SITUATION AND TRENDS IN THE DEVELOPMENT OF VITICULTURE AND WINERY IN BULGARIA FOR THE PERIOD 2000-2020

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Abstract

A thorough and in-depth review of the situation of viticulture in the period 2000 - 2020 is presented in this paper. Numerical data on the main indicators during the period under review are presented and they illustrate the negative trends in the development of the sector. Values of correlation and determination coefficients were calculated and relationships of dependence between some of the pairs of indicators were analyzed. Conclusions and recommendations have been made.
Keywords: wine production, wine industry, high quality wines, demographic and economic indicators, correlation coefficient, coefficient of determination

INTRODUCTION

In the years after 2000, the total area of vineyards in Bulgaria decreased due to their deteriorating age structure. The share of abandoned vineyards in farms is growing rapidly, thus increasing the share of non-fertile plantations. The restoration of vineyards is subsequently carried out at a decreasing rate and cannot compensate for the general reduction of these areas in the country. The grown young vines are not enough to replace the old ones, thus leading to a decline in wine production. This decline is both quantitative and qualitative. Although there are more than 300 registered wine producers in the country, and the grape producers are even ten times more, the reported decreases in the volume of production and the quality of wines are significant.

The aim of this study is to trace the trends over the past twenty years in the wine industry and analyze the causal links leading to the decline of the ancient Bulgarian traditions in vine growing and wine production.

The rest of the presentation is organized as follows: The following section describes the data used and the related prerequisites. Based on the data in the second section, statistical values are calculated and the presence or absence of dependencies between different indicators is studied. Finally, in the conclusion I make summaries and suggest ways of reducing the negative trends in the industry.

DATA ON THE DEVELOPMENT IN THE PERIOD 2000 - 2020

At the beginning of the 21st century, agriculture in the country is dominated by cooperatives, heirs of the former cooperatives (in reality, the land is still not in the hands of owners). This is especially true for vineyards. Wineries, with very few exceptions, do not have their own vineyards. Until 1990, provisions were in force under which each household had the right to cultivate up to 1 decare of vineyards for own use, as well as vines mainly for the consumption of fresh grapes. A process of transformation of the ownership of both the vineyards and the processing enterprises has started, a large part of the population of the country does not take part in these processes. (5).

Table 1. Areas with vineyards in the period 2000 – 2020.

Year	Areas with vines plantations on holdings, (ha)	Areas with vineyards outside holdings, (ha)	Total areas with vineyards, (ha)	1	2
2000	153 200	7 271	160 471	95,47	4,53
2001	146 995	4 190	151 185	97,23	2,77
2002	129 998	15 200	145 198	89,53	10,47
2003	103 019	28 050	131 069	78,60	21,40
2004	95 551	34 029	129 580	73,74	26,26
2005	94 724	32 118	126 842	74,68	25,32
2006	85 320	43 537	128 857	66,21	33,79
2007	97 387	22 954	120 341	80,93	19,07
2008	88 570	22 246	110 816	79,93	20,07
2009	74 018	27 419	101 437	72,97	27,03
2010	56 968	25 707	82 675	68,91	31,09
2011	52 567	25 901	78 468	66,99	33,01
2012	62 701	14 640	77 341	81,07	18,93
2013	58 236	4 900	63 136	92,24	7,76
2014	52 587	10 298	62 885	83,62	16,38
2015	50 705	12 086	62 791	80,75	19,25
2016	50 892	12 024	62 916	80,89	19,11
2017	51 272	12 680	63 952	80,17	19,83
2018	50 727	13 673	64 400	78,77	21,23
2019	50 100	13 912	64 012	78,27	21,73
2020	47 001	16 646	63 647	73,85	26,15

Source: MAF, Agrostatistics Department - Monitoring of Grape and Wine Production - Harvest 2000 – 2020

Legend:

1 - ratio of areas with vines in agricultural holdings to total areas with vines in percentages;

2 - ratio of areas with vineyards outside the agricultural holdings, to total areas with vineyards in percentages.

It is evident from the data that the decrease in the areas with vineyards in the farms is 3.26 times. The total decline in all areas with vineyards is 2.52 times. The dynamics in the area of vineyards outside agricultural holdings is mainly due to several reasons:

- The population acquired vineyards from the agricultural cooperatives after their liquidation;

- In the first decade of the century, wineries began to diversify their supply of raw materials by planting their own vineyards;

- In practice, the majority of small grape growers, who in 2006 owned 1/3 of all vineyards in the country, were forced to give up growing them;

- The lack of market for grapes;

- In the last 10 years there has been a steady trend in the growth of vineyards outside agricultural holdings, due to the growing number of small wine producers, as well as the trend of returning to natural production.

- The table shows that the percentage of vineyards outside farms is increasing (at the

beginning of the period) and relatively maintained (at the end of the period). This gives

an optimistic forecast for the revival of small grape growers.

Table 2. Grapes produced in the period 2000 – 2020.

Year	Total grapes produced, tons	Total grapes produced for fresh consumption, tonnes	Yield of dessert grapes, kg / dca	Total grapes produced for processing, tons	Yield of wine grapes, kg / dca
2000	723 366	59 874	471	663 492	471
2001	433 498	30 550	339	402 948	335
2002	408 922	26 716	336	382 206	356
2003	433 619	36 072	391	397 547	427
2004	351 468	38 660	294	312 808	398
2005	266 183	21 634	264	244 549	307
2006	336 128	31 778	438	304 350	449
2007	376 663	52 524	546	324 139	486
2008	369 430	61 856	731	307 574	439
2009	281 302	35 877	532	245 425	494
2010	230 198	16 344	304	213 854	450
2011	243 839	15 388	509	228 451	522
2012	260 672	17 087	385	243 585	431
2013	325 596	21 506	590	304 090	643
2014	132 731	8 819	440	123 912	410
2015	261 820	18 884	724	242 936	670
2016	211 083	7841	501	203 242	578
2017	201 529	9872	673	191 657	582
2018	195 470	12 261	610	183 209	621
2019	178 534	14 284	639	164 250	588
2020	159 097	11 937	578	147 160	550

Source: MAF, Agrostatistics Department - Monitoring of Grape and Wine Production - Harvest 2000 – 2020

- The decrease in the total amount of grapes produced is 4.55 times;
- The decline in grapes produced for fresh consumption is 5 times;
- The decline in grapes produced for processing is 4.51 times;

- The dynamics in the yields of dessert and wine grape varieties is 2.77 and 2.09 times, respectively. There are a number of reasons for this, namely: increasing the number of vines per decare, new agricultural techniques and technology, etc.

Table 3. Direction of grapes for processing in the period 2000 – 2020.

Year	Total grapes for processing, tons	Grapes for processing in industrial conditions, tons	Grapes for processing in non-industrial conditions, tons	Other products, tons
2000	663 492	359 401	304 089	0
2001	402 948	121 718	281 230	0
2002	382 206	164 223	382 206	0
2003	397 547	240 240	157 307	0
2004	312 808	182 800	98 910	31 098
2005	244 549	217 758	26 791	0
2006	304 350	255 668	48 682	0
2007	324 139	200 823	123 316	0
2008	307 574	203 447	46 444	54 881
2009	245 425	181 926	42 352	21 147
2010	213 854	148 454	50 643	14 757
2011	228 451	157 945	33 136	37 369
2012	243 585	191 923	23 825	27 837
2013	304 090	249 637	34 272	20 181
2014	123 912	103 521	10 808	9583
2015	242 936	195 860	42 176	4900
2016	203 242	173 503	26 765	2974
2017	191 657	165 818	24 327	1512
2018	183 209	151 938	27 029	4242
2019	164 250	129 311	30 558	4381
2020	147 160	114 336	29 542	3282

Source: MAF, Agrostatistics Department - Monitoring of Grape and Wine Production - Harvest 2000 – 2020

- The decrease in the grapes produced for processing during the period under review is 4.5 times;
- The decrease of the grapes produced for processing in industrial conditions for the period under review is 3.14 times;
- The decrease of the grapes produced for processing in non-industrial conditions (home-made wines) for the considered period is 10.29 times;
- The dynamics of processed grapes in other products (up to 16.72 times) can be explained by a number of factors such as: their export nature and the dynamics of foreign markets for which they are intended.

Table 4. Quantities of wine produced in the period 2000 - 2020.

Year	Total amount of wine produced in industrial conditions, hl	Category PDO, hl	Category PGI, hl	Category Other, hl	Wine produced at home, hl
2000	1 305 733	627 103	678 630		1 999 583
2001	748 956	282 760	466 196		1 159 320
2002	1 017 963	246 499	771 464		964 195
2003	1 533 323	349 110	1 184 213		780 258
2004	1 417 466	467 792	949 674		530 575
2005	1 548 466	100 758	1 447 708		0
2006	1 712 051	126 980	1 585 071		23 896
2007	1 339 536	72 122	1 267 414		415 412
2008	1 378 937	65 588	1 313 349		227 436
2009	1 215 803	45 250	424 721	745 832	181 593
2010	992 821	30 480	383 959	578 382	194 471
2011	1 049 797	23 911	422 655	603 231	138 674
2012	1 271 711	22 451	381 569	867 691	104 788
2013	1 724 469	20 891	554 015	1 149 563	158 937
2014	746 951	10 530	322 228	414 193	48 078
2015	1 310 149	16 861	503 719	789 569	200 748
2016	1 207 784	9 510	360 984	837 290	126 196
2017	1 079 897	7 411	375 224	697 262	113 195
2018	1 040 648	5 740	412 107	622 801	129 536
2019	857 375	5 400	353 685	498 290	147 497
2020	756 225	3 757	323 510	428 958	135 792

Source: MAF, Agrostatistics Department - Monitoring of Grape and Wine Production - Harvest 2000 – 2020

Note: for the period 2000 - 2008 another categorization of wines is in force, in which quality wines are equated to the PDO category, and regional table and table wines to the PGI and Other category. Sparkling, sparkling and special wines are added to the category of table wines due to their insignificant quantity.

PDO - Protected Designation of Origin; PGI - Protected Geographical Indication.

- The decrease in the total amount of wine produced in industrial conditions for the period is 1.72 times;

- The decrease in the produced quality wines (PDO) for the period is 166.92 times;

- The decline in wines produced from other categories compared to the beginning of the century is 2 times;

- The decrease in home-produced wines for the period is 14.73 times;

- The wines produced at the beginning of the century in domestic conditions are 1.53 times more than the wines produced in industrial conditions. At present, the trend is reversed and the wines produced in industrial conditions compared to the produced domestic wines are 5.57 times more.

Table 5. Quantities of grapes and wine produced to the permanent population of Bulgaria in the period 2000 – 2020.

Year	Produced grapes for fresh consumption to the permanent population of Bulgaria, kg/person	Produced grapes for processing to the permanent population of Bulgaria, kg/person	Wine produced at home to the permanent population of Bulgaria, l/person	Produced wine in industrial conditions to the permanent population of Bulgaria, l/person
2000	7,35	81,42	24,54	16,02
2001	3,87	51,06	14,69	9,49
2002	3,41	48,71	12,29	12,97
2003	4,62	50,96	10,00	19,65
2004	4,98	40,30	6,84	18,26
2005	2,80	31,68	0,00	20,06
2006	4,14	39,63	0,31	22,29
2007	6,87	42,43	5,44	17,53
2008	8,13	40,44	2,99	18,13
2009	4,74	32,45	2,40	16,07
2010	2,18	28,50	2,59	13,23
2011	2,09	31,02	1,88	14,25
2012	2,35	33,45	1,44	17,46
2013	2,97	41,97	2,19	23,80
2014	1,22	17,20	0,67	10,37
2015	2,64	33,96	2,81	18,31
2016	1,10	28,62	1,78	17,01
2017	1,40	27,19	1,61	15,32
2018	1,75	26,17	1,85	14,87
2019	2,05	23,63	2,12	12,33
2020	1,73	21,28	1,96	10,93

Source: Processed and analyzed data by the author of the article for the period 2000 - 2020.

- The decrease of the produced grapes for fresh consumption to the permanent population of Bulgaria is 4.24 times. This indicates a deterioration in the eating habits of the population, as well as a shortage of grapes produced in the country for fresh consumption.

- The decline in grapes produced for processing to the permanent population of Bulgaria is 3.83 times - moving people away from their roots and "alienation" from traditional activities.

- The decline in wine produced at home to the permanent population of Bulgaria is 12.52 times, which means increased consumption of beer and spirits, deteriorating wine culture of the population.

- The decline in wine produced in industrial conditions to the permanent population of Bulgaria is 1.46 times.

Table 6. Demographic and economic indicators in Bulgaria for the period 2000 – 2020.

Year	The permanent population of Bulgaria	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP)	Gross government debt of Bulgaria, Millions of euros	Minimum salary in Bulgaria, BGN	Minimum hourly wage in Bulgaria, BGN	Price of manual labor for growing 1 decare of vineyard/year*
2000	8 149 468	70,7	10177,1	75,33	0,45	28,8
2001	7 891 095	64,5	10269,8	87,25	0,52	33,28
2002	7 845 841	51,1	8890,3	100,00	0,59	37,76
2003	7 801 273	43,4	8126,5	110,00	0,65	41,6
2004	7 761 049	35,7	7526,2	120,00	0,71	45,44
2005	7 718 750	26,6	6388,6	150,00	0,89	56,96
2006	7 679 290	20,9	5721,0	160,00	0,95	60,8
2007	7 640 238	16,3	5296,9	180,00	1,07	68,48
2008	7 606 551	13,0	4847,5	220,00	1,30	83,2
2009	7 563 710	13,7	5111,5	240,00	1,42	90,88
2010	7 504 868	15,4	5856,1	240,00	1,42	90,88
2011	7 364 570	15,2	6284,2	250,00	1,48	94,72
2012	7 282 041	16,7	7004,9	283,33	1,69	108,16
2013	7 245 677	17,1	7147,0	310,00	1,85	118,4
2014	7 202 198	27,1	11618,5	340,00	2,03	129,92
2015	7 153 784	26,0	11871,1	370,00	2,21	141,44
2016	7 101 859	29,3	14244,1	420,00	2,50	160
2017	7 050 034	25,3	13246,7	460,00	2,78	177,92
2018	7 000 039	22,3	12491,5	510,00	3,07	196,48
2019	6 951 482	22,2	12379,5	560,00	3,37	215,68
2020	6 916 548	25,0	15187,3	610,00	3,66	234,24

Source: NSY, Business Statistics Directorate - Department of Annual Business Statistics (data for 2000 - 2020); Demographic and Social Statistics Directorate - Department of Population and Housing Statistics (data for 2000 - 2020); Macroeconomic Statistics Directorate - National Financial Accounts Department (data for 2000 - 2020); Multisectoral Statistics and Consumer Services Directorate - Regional Statistics and Monitoring Indicators Department (data for 2000 - 2020). MF, Government Debt Directorate - Strategies, Analysis and Statistical Reporting Department (data for 2000 - 2020).

* Price of manual labor for growing 1 decare of vineyard/year, determined on the basis of the minimum hourly wage for the country. In general, agriculture employs the lowest qualified and the lowest paid staff.

- The permanent population of the country has decreased by 1,232,920 people.

- Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) has decreased 2.83 times.

- Bulgaria's gross government debt has increased by just over 5 billion euros.

- The minimum wage and the minimum hourly wage in Bulgaria have increased by 8.13 times.

Basic agro-technical measures in the cultivation of vineyards (all manipulations refer to 1 decare of vineyards, with approximately 300 vines and cultivation by one person).

1. Pruning and throwing on sticks - 1 decare / 8 man-hours.

2. Tying - 1 decare / 8 man-hours.

3. Sprouting - 1 decare / 4 man-hours.

4. Fertilization (twice a year) - 1 decare / 2 man-hours (total).

5. Digging - 0.5 decares / 8 man-hours.

6. Green pruning - 1 decare / 8 man-hours.

7. Punching - 1 decare / 4 man-hours.

8. Elimination of peak (breaking) - 1 decare / 3 man-hours.

9. Preparation of solutions and spraying (average data for manual and portable motor sprayer, minimum 8 units / year) - for 1 decare / 8 man-hours (total).

10. Harvesting - 0.5 decares / 8 man-hours.

To grow 1 decare of vineyard under normal conditions requires 61 man-hours of physical work / 1 year.

Agrotechnical measures with specialized equipment in normal climatic conditions:

1. Plowing - 2 pieces / year.

2. Deepening - 1 issue / year.

3. Cultivation - 3 pieces / year.

4. Discussion - 3 pieces / year.

For the performance of each of the listed manipulations in the cultivation of 1 decare of vineyard / year, under normal conditions, 20 minutes / number or a total of 3 man-hours are required.

For the cultivation of 1 decare of vineyard, under normal conditions, 64 man-hours of physical work / 1 year are needed.

As can be seen, the price of manual labor for growing 1 decare of vineyard / year has increased 8.13 times.

As a rule, growing vineyards for one's own needs (home-made wine), price and manual labor (man-hours) have never been the leading criteria. What is important is the quality and personal satisfaction with the results obtained.

The values of coefficients and conclusions for the minimum wage in Bulgaria, the minimum hourly wage in Bulgaria and the price of manual labor for growing 1 decare of vineyard / year are the same or extremely close!

MATERIALS AND METHODS

Methodology and basic concepts

The object of study are the situation and trends in the wine sector in combination with basic demographic and economic indicators in Bulgaria for the period 2000-2022.

A large number of official statistics has been used to contribute to the correct and impartial interpretation. Practically all possible indicators for the considered sector have been used: Areas with vines plantations on farms; Areas with vineyards outside the farms; Total areas with vineyards; Total grapes produced for fresh consumption; Extraction of table grapes; Total grapes produced for processing; Extraction of wine grapes; Grapes for processing into industrial conditions; Grapes for processing in non-industrial conditions; Other products; Total amount of wine produced in industrial conditions; Category PDO; Category PGI; Category Other; Wine produced at home. Selected basic demographic and economic indicators: The permanent population of Bulgaria; Gross government debt as a percentage of Bulgaria's gross domestic product (GDP); Gross government debt of Bulgaria, Millions of euros; Minimum salary in Bulgaria; Minimum hourly wage in Bulgaria; Price of manual labor for growing 1 decare of vineyard / year. New indicators have been derived as a combination of the two main groups: Produced

grapes for fresh consumption to the permanent population of Bulgaria; Produced grapes for processing to the permanent population of Bulgaria; Wine produced at home to the permanent population of Bulgaria; Produced wine in industrial conditions to the permanent population of Bulgaria.

The main goal is to derive the causes and results of the observed trends and establish the real situation in the wine sector.

Basic method and indicators

Correlation analysis. One of the main tasks of statistics is to study the relationship between random variables. Correlation analysis is used to describe the strength and direction of the relationship between variables. Correlation coefficients are the statistical measure representing the relationship between two random variables. According to the measurement scale in which the variables are expressed, different correlation coefficients are used. (3)

Using Pearson's correlation coefficient:

$$R = \frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2} \cdot \sqrt{n\sum Y^2 - (\sum Y)^2}},$$

we will determine whether and to what extent some of the pairs of indicators are linearly related. Using the coefficient of determination R^2, we will draw conclusions about what percentage of changes in the factor variable are needed so as to lead to the desired changes in the resultant variable.(3)

In determining the strength of the dependence, there are some empirical rules that can be used in interpreting the correlation coefficient:

- At value 0 - no dependence
- Up to 0.3 - the dependence is weak
- From 0.3 to 0.5 - moderate dependence
- From 0.5 to 0.7 - significant dependence

- From 0.7 to 0.9 - strong dependence
- Over 0.9 - very strong dependence
- At 1 - the dependence is functional.

There are two options for determining the direction of dependence:

- If the correlation coefficient is a positive number, the dependence is positive, ascending - the larger values of one variable correspond to larger values of the other variable.

- If the correlation coefficient is a negative number, the dependence is negative, descending - higher values of one variable correspond to lower values of the other variable.(3)

The first pair of indicators considered is: the minimum wage in Bulgaria and the price of manual labor for growing 1 decare of vineyard / year. After the calculations, it turns out that R = 1.0000, which shows that the change in the minimum wage in Bulgaria has a functional dependence on the price of manual labor for growing 1 decare of vineyard / year. The percentage coefficient of determination R^2 = 99.99% means that over 99.99% of the changes in the price of manual labor for growing 1 decare of vineyard / year for the period 2000-2020 are the result of the change in the minimum wage in Bulgaria.

The rule in the country is that only low-paid workers are mainly engaged in agricultural work, including viticulture and fruit growing.

The second pair of indicators are the grapes produced for processing and the total quantity of grapes produced. R = 0.9966, which shows that the change in the grapes produced for processing had a very strong effect on the total amount of grapes produced. Over 99.32% of the change in the total quantity of grapes produced for the period 2000-2020 is a result of the change in the grapes produced for processing.

Table 7. Functional and very strong dependence.

№	Two indicators	Odds values	Conclusions
1.	Minimum wage in Bulgaria and price of manual labor for growing 1 decare of vineyard / year	$R = 1,0000$ $R^2 = 99,99$	Functional dependence. Over 99.99% of the changes in the price of manual labor for growing 1 decare of vineyard / year for the period 2000-2020 are a result of the change in the minimum wage in Bulgaria.
2.	Produced grapes for processing and the total quantity of grapes produced	$R = 0,9966$ $R^2 = 99,32$	Very strong dependence (almost functional). Over 99.32% of the change in the total quantity of grapes produced for the period 2000-2020 is a result of the change in the grapes produced for processing
3	The permanent population of Bulgaria and total areas with vineyards	$R = 0,9586$ $R^2 = 91,90$	Very strong dependence. Over 91.90% of the changes in the total areas with vineyards for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
4	Areas with vines plantations in farms and total areas with vineyards	$R = 0,9547$ $R^2 = 91,15$	Very strong dependence. Over 91.15% of the total changes areas with vineyards for the period 2000-2020 are a result of the change in the areas with vines plantations on farms.
5	The permanent population of Bulgaria and vineyards plantations on the farm	$R = 0,9124$ $R^2 = 83,25$	Very strong dependence. Over 83.25% of the changes in the areas with vineyards in the farms for the period 2000-2020 are a result of the change in the permanent population of Bulgaria

Source: Processed and analyzed data by the author of the article for the period 2000 - 2020.

To determine whether the permanent population of Bulgaria is important for the areas under vines, we calculate separately the coefficients of correlation and determination between the permanent population of Bulgaria, areas under vines in farms and total areas under vines. The results R = 0.9124 and R = 0.9586 for the first two coefficients show that the change in the population of Bulgaria has shown a very strong dependence on the areas under vines in the farms and the total areas under vines. Due to the declining and aging population of the country, as well as the reluctance of young people to engage in low-paid work, this result is not surprising. The values $R^2 = 83.25\%$ and $R^2 = 91.90\%$ indicate this very strong dependence.

Examining the very strong dependence, we find that the permanent population of the country has not had a sufficient impact on the minimum wage, minimum hourly wage, the cost of manual labor for the cultivation of 1 decare / vineyard / year.

Table 8. Inverse very strong dependence.

№	Two indicators	Odds values	Conclusions
1	The permanent population of Bulgaria and the minimum wage in Bulgaria	$R = -0{,}9574$ $R^2 = 91{,}66$	Reverse very strong dependence. Over 91.66% of the changes in the minimum wage in Bulgaria for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
2	The permanent population of Bulgaria and the minimum hourly wage in Bulgaria	$R = -0{,}9562$ $R^2 = 91{,}43$	Reverse very strong dependence. Over 91.43% of the changes in the minimum hourly wage in Bulgaria for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
3	The permanent population of Bulgaria and the price of manual labor for growing 1 decare of vineyard / year	$R = -0{,}9562$ $R^2 = 91{,}43$	Reverse very strong dependence. Over 91.43% of the changes in the price of manual labor for growing 1 decare of vineyard / year for the period 2000-2020 are a result of the change in the permanent population of Bulgaria

Source: Processed and analyzed data by the author of the article for the period 2000 - 2020.

Table 9. Strong dependence.

№	Two indicators	Odds values	Conclusions
1	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and wine produced at home	$R = 0{,}8963$ $R^2 = 80{,}33$	Strong dependence. Over 80.33% of the changes in the wine produced at home for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria
2	Areas with vineyards on the farm and total grapes produced	$R = 0{,}8830$ $R^2 = 77{,}97$	Strong dependence. Over 77.97% of the changes in the total grapes produced for the period 2000-2020 are a result of the change in the areas with vineyards on the farms.
3	Areas with vines plantations in farms and grapes for processing in non-industrial conditions	$R = 0{,}8829$ $R^2 = 77{,}95$	Strong dependence. Over 77.95% of the changes in the grapes for processing in non-industrial conditions for the period 2000-2020 are a result of the change in the areas with vines plantations on farms.
4	Areas with vines plantations in farms and produced grapes for processing	$R = 0{,}8809$ $R^2 = 77{,}60$	Strong dependence. Over 77.60% of the changes in grapes produced for processing for the period 2000-2020 are a result of the change in the areas under vines plantations on farms.
5	Produced wine at home and produced quality wines (PDO)	$R = 0{,}8686$ $R^2 = 75{,}44$	Strong dependence. Over 75.44% of the changes in the produced quality wines (PDO) for the period 2000-2020 are a result of the change in the produced wine at home.

6	The permanent population of Bulgaria and total grapes produced	$R = 0{,}8513$ $R^2 = 72{,}47$	Strong dependence. Over 72.47% of the changes in the total grapes produced for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
7	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and grapes for processing in non-industrial conditions	$R = 0{,}8473$ $R^2 = 71{,}79$	Strong dependence. Over 71.79% of the changes in the grapes for processing in non-industrial conditions for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria
8	The permanent population of Bulgaria and grapes produced for processing	$R = 0{,}8389$ $R^2 = 70{,}37$	Strong dependence. Over 70.37% of the changes in the grapes produced for processing for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
9	Total quantity of wine produced in industrial conditions and ordinary wines produced	$R = 0{,}8356$ $R^2 = 69{,}82\%$	Strong dependence. Over 69.82% of the changes in the produced ordinary wines for the period 2000-2020 are a result of the change in the total amount of wine produced in industrial conditions.
10	Total areas with vineyards and total grapes produced	$R = 0{,}8297$ $R^2 = 68{,}84$	Strong dependence. Over 68.84% of the changes in the total grapes produced for the period 2000-2020 are a result of the change in the total areas with vines.
11	Total areas with vineyards and grapes produced for processing	$R = 0{,}8171$ $R^2 = 66{,}77$	Strong dependence. Over 66.77% of the change in grapes produced for processing for the period 2000-2020 is a result of the change in the total area under vines.
12	Total areas with vineyards and quality wines produced (PDO)	$R = 0{,}8108$ $R^2 = 65{,}74$	Strong dependence. Over 65.74% of the change in the produced quality wines (PDO) for the period 2000-2020 is a result of the change in the total areas with vineyards.
13	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and quality wines produced (PDO)	$R = 0{,}8100$ $R^2 = 65{,}62$	Strong dependence. Over 65.62% of the changes in the produced quality wines (PDO) for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria
14	Dessert grapes produced and the total quantity of grapes produced	$R = 0{,}8014$ $R^2 = 64{,}22$	Strong dependence. Over 64.22% of the changes in the total quantity of grapes produced for the period 2000-2020 are a result of the change in produced dessert grapes
15	The permanent population of Bulgaria and the produced quality wines (PDO)	$R = 0{,}7998$ $R^2 = 63{,}97$	Strong dependence. Over 63.97% of the changes in the produced quality wines (PDO) for the period 2000-2020 are a result of the change in the permanent population of Bulgaria

16	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and areas under vines on farms	$R = 0{,}7959$ $R^2 = 63{,}35$	Strong dependence. Over 63.35% of the changes in the areas under vines in the farms for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria
17	Grapes for processing in non-industrial conditions and total grapes for processing	$R = 0{,}7931$ $R^2 = 62{,}90$	Strong dependence. Over 62.90% of the changes in the total quantity of grapes for processing for the period 2000-2020 are a result of the change in the quantity of grapes for processing in non-industrial conditions.
18	Total areas with vineyards and grapes for processing in non-industrial conditions	$R = 0{,}7754$ $R^2 = 60{,}13$	Strong dependence. Over 60.13% of the change in grapes for processing in non-industrial conditions for the period 2000-2020 is a result of the change in the total areas with vines.
19	Grapes for processing in industrial conditions and total grapes for processing	$R = 0{,}7578$ $R^2 = 57{,}42$	Strong dependence. Over 57.42% of the changes in the total quantity of grapes for processing for the period 2000-2020 are a result of the change in the quantity of grapes for processing in industrial conditions.
20	The permanent population of Bulgaria and produced grapes for fresh consumption	$R = 0{,}7513$ $R^2 = 56{,}45$	Strong dependence. Over 56.45% of the changes in the produced grapes for fresh consumption for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
21	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and grapes produced for processing	$R = 0{,}7367$ $R^2 = 54{,}28$	Strong dependence. Over 54.28% of the changes in the grapes produced for processing for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria
22	Total areas with vineyards and grapes produced for fresh consumption	$R = 0{,}7360$ $R^2 = 54{,}17$	Strong dependence. Over 54.17% of the change in produced grapes for fresh consumption for the period 2000-2020 is a result of the change in the total areas with vines.
23	Total areas with vineyards and wine produced at home	$R = 0{,}7263$ $R^2 = 52{,}75$	Strong dependence. Over 52.75% of the change in the wine produced at home for the period 2000-2020 is a result of the change in the total areas with vineyards.
24	The permanent population of Bulgaria and grapes for processing in non-industrial conditions	$R = 0{,}7232$ $R^2 = 52{,}31$	Strong dependence. Over 52.31% of the changes in the grapes for processing in non-industrial conditions for the period 2000-2020 are a result of the change in the permanent population of Bulgaria

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25	The permanent population of Bulgaria and wine produced at home	$R = 0{,}7132$ $R^2 = 50{,}87$	Strong dependence. Over 50.87% of the changes in the wine produced at home for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
26	Areas with vines plantations in farms and produced grapes for fresh consumption	$R = 0{,}7014$ $R^2 = 49{,}19$	Strong dependence. Over 49.19% of the change in grapes produced for fresh consumption for the period 2000-2020 is a result of the change in the areas under vines on the farms.
27	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and total grapes	$R = 0{,}7008$ $R^2 = 49{,}12$	Strong dependence. Over 49.12% of the changes in the total produced grapes for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria

Source: Processed and analyzed data by the author of the article for the period 2000 - 2020.

Of interest in these data are the strong dependencies of home-produced wine and quality wines (PDO) produced, as well as the permanent population of Bulgaria and quality wines (PDO) produced. Respectively R = 0.8686 and R = 0.7998. Which in turn means: over 75.44% of the changes in the produced quality wines (PDO) for the period 2000-2020 are the result of the change from the produced wine at home, and over 63.97% are a result of the changes of the structure of the population. The quality wines (PDO) for the period 2000-2020 are the result of the change in the permanent population of Bulgaria.

This leads to the conclusion that a large part of the quality wines produced in the country were consumed in the country and the population had a significant wine culture.

Table 10. Inverse strong dependence.

№	Two indicators	Odds values	Conclusions
1	Minimum wage in Bulgaria and total areas with vines	$R = -0{,}8728$ $R^2 = 76{,}18$	Reverse strong dependence. Over 76.18% of the changes in the total areas with vineyards for the period 2000-2020 are a result of the change in the minimum wage in Bulgaria
2	Minimum wage in Bulgaria and areas with vineyards on farms	$R = -0{,}8103$ $R^2 = 65{,}67$	Reverse strong dependence. Over 65.67% of the changes in the areas under vines in the farms for the period 2000-2020 are a result of the change in the minimum wage in Bulgaria
3	Minimum wage in Bulgaria and total grapes produced	$R = -0{,}7477$ $R^2 = 55{,}91$	Reverse strong dependence. Over 55.91% of the changes in the total grapes produced for the period 2000-2020 are a result of the change in the minimum wage in Bulgaria
4	Minimum wage in Bulgaria and grapes produced for processing	$R = -0{,}7371$ $R^2 = 54{,}33$	Reverse strong dependence. Over 54.33% of the changes in the grapes produced for processing for the period 2000-2020 are a result of the change in the minimum wage in Bulgaria

| 5 | Yield per decare for wine grape varieties and total areas with vineyards | $R = -0,7320$ $R^2 = 53,58$ | Reverse strong dependence. Over 53.58% of the changes in the total areas with vines for the period 2000-2020 are a result of the change in the yield per decare for wine grape varieties. |
| 6 | Yield per decare for wine grape varieties and grapes produced for processing | $R = -0,7053$ $R^2 = 49,74$ | Reverse strong dependence. Over 49.74% of the changes in the grapes produced for processing for the period 2000-2020 are a result of the change in the yield per decare for wine grape varieties. |

Source: Processed and analyzed data by the author of the article for the period 2000 - 2020.

Table 11. Weak dependence.

№	Two indicators	Odds values	Conclusions
1.	The permanent population of Bulgaria and areas with vineyards outside agricultural farms.	$R = 0,2972$ $R^2 = 8,83$	Weak dependence. Over 8.83% of the changes in the areas with vineyards outside The agricultural holdings for the period 2000-2020 are a result of the change in the permanent population of Bulgaria.
2.	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and grapes for processing in industrial conditions.	$R = 0,2844$ $R^2 = 8,09$	Weak dependence. Over 8.09% of the changes in the grapes for processing in industrial conditions for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria.
3	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and grapes produced for fresh consumption.	$R = 0,2834$ $R^2 = 8,03$	Weak dependence. Over 8.03% of the changes in the produced grapes for fresh consumption for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria
4	Total areas with vineyards and total amount of wine produced in industrial conditions.	$R = 0,2802$ $R^2 = 7,85$	Weak dependence. Over 7.85% of the change in the total amount of wine produced in industrial conditions for the period 2000-2020 is a result of the change in the total area of vineyards.
5	Grapes for processing in industrial conditions and grapes for processing in non-industrial conditions.	$R = 0,2797$ $R^2 = 7,82$	Weak dependence. Over 7.82% of the changes in the quantity of grapes for processing in non-industrial conditions for the period 2000-2020 are the result of the quantity of grapes for processing in industrial conditions.

6	Yield per decare for wine grape varieties and ordinary wines produced.	$R = 0,2622$ $R^2 = 6,88$	Weak dependence. Over 6.88% of the changes in the produced ordinary wines for the period 2000-2020 are a result of the change in the yield per decare for the wine grape varieties.
7	Areas under vines outside agricultural holdings and grapes produced for fresh consumption..	$R = 0,2254$ $R^2 = 5,08$	Weak dependence. Over 5.08% of the change in grapes produced for fresh consumption for the period 2000-2020 is a result of the change in the areas under vines outside the agricultural holdings.
8	Total quantity of wine produced in industrial conditions and quality wines produced (PDO).	$R = 0,2150$ $R^2 = 4,62$	Weak dependence. Over 4.62% of the changes in the produced quality wines (PDO) for the period 2000-2020 are a result of the change in the total quantity of wine produced in industrial conditions.
9	Areas of vineyards outside agricultural holdings and grapes for processing in industrial conditions.	$R = 0,1490$ $R^2 = 2,22$	Weak dependence. Over 2.22% of the change in grapes for processing in industrial conditions for the period 2000-2020 is a result of the change in the areas with vineyards outside the agricultural holdings.
10	Yield per decare for wine grape varieties and total amount of wine produced in industrial conditions.	$R = 0,0021$ $R^2 = 0,00\%$	Weak dependence (insignificant). 0% of the changes in the total amount of wine produced in industrial conditions for the period 2000-2020 are a result of the change in the yield per decare for wine grape varieties.
11	Areas with vines plantations in holdings and areas under vines outside agricultural holdings	$R = 0,0032$ $R^2 = 0,00$	Slight dependence. 0% of the changes in the areas with vineyards outside the agricultural holdings for the period 2000-2020 are a result of the change in the areas with vineyards on the holdings.

Source: Processed and analyzed data by the author of the article for the period 2000 - 2020.

Table 12. Inverse weak dependence.

№	Two indicators	Odds values	Conclusions
1	Yield per decare for wine grape varieties and wine produced at home	$R = -0,3217$ $R^2 = 10,35$	Reverse weak dependence. Over 10.35% of the changes in the wine produced at home for the period 2000-2020 are the result of the change in the yield per decare for wine grape varieties.
2	Gross government debt of Bulgaria and areas under vines on farms	$R = -0,2868$ $R^2 = 8,23$	Reverse weak dependence. Over 8.23% of the changes in the areas with vineyards in the farms for the period 2000-2020 are a result of the change in the gross government debt of Bulgaria

3	Gross government debt of Bulgaria and grapes produced for processing	$R = -0,2752$ $R^2 = 7,58$	Reverse weak dependence. Over 7.58% of the changes in the grapes produced for processing for the period 2000-2020 are a result of the change in the gross government debt of Bulgaria
4	Yield per decare for table grapes and the total amount of grapes produced	$R = -0,2313$ $R^2 = 5,35$	Reverse weak dependence. Over 5.35% of the changes in the total amount of grapes produced for the period 2000-2020 are a result of the change in the yield per decare of dessert grapes
5	Areas of non-agricultural vineyards and grapes for processing in non-industrial conditions	$R = -0,2239$ $R^2 = 5,01$	Reverse weak dependence. Over 5.01% of the changes in the grapes for processing in non-industrial conditions for the period 2000-2020 are a result of the change in the areas with vineyards outside the agricultural holdings.
6	Total areas with vineyards and ordinary wines produced	$R = -0,1880$ $R^2 = 3,54$	Reverse weak dependence. Over 3.54% of the change in the produced ordinary wines for the period 2000-2020 is a result of the change in the total areas with vineyards.
7	Gross government debt as a percentage of Bulgaria's gross domestic product (GDP) and total amount of wine produced in industrial conditions	$R = -0,1589$ $R^2 = 2,53$	Reverse weak dependence. Over 2.53% of the changes in the total amount of wine produced in industrial conditions for the period 2000-2020 are a result of the change in the gross government debt as a percentage of the gross domestic product (GDP) of Bulgaria
8	Bulgaria's gross government debt and quality wines produced (PDO)	$R = -0,1243$ $R^2 = 1,55$	Reverse weak dependence. Over 1.55% of the changes in the produced quality wines (PDO) for the period 2000-2020 are a result of the change in the gross government debt of Bulgaria
9	The permanent population of Bulgaria and the produced ordinary wines	$R = -0,1119$ $R^2 = 1,25$	Reverse weak dependence. Over 1.25% of the changes in the produced ordinary wines for the period 2000-2020 are a result of the change in the permanent population of Bulgaria
10	Areas under vines outside agricultural holdings and grapes produced for processing	$R = -0,0774$ $R^2 = 0,60$	Reverse weak dependence. Over 0.60% of the changes in the grapes produced for processing for the period 2000-2020 are a result of the change in the areas with vineyards outside the agricultural holdings.
11	Total quantity of wine produced in industrial conditions and wine produced in domestic conditions	$R = -0,0458$ $R^2 = 0,21$	Inverse minor dependence. Over 0.21% of the changes in wine produced at home for the period 2000-2020 are a result of the change in the total amount of wine produced in industrial conditions

12	Gross government debt of Bulgaria and grapes for processing in non-industrial conditions	$R = -0,0432$ $R^2 = 0,19$	Reverse weak dependence. Over 0.19% of the changes in the grapes for processing in non-industrial conditions for the period 2000-2020 are a result of the change in the gross government debt of Bulgaria
13	Areas with vineyards outside agricultural holdings and total grapes produced	$R = -0,0419$ $R^2 = 0,18$	Reverse weak dependence. Over 0.18% of the changes in the total grapes produced for the period 2000-2020 are a result of the change in the areas under vines outside the agricultural holdings.
14	Minimum wage in Bulgaria and ordinary wines produced	$R = -0,0284$ $R^2 = 0,08$	Reverse weak dependence. Over 0.08% of the changes in the produced ordinary wines for the period 2000-2020 are a result of the change of the minimum wage in Bulgaria
15	Gross government debt of Bulgaria and wine produced at home	$R = 0,0274$ $R^2 = 0,07$	Weak dependence. Over 0.07% of the changes in the wine produced at home for the period 2000-2020 are the result of the change in the gross government debt of Bulgaria
16	Yield per decare of table grapes and grapes produced for fresh consumption	$R = -0,0043$ $R^2 = 0,00$	Inverse minor dependence. 0% of the changes in the produced grapes for fresh consumption for the period 2000-2020 are a result of the change in the yield per decare of the dessert grapes.

Source: Processed and analyzed data by the author of the article for the period 2000 - 2020.

The following pair of indicators speaks very clearly about the trends in Bulgarian wine production: yield per decare for wine grape varieties and the total amount of wine produced in industrial conditions. The dependence is very weak, we can say insignificant R = 0.0021. The value of R2 = 0.00% or 0% of the changes in the total amount of wine produced in industrial conditions for the period 2000-2020 are the result of the change in the yield per decare for wine grape varieties.

The following pair of indicators clearly speaks about the tendencies in the Bulgarian viticulture: the yields per decare of table grapes and the grapes produced for fresh consumption. The dependence is inverse very weak, insignificant R = -0.0043. The values of R2 = 0.00% or 0% of the changes in the produced grapes for fresh consumption for the period 2000-2020 are a result of the change in the yield per decare of the dessert grapes.

The obtained results are unambiguous and definitely give us an explanation why the situation in viticulture and winemaking in the country has reached a critical situation!

CONCLUSION

The observed trends in the period 2000-2020 of decline in the volume of manufactured products (grapes, wine, etc.) in combination with their greatly reduced quality is associated with many socio-economic, national and other prerequisites. Their total impact maintains the negative direction of development in the industry.

There are clear downward trends for the period under review:

- the grapes produced for processing by 4.51 times;
- the grapes produced for processing in industrial conditions are 3.14 times;
- the total quantity of wine produced in industrial conditions for the period is 1.72 times,

etc.

And somehow it seems illogical to increase:
- yields of wine grape varieties by 2.09 times.

Following the declines again:
- produced quality wines (PDO) for the period is 166.92 times;
- produced wines from other categories compared to the beginning of the century is 2 times.

The tendency of depersonalization of wine industry and the liquidation of the highest quality categories of produced wines (they were the flagship, the face of Bulgarian exports) is clearly outlined at the expense of low quality wines (even wine production without grapes). The latter is also confirmed by the conclusions in the analysis of the pair of indicators: yield per decare for wine grape varieties and the total amount of wine produced in industrial conditions. The dependence is very weak, we can say insignificant R = 0.0021. The value of R2 = 0,00% or 0% of the changes in the total quantity of wine, produced in industrial conditions for the period 2000-2020 are the result of the change in the yield per decare for wine grape varieties.

The mass depopulation of the country with 1 232 920 people, both with the decline, which is observed at home-made wines by 14.73 times,and also that the wines, produced at the beginning of the century at home were 1.53 times more than these,produced in industrial conditions. It is not a coincidence that the decrease of home-made wines in Bulgaria is 12.52 times. The long-standing policy of eradicating the wine culture and modeling the tastes of the "new generations" of consumers is having an impact. A point has been reached where the authentic taste of Bulgarian wines and brandies has been forgotten (the production of which requires natural raw materials - grapes in combination with knowledge and skills), and the consumption of beer and spirits has increased.

A turning point has been reached in the historical development of viticulture in the country, there is no more talk of development and modernization, but of the physical survival of an entire sector of the food industry. All measures must be focused on this - the survival of the industry (5).

The minimum wage and the minimum hourly wage in Bulgaria have increased by 8.13 times, but comparing the purchase prices only for 2000 and 2020, there is no difference in prices. And this is hardly normal market pricing.

The increased number of producers is accompanied by a decrease in production and product quality (the prices of the wines exported by France are among the highest in the world, reflecting a positioning on well-valued products and even better and better-valued products considering the evolution of the average prices for 15 years (+9%), especially for PDO wines (+20%)) (11). This, in combination with inadequate government policy, leads to a sharp deterioration of the situation in the industry.

Steps in the right direction would be to support small producers to produce small quantities of quality products at competitive prices, as well as linking these small grape producers to the final product and its realization. Combining small producers on a regional basis with a focus on local grape varieties and terroir would also be a good approach.

The state must begin to differentiate and distinguish between mini, small, medium, large and mega producers.

Its main responsibility is to help and control producers, but not to hinder them with all sorts of prohibitions and restrictions.

Institutional factors contribute to the increasing of the production potential by optimizing the institutional medium and the public decision making model. The institutional medium is a system of social, political and legislative norms (9).

It is the responsibility of the state to limit and subsequently eliminate all "imitations" of wines and wine products, from which

consumers, traders, fair producers and, last but not least, wine growers suffer. It is important to understand that the admission of counterfeits brings mainly losses for the state.

Despite the problems facing the wine business in our country, it can be assumed that this business has a future, which, however, will depend on the creation of modern and competitive wine and wine sector (8).

All grape and wine-producing countries have protectionist policies, regardless of their membership in the EU. It is no coincidence that Bulgaria, a wine producer and a trader, one of the top 10 countries in the world (in the recent past), is now in the top 55 – 65. (12)

In the end, I would suggest that we protect and promote the sale and consumption of Bulgarian wines in the country.

REFERENCES

Atanasov, D., Popova B. (2010). Approaches to selection and integration of indicators for sustainable development of agriculture, *Trakia Journal of Science*, 8, Suplement 1, 133. ISSN 1313-7069.

Bulgarian Chamber of Commerce (2021). Retrieved from https://www.bia-bg.com/analyses/view/28857// .

Dimitrova, D. Dimitrov,V. (2017). Regional aspects of viticulture and wine production development in Bulgaria, *Journal of Mountain Agriculture on the Balkans*, 20 (3), 162-186.

Dimitrova, J., Dimitrova, R. (2022). *Sistema za obuchenie po statistika I statisticheski izchisleniya s Microsoft Excel.* [Training system for statistics and statistical calculations with Microsoft Excel]. University "Prof. Dr. Asen Zlatarov" – Burgas, Retrieved from https://www.btu.bg/statexcel/file8.html .

Georgiev, St. (2020). Tendenziite v lozaro-vinarskiya sector v Bulgaria za perioda 2015-2019. [The trends in vine and wine sector in Bulgaria for period 2015 – 2019]. In: *Parva nauchna konferenziya Inovazii I konkurentnosposobnost, 20 Oktomvri 2020, Plovdiv. [First National Scientific Conference Innovation and Competitiveness,20 October 2020, Plovdiv]*, 101-110, ISSN 2738-7534.

Georgiev, St., Yankova, T. (2021) Waste Products from Wine Production and Possible Paths to a Green Economy. In: Conference Proceedings *Economic, Regional and Social Challengesin the Transition Towards a Greew Economy*, 30th September 2021, Plovdiv, Bulgaria, 233-248. ISBN (online) 978-619-7663-07-5. Retrieved from https://storefisn.uni-plovdiv.bg/conf/wp-content/uploads/2022/01/ECONOMIC-REGIONAL-AND-SOCIAL-CHALLENGES-IN-THE-TRANSITION_END_NEW.pdf

International Organisation of Vine and Wine (2018), Global economic vitiviniculture data. Paris, 26 October 2018, Retrieved from http://www.oiv.int/public/medias/6307/oiv-press-release-global-economic-vitiviniculture-data-octob.pdf .

Kirechev, D. (2010) Trends and Prospect for the Viticulture Business in Bulgaria, *Trakia Journal of Science*, 8(Suppl. 1), 174-183.

Ministry of Agriculture, Food and Forestry (2022). Retrieved from https://www.mzh.government.bg/bg/statistika-i-analizi/izsledvane-rastenievadstvo/danni/ .

Roycheva, A. (2015). Production Potential of Bulgarian Viticulture. *Trakia Journal of Sciences*, 13(Suppl. 1), 202 – 206. https://doi.org/10.15547/tjs.2015.s.01.034 .

Ruiz Estrada, Mario Arturo, Park, D. and Chin, A., T. H. (2017). *Measuring Wine Industry Efficiency with Wine Industry*

Network Evaluation Model (WINE-Model). SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3040105 .

Toteva, D. (2017) Competitive level and trends for development of the vine and wine sector in Bulgaria. *Journal of Mountain Agriculture on the Balkans*, 20 (4), 39-48.

Ugaglia, A. J-M., Cardebat & Jiao, L. (2019). The French Wine Industry. In: *The Palgrave Handbook of Wine Industry Economics* (pp.17-46), Publisher: Palgrave Macmillan, https://doi.org/10.1007/978-3-319-98633-3_2 .