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SCENARIO FOR THE DEVELOPMENT OF VITICULTURE IN BULGARIA THROUGH THE CONTEXT OF THE GREEN DEAL

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Abstract

The challenges facing the development of agriculture and rural areas in Bulgaria during the CAP program period 2023-2027 are related to the renewal of production potential and the modernization of activities to improve competitiveness, added value, and well-being in rural areas. The enhanced environmental requirements laid down in the new CAP resulting from the "Green Deal" and the "Farm to Fork" strategy define the need to accelerate the pace of modernization of farm operations and improve the viability of rural areas. Closer linking of the Green Deal targets with economic, social, and environmental goals, as well as the mechanisms to achieve them, will define the future of the industry and rural areas in the coming decades. The purpose of this study is to forecast the main trends in the development of agriculture and rural areas in Bulgaria until 2027 in the context of the Green Deal. A linear scenario model is applied and the sensitivity of selected indicators is identified under certain assumptions in the independent variables. In crop production and specifically in the viticulture sector, efforts to close the production cycle must continue, while at the same time working in the direction of the possibilities for the realization of the final product - wine, increasing its competitiveness and using the potential of diversifying activities, such as wine tourism. The scenario approach is widely used in assessing the impact of climate changes on the future development of the viticulture sector in Bulgaria. According to the proposed scenarios for the selected indicators in rural areas, it can be assumed that the negative trend of depopulation in rural areas will continue, but at a slower pace than before, without a sharp deterioration in demographic indicators.

Key words**:** *scenario approach, agriculture, rural areas, Green Deal, Bulgaria*

INTRODUCTION

The challenges facing the development of agriculture and rural areas in Bulgaria during the CAP program period 2023-2027 are related to the renewal of production potential and the modernization of activities to improve competitiveness, added value, and well-being in rural areas (Borisov, P., Radev, T., Petrov, K., Kolaj, R., Arabska, E., 2023) [3]. The enhanced environmental requirements laid down in the new CAP resulting from the "Green Deal" and the "Farm to Fork" strategy [5] define the need to accelerate the pace of modernization of farm operations and improve the viability of rural areas. Closer linking of the Green Deal targets with economic, social, and environmental goals, as well as the mechanisms to achieve them, will define the future of the industry and rural areas in the coming decades.

The expected variability of the environment in which agriculture will function under the changed conditions of the agrarian policy creates uncertainty among producers. In this aspect, the application of the scenario analysis is a means of developing and discussing different options for the development of the individual sectors of agriculture, as a basis for determining appropriate policies and decisions applicable in the coming years.The scenario method is a process of forecasting the expected value of a certain indicator or set of indicators that are likely to occur in the conditions of a changing environment (Balaman, 2019) [2]. According to Kosow and Gaβner (2008) [8], the widespread definition of a "scenario" covers two main aspects: a description of a possible future situation and the development

paths that could lead to that situation.In recent years, the scenario approach has been widely used in assessing the impact of climate change on the future development of the viticulture sector (Fraga et al., 2013, Quénol et al., 2014, Aouadi et al., 2021, Moral et al., 2022) [6, 11, 1, 9].

The purpose of this study is to forecast the main trends in the development of agriculture and rural areas in Bulgaria until 2027 in the context of the Green Deal. A linear scenario model is applied and the sensitivity of selected indicators is identified under certain assumptions in the independent variables.

MATERIALS AND METHODS

For the purposes of the present study, the application of the scenario method is reduced to the development of three main scenarios – pessimistic, moderate and optimistic, describing the expected state of the viticulture sector by 2027.

A comparative analysis and probability calculation methodology was applied (Ivanov, 2022) [7]. Scenario probabilities were determined based on covariance and z statistics. The measurement units of the selected indicators are expressed in parts per million (‰), according to the accepted methodology of the National Statistical Institute [12]. Only the average age of the mother at birth of a child is presented in years.

Three scenarios are envisaged for the population projections.They have been determined in accordance with the expert opinion of leading researchers and analysts in the country - University of National and World Economy, Sofia, Agricultural University, Plovdiv and Higher School of Agribusiness and Regional Development, Plovdiv. They were built on the basis of the expected socio-economic development in the rural areas of Bulgaria. According to the accepted general methodology of the planning topic, developed by Ivanov, B., 2022 [7] is set as the base year 2019/2020.As a reference point, the positive attitudes among the public regarding the Strategic Plan proposed by the Ministry of Agriculture and adopted by the European Commission for the new Program Period 2023-2027 are taken into account [13]. The scenarios reflect the final 2027 year of the period and are constructed based on the criteria and methodology of the National Statistical Institute, as follows:

I scenario - temperate. It complies with the norms of the European Union regarding the demographic and socio-economic development of the member countries;

II scenario - optimistic. It foresees that favourable socio-economic processes in the country with positive demographic indicators will be taken into account;

III scenario - pessimistic: A variant is set for unfavourable demographic and socio-economic processes in the country.

Based on the proposed scenarios, the model's algorithm gives a certain coefficient in the solution, which is practically accepted as an evaluation scale.It can be represented from 0 to 1. When in a range:

- From 0 - 0.2 - unfavourable assessment;
- From 0.2-0.45 - unsatisfactory assessment;
- From 0.45 - 0.65 - satisfactory assessment;
- From 0.65 - 0.8 - good assessment;
- 0.8- 1.0 - excellent rating.

The last group of coefficients (Scenario Likelihood) in the matrix gives information about the probability of the scenario to (not) happen.

RESULTS AND DISCUSSIONS

In crop production and specifically in the viticulture sector, efforts to close the production cycle must continue, while at the same time working in the direction of the possibilities for the realization of the final product - wine, increasing its competitiveness and using the potential of diversifying activities, such as wine tourism (Petrov, K., Borisov, P., 2021) [10]. The scenario approach is widely used in assessing the impact of climate changes on the future development of the viticulture sector in Bulgaria. According to the proposed scenarios for the selected indicators in rural areas, it can be assumed that the negative trend of depopulation in rural areas will continue, but at a slower pace than before, without a sharp deterioration in demographic indicators.

The starting point for the development of the scenarios is the situation in the viticulture sector during the base period 2019-2020.The total area of harvested vineyards with wine and dessert vine varieties, averaged over the two years, amounts to 29.4 thousand ha, of which 27.3 ha is the area of wine vineyards, and 2.1 ha - of dessert vines (Table 1).Viewed in dynamics over the years from 2007 to 2020, the trend of area change, both for wine grape production and for dessert grapes, outlines a decline.The comparison between the level of the indicator during the two periods of CAP application in the country shows that the negative dynamics is stronger in wine viticulture.The average level of the harvested area of vineyards with wine grape varieties in the period 2007-2013 was 56,699 ha, and in 2014-2020 it decreased to 31,039 ha (-45.3%).The area of harvested vineyards with dessert varieties averaged 2,614 ha in the first period of CAP application compared to 2,016 ha in the second, marking a decrease of 22.9%. The reasons for the reduction of harvested areas in the two sub-sectors are largely similar and primarily related to the significant capital and labor intensity of production, as well as the economic conditions and difficulties in the market realization of the production.The pace of renewal of plantations is extremely slow, and according to official data, as of 2020, the area of young, unfruitful vines represents 3% of the area of vines on farms, or approximately 1,410 ha.The slower rate of reduction in harvested areas in dessert viticulture can be explained to some extent by the subsidy provided under the production-linked support scheme.

The main financial resource that provides support in wine viticulture is the National Program to Support the Viticulture Sector for the period 2019-2023 [14]. The greatest importance in terms of maintaining and renewing the production potential is the measure "Restructuring and conversion of the vineyards", which is carried out in three main directions - conversion of the varietal composition of the plantations, change of the location of the vineyards and improvement of the management techniques the vineyards. Total, for 2019 and 2020, the issued participation certificates under the measure cover area of 3,745 ha, but the replanting permits for the same period cover 971 ha.

Table 1. Scenarios for the development of viticulture by 2027

Indicators	**Base period 2019-2020**	**Scenario**		
		Pessimistic	**Temperate**	**Optimistic**
Harvested areas of vine plantations, thousand ha	29.4	27.5	29.0	30.5
Production of grapes, thousand tons	168.2	179.0	188.5	197.9
Wine grape producer price index (%)	108.0	128	133	148
Material cost index (%)	126.0	170	140	130
Net farm income per hectare for wine grapes (euro)	-212.30	166	220	300
Share of the Gross product of grapes in the gross production of agriculture (%)	1.2	0.9	1.0	1.2

Source: Own calculations using Ivanov's methodology, Chapter I (2022) [7].

The constantly decreasing areas of vineyards in the country also determine the decline in grape production. Average for the base period, the total amount of production was 168.2 thousand tons, of which 155.6 thousand tons were wine grapes and 12.7 thousand tons were dessert grapes.

The decrease in the production of dessert grapes is less significant - by 2.6%.During the two base years, the production of grapes for fresh consumption remained above 12 thousand tons and above the level of 2018 – 11.8 thousand tons, which outlines a certain stability of the subsector.

Wine grape producers who do not have processing facilities are highly vulnerable to the change in price conditions, both in terms of inputs into production and in the realization of production.The producer price index, taken as a base, shows the increase in the price level in 2020 compared to the level of 2015, according to the official information of National Statistical Institute [12].

The established index of increase of material costs in wine viticulture for the base period 2019-2020 compared to 2015 is 126%.The value of the indicator was calculated based on data from the Agricultural Accounting Information System (FADN) for the input specific costs (expenses for plant protection preparations, fertilizers and other specific costs) per hectare of farms specialized in wine viticulture, which represent respectively 57% and 61% of the total amount of direct investments in the production activity in 2019 and 2020.

The net income is a result indicator of the activity of wine farms with a determining importance for the viability of the economic units operating in the sector.During the base period, its value is a negative, realized primarily due to the decrease in income from production in the conditions of growing maintenance of production.

The contribution of viticulture to the general development of agriculture is expressed through the share of the gross production of grapes in the total production of agriculture, and during the base period it is 1.2%.During the years from 2014 to 2020, the value of the indicator varies between 0.9% and 1.6%.

The system of primary (initial) and result indicators is the basis on which three scenarios have been developed for the development of viticulture in the period 2023-2027.

Pessimistic scenario

The scenario assumes that by 2027 the total area under vines with wine and dessert varieties will decrease by 2.6 hectares compared to the average level of 2019-2020.The loss of the part of the low-productive plantations will reduce the size of the farmed areas for the production of wine grapes to 25.6 thousand ha by the end of the forecast period and for dessert grapes to 1.9 thousand ha.The investments made in the renewal of the varietal composition, implemented with the mechanisms of the CAP 2014-2020, are likely to support the growth of productivity per unit area in wine viticulture in the coming years, which will ensure a level of wine grape production close to that of 2019 - 165.7 thousand tons.Production of dessert grapes will be slightly above the level of the base period - 13.3 thousand tons, but below the average level for 2015-2017 - 13.6 thousand tons.A relatively small increase in the price per producer of wine grapes is expected - by 28%, while direct material costs may increase by around 70%, as a result of continued increases in energy and fuel prices.The scenario envisages a minimum level of net farm income per hectare, determined on the basis of the average for the period 2017-2020, according to FADN data.This can be achieved with an increase in the volume of the obtained production and a certain reduction of the fixed costs of the activity (interest, insurance, rent payments) and other specific costs. The relative share of the gross production of grapes in the total production of agriculture will decrease to 0.9%, which determines the decreasing importance of the sector in the general framework of development of the Bulgarian agriculture.

Temperate scenario

The total harvested area of vineyards with wine and dessert varieties will be below the base level - 29 thousand ha.The area of vineyards for the production of wine grapes will decrease to 26.8 thousand ha.Under favorable market and economic conditions, the investment interest in dessert viticulture may increase, as a relatively small increase in the area harvested with dessert varieties is predicted - up to 2.2 thousand ha.The amount of wine grapes produced in the scenario by 2027 is 173.1 thousand tons and dessert grapes - 15.4 thousand tons.The scenario determines a temperate growth in the price of a producer of wine grapes - by 33%.The indicated increase in direct material costs in the amount of 40% is primarily the result of the expected inflationary processes and the increase in the price of resources with a slight to temperate increase in the amount of resources invested in production.The intended net farm income per hectare (€220) exceeds by 32.5% the pessimistic scenario, but the level of profitability remains relatively low compared to what is needed to improve and expand the production process.The described development of viticulture under the temperate scenario implies the retention of the sector's position in the general framework of

agricultural dynamics by 2027 at the level of the base period - 1.2% share of the value of grape production in the total production of the sector.

Optimistic scenario

The scenario envisages more favorable economic conditions and a certain increase in entrepreneurial interest in viticulture, which can be supported by a complex of mechanisms within the framework of the agrarian policy applied in the country during the period. The total area of harvested vine plantations in this option is 30.5 thousand ha.It is expected that the areas of vineyards with dessert varieties will expand to 2.5 thousand ha, and those of vineyards with wine varieties - to 28 thousand ha.The simultaneous increase in average yields and harvested area will ensure a greater amount of production - 197.9 thousand tons, of which 180.4 thousand tons are wine grapes and 17.5 thousand tons are dessert grapes.The predicted increase in the price of a wine grape producer is more tangible than in the previous two scenarios - by 48% and exceeds the expected growth in material costs - by 30% more compared to the base period.On this basis, a higher level of net income per hectare (EUR 300) is outlined, with the excess compared to that predicted in the pessimistic scenario is 80.7%, and compared to that in the temperate scenario is 36.4%.As a result of the increase in grapes produced in the country and the significantly higher production price, the share of gross production from viticulture in the total production from agriculture may reach 2%.

The calculated covariance in Table 2 shows one-way change and almost insignificant differences between the indicator estimates and the real values of the indicators covered in the scenarios. The differences are smallest in the temperate scenario.

The probability for realization is highest in the temperate scenario (41.4%), followed by the optimistic one (40.9%).The pessimistic scenario is characterized by the lowest probability of implementation – 35.5%.

Table 2. Probabilities for realization of the scenarios

Indicators	**Scenario**		
	Pessimistic	**Temperate**	**Optimistic**
Covariance (CoVAR)	0.033	0.003	0.005
Primary probability for realization of the scenarios (PPROS)	0.367	0.415	0.412
Final probability for realization of the scenarios (FPROS)	0.355	0.414	0.409
Scenario Likelihood	0.129	0.151	0.149

Source: Own calculations using Ivanov's methodology, Chapter I (2022) [7].

The concept on which the temperate scenario is built is based on the expectation of a slowdown in the rate of manifestation of the negative dynamics in the harvested areas of vineyards with wine varieties and weak growth towards the end of the forecast period in the areas with dessert varieties.The range of intervention mechanisms in the viticulture sector will be expanded, such as those implemented in the last two program periods - "Restructuring and conversion", "Investments in the viticulture sector", "Harvest insurance", "Green harvesting" , "Information in Member States" and "Promotion in third countries" the measures "Promotion of wine tourism" and "Investment in environmental facilities" are added.Wine tourism is an opportunity to diversify the sources of income in viticulture and winemaking, and for a large part of wineries in the country this is not a new and unknown activity. The justification of the measure envisages that it will be implemented through recognized inter-branch organizations in the viticulture sector, which requires the maintenance of lasting relationships and cooperation between wine grape producers, wine enterprises and grape and wine traders.Supporting investments in renewable energy sources, treatment plants, composting installations and processing of other waste products is an opportunity to implement eco-innovations that can also contribute to more efficient implementation of the activity.

In dessert viticulture, it is planned to continuethe scheme for support tied to production, and in addition to it, a scheme for support tied to production will be applied for the income of plantations until they begin to

bear fruit.Theapplication of the two measures may lead to some increase in investment activity in the subsector, which supports the expectation of a slight expansion of the area planted with dessert vines, indicated in the temperatescenario.

The increase in the production of wine and dessert grapes, according to the scenario, will occur mainly on the basis of the growth of average yields.In this aspect, increased environmental requirements and the desire to reduce the use of chemical preparations will be a challenge.The European Commission's medium-term forecast for the development of the European viticulture sector by 2032 envisages a decrease in average yields about 0.1% per year, both due to the recommended limitation of the amounts of pesticides and fertilizers used in production, and due to the climate changes- temperature and water stress [4].

These processes will also effect on the Bulgarian production of grapes and wine, but in view of the fact that the average yields from the vineyards in the country lag behind those in European countries with developed viticulture and wine production, the expectations are that the established trend of increasing the level of productivity from a unit area to continue in the coming years mainly on the basis of varietal renewal.

CONCLUSIONS

The results of the statistical analysis show that there is a probability of realization of all three developed scenarios. The most likely to be realized is the temperate scenario for the development of viticulture by 2027.The prerequisites for the realization of the temperatescenario are primarily related to the expansion of the complex of interventions in wine and dessert viticulture foreseen in the Strategic Plan for the Development of Agriculture 2023-2027.The threats for the implementation of this scenario, in view of the current economic situation seem much more serious.The rising prices of resources, the pressure of inflationary processes on consumers and the uncertainty of the international environment represent a challenge especially in terms of profitability in farms, and from there on investment intentions.In this aspect, improving the positions of wine and dessert grape producers along the supply chain is extremely important.Especially in the viticulture sector, efforts to close the production cycle must continue, while at the same time working towards the possibilities of realization of the final product - wine, increasing its competitiveness and using the potential of diversifying activities, such as wine tourism.The fact that this option is most likely to be implemented shows the need for political influence and support of the activity in the wine sector to achieve better than expected results.

The enhanced environmental requirements laid down in the new CAP, resulting from the "Green Deal" and the "Farm to Fork" strategy, determine the need to accelerate the pace of modernization of the activity in farms in connection with the implementation of digital technologies and technologies for precision agriculture and wider occurrence of varieties with increased resistance to stress factors.In this regard, it will be important to strengthen the links between manufacturers and scientific research organizations and to expand scientific research in this direction.

However, it should not be forgotten that the obtained results are the result of selected indicators and forecasts at an expert level.There are also a number of assumptions and assumptions built into the model, which means that trends are more important than exact numbers.The results can serve policymakers as a guideline for choosing impact policies, but in no case should concrete actions be taken based on the evaluation of the indicators from the application of the model.

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