians of the country, and especially winemakers, should be more active in re-profiling the assortment and improving the quality of production.

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