Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

OPEN ACCESS

Citation: Kamila Vesela, David Křížek, Lucie Severova (2023). Structure and development of the Czech wine market and foreign wine trade. *Wine Economics and Policy* 12(1): 37-49. doi: 10.36253/wep-11522

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Structure and development of the Czech wine market and foreign wine trade

Kamila Vesela, David Křížek*, Lucie Severova

Czech University of Life Sciences Prague, Faculty of Economics and Management, Kamýcká 129, 165 00 Prague, Czech Republic
E-mail: veselakamila@pef.czu.cz; krizekd@pef.czu.cz; severova@pef.czu.cz
*Corresponding author.

Abstract. The aim of the presented text is to evaluate the structure and development of the Czech wine market, foreign wine trade and to analyse the factors shaping domestic demand for wine. The text presents the results of the analysis of primary and secondary data. Time series on the development and direction of the foreign wine trade are analysed and the results are then compared with the findings of a questionnaire survey of 946 respondents which provides information about the current consumer preferences of the Czech population in drinking wine. Wine consumption has shown stable growth over the last 20 years, as demonstrated by primary research. The research has proven that wine consumption in the Czech Republic shows a faster growth rate than domestic production, which is also reflected in import demand. From the point of view of factors influencing domestic demand for wine, it is mainly the age, education, income and size of the consumer's residence. The research provides an up-to-date view of the structure of wine demand in the Czech Republic and identifies the factors influencing wine demand. The research also makes it possible to predict the future direction of the Czech wine trade.

Keywords: export, import, production, consumption, wine.

1. INTRODUCTION

The Czech Republic is a country with long-term wine production, but also consumption. From 1995 to 2016, wine production increased from 459 (in 1000 hl) to 631 (1000 hl). This production grew at an average annual rate of 4.57% per year. In contrast, wine consumption in the Czech Republic increased from 1995, when its value was 63.7 (1000 hl) to 192 (1000 hl). It is an increase of more than 300%. The average consumption per person in 1995 was 7.6 l of wine, in 2016 it was already 21.3 l/person. The average growth rate of wine consumption was 6.57% per year. For a clear overview, see figure 1.

A similar trend can be observed in Asia, where the share of consumer spending in total household spending is also growing. The largest consumption of wine is currently in France, followed by Italy and Austria. Bentzen and Smith [1] dealt with the situation and problems of wine production in

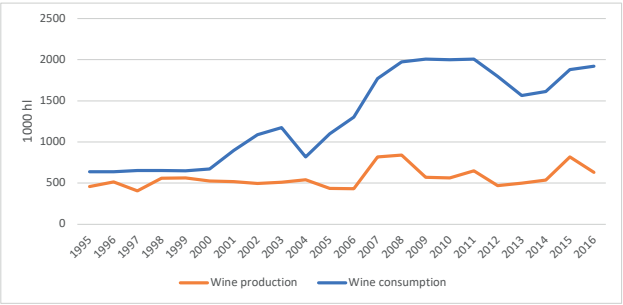

Figure 1. The development of wine production and consumption in the Czech Republic over the period 1995-2016 (Source: own processing based on MZCR data).

countries with low wine production, especially in Denmark, whereas Marquart and Hanf [2] focused on Armenia. Wine production in the Czech Republic is more focused on white wine. The share of white grape varieties in young vineyards in the Czech Republic in 2015–2018 was 92% of the total area of vineyards. Veltlínské zelené, Pálava and Ryzlink rýnský [3] have the largest share in the Czech Republic. The unequivocal market leader is the Bohemia sekt group [4]. Chládková [5] adds sufficient investment in the development and expansion of market share as a key element for maintaining the company's competitive position in the wine market. It should also be noted that the Czech Republic's accession to the European Union significantly affected the wine market in the Czech Republic, which was reflected, among other things, in a slight decline in the market shares of most companies [6]. For example, Butkus et al. [7] dealt with the issue of the impact of the Czech Republic's accession to the European Union on the Czech Republic's foreign trade. They used an econometric model to try to determine the direct effect of the Czech Republic's accession to the EU on the size of foreign trade. However, the analyses carried out provided mixed results regarding EU membership and export growth.

With the accession of the Czech Republic to the European Union, there have been a number of changes in Czech viticulture, the market for Czech consumers now offers a number of foreign wines in various price categories and quality levels. The integration of domestic and foreign wine markets can be expected, which will be reflected in the gradual convergence of wine prices at the global level. Most Czech producers are convinced that their wines will continue to be sufficiently competitive [8]. The development of the wine industry contributes to the overall competitiveness of individual regions of the Czech Republic, as well as the competitiveness of the Czech Republic on global markets [9]. Specific problems of this sector including the development of wine consumption per capita were analysed, for example, by Chládková [10]. Verner [11] analysed the relationship between economic growth, production growth in the sector and quality of life. To understand the functioning of a particular market, in addition to knowledge of secondary data on overall market variables (such as production, consumption, profitability, or foreign trade), it is important to know the factors influencing the behaviour of individual market players. The importance of studies of agricultural commodities in the Czech Republic was emphasized e.g. by Svatoš and Smutka [12].

Wine is one of the commodities with a long history of production and consumption in the Czech Republic. The aim of this text is to evaluate the structure and development of the Czech wine market, foreign trade in wine and to analyse the factors shaping domestic demand for wine. The research provides an up-to-date view of the structure of wine demand in the Czech Republic and identifies the factors influencing wine demand. The research also allows predicting the future direction of the Czech wine trade. This is important for regional development planning, as wine production is significantly more widespread in certain regions than in others (due to climatic conditions).

The aim of the presented text is a comprehensive evaluation of the Czech wine market in terms of wine production, consumption and foreign trade. The following sub-objectives have been set, the fulfilment of which will lead to the fulfilment of the main objective: 1) to evaluate the development and predict production, consumption and foreign trade (exports and imports) in wine in the Czech Republic; 2) to analyse the factors of wine demand among the population of the Czech Republic.

2. MATERIAL AND METHODS

The key source of data for this research are 1) secondary data coming from the official website of the Czech Statistical Office (hereinafter referred to as the CSU) and the Ministry of Agriculture of the Czech Republic (hereinafter referred to as the MZCR); 2) primary data obtained by a questionnaire survey. The data base of secondary data consists mainly of annual data on the development of wine production and consumption in litres, as well as wine exports and imports in litres and average wine consumption per person (in litres/year). In the research of secondary data, both absolute and relative indicators are analysed. Secondary data for analysis are available in a comprehensive version for the

period 1995–2016 (unfortunately, newer data are not yet available).

For the basic evaluation of time series, basic statistical descriptive characteristics were used, which were utilized to describe the year-on-year rates and the absolute deviation and their development between wine production and consumption and wine exports and imports. Methods of trend analysis and regression statistics were used for analysis and prediction. The selection of a suitable trend function was made by using and evaluating interpolation criteria. The function chosen is that which has the smallest possible value of the MSE criterion, meets the conditions of the F-test and has a sufficiently high value of reliability R. The value of MSE is determined using function (1):

$$MSE = \frac{\sum_{t=1}^{T}(-\hat{y}_t)^2}{T} \quad (1)$$

where T is the number of observations, y_t are measured values and $\hat{y}_t$ are expected values. Linear and quadratic curves were used as basic with respect to the development of time series. The following null hypotheses were established:

- *H01: The wine production/consumption in the Czech Republic has no trend (is stationary);*
- *H02: The development of the wine export/import ratio in the Czech Republic has no trend. (is stationary).*

The results of the analysis of time series are further confronted with the results of the questionnaire survey, which was conducted in 2020 and was focused on the evaluation of consumer preferences of the population of the Czech Republic regarding wine consumption. In order to obtain up-to-date consumer information, primary research was carried out to determine the extent, size and structure of the demand for wine. The aim was in particular to identify the factors influencing the size and formation of demand for wine. Quantitative research using a questionnaire technique of data collection was used to obtain primary data. The research was carried out in 2020 in September and October. A total of 946 respondents took part in the questionnaire survey, which represented an 84% return after the elimination of empty or incomplete questionnaires. The gender composition of the respondents was 420 (44.4%) men and 526 (55.6%) women. The age structure of the respondents was divided into groups of 0–20 years, 21–25 years, 26–30 years, 31–40 years, 41–50 years, 51–60 years and 61 and more years. The dominant groups are 0–20 years and 21–25 years, which together make up 86% of all respondents. The structure of respondents' demand was further examined according to the highest level of education attained and the amount of income. Of the total number of respondents, 81.1% of respondents indicated that they would indulge in wine at least occasionally. Absolute and relative frequencies were used in the descriptive statistics and contingency tables and the $\chi 2$ test was used to analyse the obtained data. The contingency table contains the observed frequencies from the questionnaire survey of individual combinations of characters. From the differences (residues) of the observed frequencies and the frequencies obtained from the assumption of the null hypothesis, the total normalized residue is calculated. If its value is less than the critical value of the distribution $\chi 2$ at the significance level of 0.95 for the appropriate degree of freedom, the null hypothesis cannot be rejected at the 95% significance level. Significant variables (according to Chi-square test) were further tested using multinomial and ordinal logistic regression, depending on the type of dependent variable. Logistic regression models were constructed and their quality was evaluated based on Nagelkerke's R squared value. Furthermore, the significance of the regressors was tested using Omnibus Likelihood Ratio Tests. The questionnaire survey focused on the following questions: How often do you drink wine? What wine do you prefer? Where do you most often buy wine? In what price range do you most often buy wine? The answers to these questions were then analysed according to gender, age, education attained, income and size of residence of the respondents. For these purposes, null hypotheses were established and tested.

3. RESULTS

The first phase of the research is focused on evaluating the state of the Czech wine market and the possibilities of predicting further market direction. For these purposes, time series on the production and consumption of wine in the Czech Republic and the values of exports and imports of wine from or to the Czech Republic are analysed. In the next phase, the results of this research are compared with the results of the analysis of primary data from the questionnaire survey.

The following graph (Figure 2) maps the development of wine production and consumption in the Czech Republic for the period 1995–2016.

Wine production shows growth in the period observed, but it also shows relatively high variations. This phenomenon must be attributed to the fact that wine production is conditioned by a number of factors. First of all, it is the area of vineyards, then especially

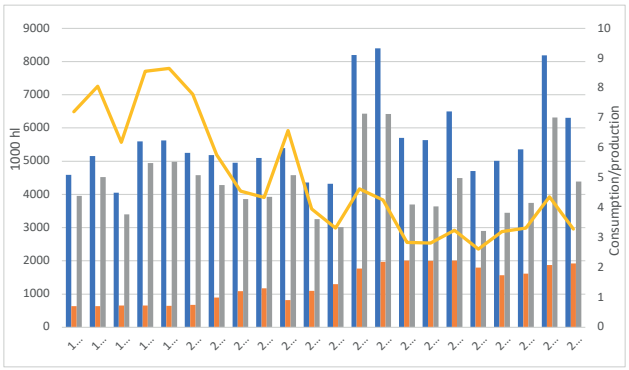

Figure 2. The development of wine production and consumption in the Czech Republic over the period 1995-2016. Blue columns indicate wine production. Orange shows wine consumption. The grey column is wine production minus consumption. The yellow curve shows the ratio of production to consumption (Source: own processing based on MZCR data).

the quality and extent of the harvest in individual years, which is conditioned by the quality of climatic conditions, the number of pests and other factors. In the whole period observed, wine production exceeds consumption, however, the absolute difference between production and consumption decreases over time. This is due to the faster growth rate of wine consumption over production. This effect is clearly evident from the indicator of wine production/consumption where, as the graph above shows, this indicator has been declining for a long time. It is this indicator of the ratio of the amount of production and consumption of wine that expresses the direction of the Czech wine market and was the subject of analysis and prediction. For these purposes, a null hypothesis was established:

- *H01: The ratio of the amount of production and consumption of wine in the Czech Republic has no trend.*

The relationship between wine production and consumption was expressed using a ratio indicator found as the ratio of total wine production in the Czech Republic/total wine consumption in the Czech Republic. As the graph above shows, this indicator has a declining trend, indicating a faster increase in wine consumption compared to production. Subsequently, a regression analysis was performed in order to reveal and describe the function characterizing the development of the share of wine production and consumption. Using the quadratic trend function, it was possible to explain 74.34% of the variability of the dependent variable; the value of the F test, or the P value shows a value of 0.000002, i.e. it satisfies the condition of a result with less than 5% level of significance. The individual parameters of the function are described in the following table (Table 1).

The functional relationship is described by equation (2):

$$y_t = 9{,}1473\text{-}0{,}5587t + 0{,}0131t^2 \quad (2)$$

where y_t is the ratio of wine production and consumption in the Czech Republic in individual years. Using this function, the values for the expected development of production and consumption for the next 4 periods are then simulated. These are shown in the following graph (Figure 3).

The research has shown a relationship between wine production and consumption, which can be described by this function. The development showed a faster growing rate of wine consumption than production, which reduces the difference between production and consumption, and thus also decreases the analysed ratio indicator of wine production/consumption. This is followed by research into whether and how this growing consumption is reflected in the foreign trade of the Czech Republic. For these purposes, time series on the export and import of wines from and to the Czech Republic are analysed. Data in this case are available until 2019. The development of the foreign wine trade is analysed in summary and according to the division into vermouth, sparkling wine and grape wine (still). For these purposes, a null hypothesis was established:

- *H02: The development of the wine export/import ratio in the Czech Republic has no trend.*

The relationship between wine exports and imports was expressed using a ratio indicator found as the ratio of wine exports from the Czech Republic/wine imports to the Czech Republic. The following graph (Figure 4) describes the development of the foreign wine trade.

Table 1. Parameters of the function of the ratio of production and consumption of wine in the Czech Republic.

Reliability value R	SS residues	MSE	F test ("P")	parameter a	parameter b	parameter c
0.74343514	21.93117	0.996871	0.000002	9.147321	-0.55866	0.013096

Source: own processing.

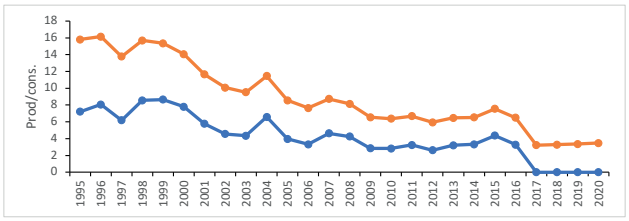

Figure 3. Prediction of the development of wine production/consumption in the Czech Republic. The orange curve shows an estimate. The blue curve represents production and consumption (Source: own processing).

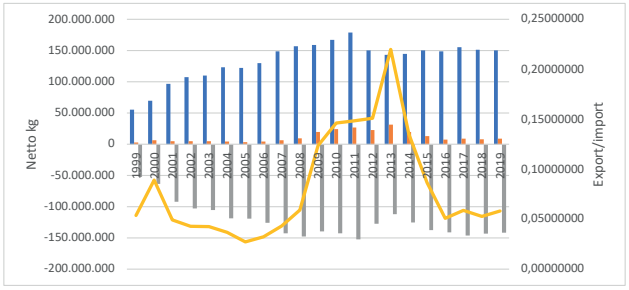

Figure 4. The Czech Republic's foreign wine trade. The blue column indicates import. Orange indicates export. Gray shows net exports. The yellow curve represents the export/import (Source: own processing based on CSU data).

Figure 4 shows the growth of wine imports, which corresponds to the growing demand, or wine consumption. The import of wine in 2019 increased almost threefold compared to 1999, i.e. approximately the same as the consumption of wine in the Czech Republic. Tomšík [13, 14] adds that the largest volumes of wine are imported from Italy and Hungary. The export of wine then goes mainly to Slovakia and Poland. In the case of Slovakia, the export of wine from the Slovak Republic is directed, among other destinations, to the Czech Republic [15].

Subsequently, a regression analysis was performed in order to reveal and describe the function characterizing the development of the share of wine exports and imports. In the case of total exports and imports, it is not possible to describe the development of the share of exports and imports of wine using a suitable function

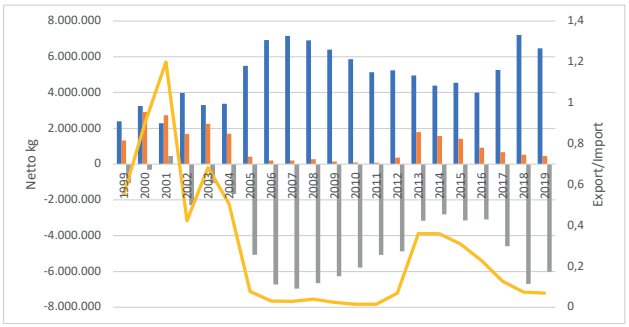

Figure 5. The Czech Republic's foreign trade in vermouth. The blue column indicates import. Orange indicates export. Gray shows net exports The yellow curve shows exports/imports (Source: own processing based on CSU data).

and it must be stated that there is no statistically significant relationship describing the development of exports and imports of wine. A more detailed analysis according to the type of wine has already been able to describe a statistically significant relationship, broken down into foreign trade in vermouth, sparkling wine and grape wine (still). The development of foreign trade in vermouth is shown in the following graph (Figure 5). During the period observed, imports of vermouth increased by 2.7 times the value of 1999, while exports fell to about one third.

Using the quadratic trend function, it was possible to explain 55.90% of the variability of the dependent variable of the ratio of exports and imports, yet the model shows statistical significance; the value of the F test, or the P value shows a value of 0.0006, thus satisfying the condition of a result with less than a 5% level of significance. The individual parameters of the function are described in the following table (Table 2).

The functional relationship is described by equation (3):

$$y_t = 1{,}0097 - 0{,}1294t + 0{,}0045t^2 \quad (3)$$

where y_t is the ratio of vermouth export and import over time. Using this function, the values for the expected development of foreign trade in vermouth for the following period are then simulated. These are shown in the following graph (Figure 6).

Table 2. Parameters of the function of the ratio of export and import with vermouth.

Reliability value R	SS residues	MSE	F test ("P")	parameter a	parameter b	parameter c
0.559041	0.943614	0.044934	0.00063	1.009714	-0.12944609	0.00446645

Source: own processing.

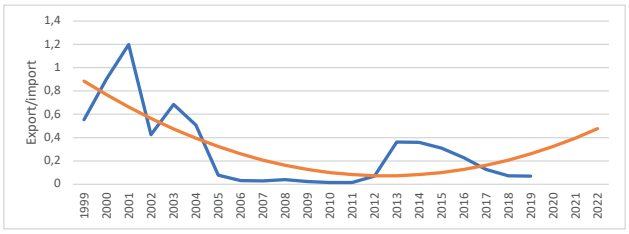

Figure 6. Predicting the development of foreign trade in vermouth. The blue curve indicates export/import and the orange estimate (Source: own processing).

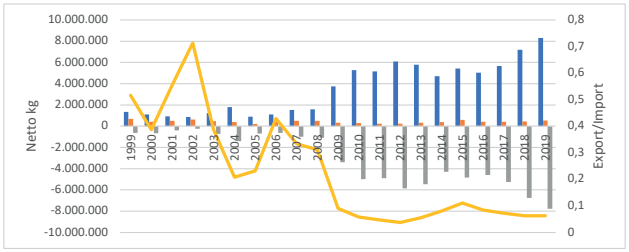

Figure 7. The Czech Republic's foreign trade in sparkling wine. The blue column indicates import. Orange indicates export. Gray shows net exports. The yellow curve represents the export/import (Source: own processing based on CSU data).

In the case of sparkling wine, there was an even greater increase in imports. Compared to 1999, the import of sparkling wine increased more than 6-fold by 2019, while exports, similarly to vermouth, decreased in the period observed (Figure 7).

Using the quadratic trend function, it was possible to explain 73.88% of the variability of the dependent variable of the ratio of exports and imports, yet the model shows statistical significance; the value of the F test, or the P value shows a value of 0.00001, thus satisfying the condition of a result with less than a 5% level of significance. The individual parameters of the function are described in the following table (Table 3).

The functional relationship is described by equation (4):

$$y_t = 0{,}6465 - 0{,}0584t + 0{,}0014t^2 \quad (4)$$

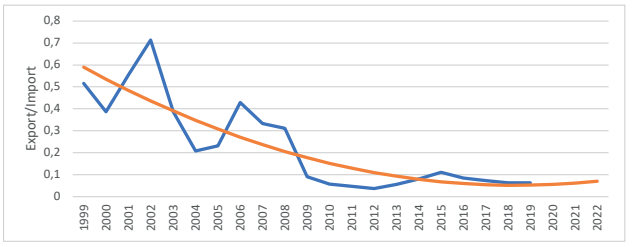

Figure 8. Predicting the development of foreign trade in sparkling wine. The orange curve shows an estimate. The blue curve represents production and consumption (Source: own processing).

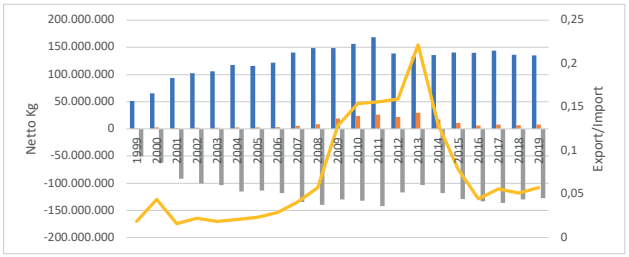

Figure 9. The Czech Republic's foreign trade in grape wine – still. The blue column indicates import. Orange indicates export. Gray shows net exports. The yellow curve represents the export/import (Source: own processing based on CSU data).

where y_t is the ratio of export to import of sparkling wine over time. Using this function, the values for the expected development of foreign trade in sparkling wine for the following period are simulated. These are shown in the following graph (Figure 8).

Unlike vermouth and sparkling wine, still grape wine showed significant growth on the export side during the period observed. Compared to 1999, wine exports in 2019 reached more than 8 times the value in 1999. At the same time, imports in this case increased "only" 2.7 times over the period observed (Figure 9).

The development of the foreign trade relationship, or the mutual ratio of exports and imports is more complicated in this case. The quadratic trend function was able to explain 42.33% of the variability of the dependent variable, yet the model shows statistical significance. The individual parameters of the function are described in the following table (Table 4).

Table 3. Parameters of the function of the ratio of export and import with vermouth.

Reliability value R	SS residues	MSE	F test ("P")	parameter a	parameter b	parameter c
0.738835	0.213037	0.010145	0.00001	0.646529	-0.05843594	0.00143415

Source: own processing.

Table 4. Parameters of the function of the ratio of export and import with still wine from grapes.

Reliability value R	SS residues	MSE	F test ("P")	parameter a	parameter b	parameter c
0.423322	0.041582	0.00198	0.007053	-0.04624	0.02292227	-0.0008445

Source: own processing.

The functional relationship is described by equation (5):

$$y_t = -0{,}0462 + 0{,}0229t - 0{,}0008^{*}t^2 \quad (5)$$

where y_t is the ratio of export to import of still wine over time. Using this function, the values for the expected development of foreign trade in still wine for the following period are simulated. These are shown in the following graph (Figure 10).

The conclusions from the first phase of the research are as follows: Although the volume of wine production in the Czech Republic outweighs its consumption, in the long run and in the whole period observed there is a faster growth rate of wine consumption than production. Thus, the ratio indicator of production/consumption decreases; this phenomenon proved to be statistically significant. The growing consumption of wine was also evidenced by the growing demand for wine imports, which also showed a total of about 3-fold growth between 1999 and 2019 (i.e., approximately the same growth as the growth of total wine consumption in the Czech Republic in the given period). Imports of sparkling wine are growing the fastest (6 times the imports between 1999 and 2019), vermouth and still wine from grapes show an increase of 2.7 times over the period observed from 1999. In terms of volume, however, the largest item is the import of still wine. In the case of still wine from grapes, it was the only item mentioned for which exports increased, particularly by 8 times compared to 1999. The trends observed in exports and imports for individual wines proved to be statistically significant in all cases.

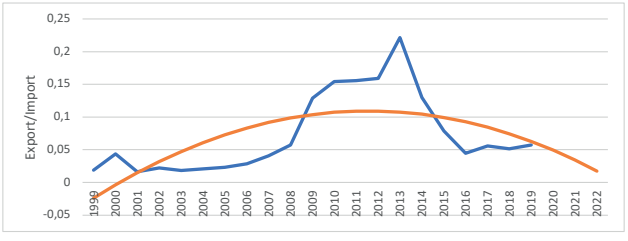

Figure 10. Predicting the development of foreign trade in still wine. The orange curve shows an estimate. The blue curve represents production and consumption (Source: own processing).

The second part of the research is based on the evaluation of primary data obtained from a questionnaire survey. The aim of this research was mainly to test the results of previous research resulting from the analysis of secondary data. Given the findings of growing wine consumption, respondents were first asked if they drank wine and how often. Respondents chose from the answers: daily, every other day, once a week, once a month and exceptionally. The highest frequency was recorded in the answer "exceptionally" (383 answers) and "once a week" (263 answers), the lowest frequency, on the other hand, was recorded in the answer "daily" (10 answers). Furthermore, factors that may affect the intensity of wine drinking were analysed, namely gender, age, education, income and size of residence of the respondents. In this context, the following null hypothesis was established:

- *H03: The gender, age, education, income and size of residence do not significantly predict the frequency of wine drinking.*

Multinomial and ordinal logistic regression were used to evaluate the statistical hypothesis. First, initial preparation for the use of logistic regressions was performed. A separate table of results is created for each dependent variable to determine the relationship between the dependent and independent variables. The dependencies were examined using Chi-square test. The significant variables were then entered into an ordinal logistic regression model.

The results of the first hypothesis testing by the chi-square test are shown in the following Table 5.

Table 5. The results of Chi-square test of the question "How often do you drink wine?".

Criterion	χ2	Critical value	Result
gender	32.6112	9.487729	rejected
age	16.38039	15.50731	rejected
education	25.39251	9.487729	rejected
income	19.84832	21.02607	not rejected
size of residence	23.76653	26.29623	not rejected

Source: own processing.

The research has shown that there is a relationship between gender and the frequency of wine drinking.

Based on the results of the Chi-square test, an Ordinal Logistic Regression model was created. The reference category was the last and most numerous category "exceptionally". Only variables that were statistically significant according to the Chi-square test were included in the model.

The results of the ordinal logistic regression are shown in the following Table 6.

Based on the result of the Likelihood Ratio test, we accept the alternative hypothesis, i.e. at least one predictor is statistically significant at the 5 % significance level. Nagelkerk's pseudo R^2 of 0.02 indicates a very small effect of the predictors on the explanatory variable.

Table 7 summarizes the impact of each predictor. It is clear from the table that at the standard 5 % significance level, the variables education and gender are influential in the model.

The answers are in line with the findings of Chládková et al. [16], who showed in her research based on direct questioning of 1,000 respondents from all over the Czech Republic that 11.3% of respondents drink wine several times a week, 29.8% of respondents drink wine at least once a week and 23.32% of respondents drink wine several times a month. She also noted that only 2.7% of respondents do not drink wine at all. Kelley et al. [17] also concluded that wine is drunk more by women, but argues that the frequency of consumption is higher in men than in women. An interesting feature of his research is also the research on the importance of the relationship between information about the pairing of food and wine on the labels of bottles and demand, or consumption of wine. As a result, consumers who buy wine at least once a week were positively affected by this information, and this effect decreased with the frequency of purchase.

The second research question was: "What wine do you prefer? White, rosé or red?" White wine had the highest frequency of responses (664 responses), rosé had the lowest frequency of responses (187). Subsequently, null hypothesis was established:

- *H04: The gender, age, education, income and size of residence do not significantly predict the wine type preference (White, rosé or red).*

The results of the chi-square test are shown in the following Table 8.

The research has shown that there is a relationship between wine type selection and gender, age, education and income. The relationship between the size of residence and wine type selection was not confirmed.

Based on the Chi-square test results, a Multinomial Logistic Regression model was created. The reference category was the most numerous category – white wine and only variables that have a significant effect on the dependent variable according to the Chi-square test were included in the model.

The results of the multinomial logistic regression are shown in the following table Table 9.

Based on the result of the Likelihood Ratio test, we accept the alternative hypothesis, i.e. at least one predictor is statistically significant at the 5 % significance level.

Table 6. The results of the Ordinal logistic Regression of the question "How often do you drink wine?".

Model	R^2_N	χ^2	df	p
1	0.02	47.33	8	<.0001

Source: own processing.

Table 7. Omnibus Likelihood Ratio Tests of the question "How often do you drink wine?".

Predictor	χ^2	df	p
gender	15.05	1	0.0001
age	8.72	6	0.1897
education	11.09	1	0.0009

Source: own processing.

Table 8. The results of the chi-square test of the question "Which wine do you prefer?".

Criterion	χ2	Critical value	Result
gender	15.35246	5.991465	rejected
age	29.48014	18.30704	rejected
education	6.094705	5.991465	rejected
income	20.56061	15.50731	rejected
size of residence	14.64243	15.50731	not rejected

Source: own processing.

Table 9. The results of the multinomial Logistic Regression of the question "Which wine do you prefer?".

Model	R^2_N	χ^2	df	p
2	0.05	62.57	24	<.0001

Source: own processing.

Nagelkerk's pseudo R^2 of 0.05 indicates a small effect on the explanatory variable.

Table 10 summarizes the effect of each predictor on different categories of the dependent variable. It is clear from the table that at the standard 5 % significance level, only the variables age and gender have a significant effect in the model. For the other variables we see statistically inconclusive effects.

In connection with wine type selection, respondents were also asked about the preference for dry, sweet or semi-sweet wine. Most respondents indicated a preference for semi-sweet wine (452 responses), the least respondents indicated dry wine (293 responses).

Tested null hypothesis:

- H05: The gender, age, education, income and size of residence do not significantly predict the wine type preference (Dry, semi-sweet and sweet).

The results of the chi-square test are shown in the following table (Table 11).

The research showed the existence of a relationship between the preference of the wine type and the education and income of the respondents.

Based on the results of the Chi-square test, a Multinomial Logistic Regression model was again created. The reference category was the most numerous category – semi-sweet wine and only the variables education and income, which are statistically significant according to the Chi-square test, were included in the model.

The results of the multinomial logistic regression are shown in the following Table 12.

Based on the result of the Likelihood Ratio test, we accept the alternative hypothesis, i.e. at least one predictor is statistically significant at the 5 % significance level. Nagelkerk's pseudo R^2 of 0.04 indicates a very small effect of the predictors on the explanatory variable.

Table 13 summarizes the impact of each predictor on different categories of the dependent variable. The table shows that at the standard 5 % significance level, both variables have a significant effect in the model.

The next research question tested was where people buy wine most often. In this question, respondents chose a supermarket, a wine shop, directly from a wine-maker or from fair-trade stores. As expected, the most frequent answer was a supermarket, followed by a wine shop. The lowest frequency of responses was for fair-trade stores. Subsequently, null hypothesis was established:

- H06: The gender, age, education, income and size of residence do not significantly predict the place of purchase of wine.

The results of the chi-square test are shown in the following table (Table 14).

The research has shown a relationship between the place of purchase of wine and age and the size of residence. In her research, Chládková et al. [16] also showed the highest proportion of supermarkets as places of sale of wine (45.2% of respondents buy wine in supermarkets and 23.8% in wine shops).

Based on the results of the Chi-square test, a Multinomial Logistic Regression model was again created. The

Table 10. Omnibus Likelihood Ratio Tests of the question "Which wine do you prefer?"

Predictor	χ^2	df	p
age	23.15	12	0.0265
education	2.55	2	0.2801
gender	11.76	2	0.0028
Income	14.82	8	0.0628

Source: own processing.

Table 11. The results of the chi-square test of the question "Which wine do you prefer?".

Criterion	$\chi 2$	Critical value	Result
gender	0.808905	5.991465	not rejected
age	6.010452	9.487729	not rejected
education	20.22551	5.991465	rejected
income	27.54793	15.50731	rejected
size of residence	5.039119	15.50731	not rejected

Source: own processing.

Table 12. The results of the multinomial Logistic Regression of the question "Which wine do you prefer?"

Model	R^2_N	χ^2	df	p
3	0.03	41.67	10	< .0001

Source: own processing.

Table 13. Omnibus Likelihood Ratio Tests of the question "Which wine do you prefer?"

Predictor	χ^2	df	p
education	12.57	2	0.0019
income	21.28	8	0.0064

Source: own processing.

reference category was the largest category – supermarket shopping and only the variables age and size of the municipality, which are statistically significant according to the Chi-square test, were included in the model.

The results of the multinomial logistic regression are presented in the following Table 15.

Based on the result of the Likelihood Ratio test, we accept the alternative hypothesis, i.e. at least one predictor is statistically significant at the 5 % significance level. However, it should be noted that this significance level is very marginal. A Nagelkerk pseudo R^2 of 0.02 indicates a very small effect of the predictors on the explanatory variable.

Table 16 summarizes the impact of each predictor on different categories of the dependent variable. It is clear from the table that at the standard 5 % significance level, only municipality size has an effect on the dependent variable.

The last question tested is the price range of purchased wines. Respondents chose from the following price categories: up to CZK 70, CZK 70–100, CZK 100–150 and over CZK 150. From the point of view of absolute frequencies, people buy wine the most in the price category CZK 100–150, the least in the category up to CZK 70. Tested hypothesis:

- *H07: The gender, age, education, income and size of residence do not significantly predict the choice of price category when buying wine.*

The results of the chi-square test are shown in the following table (Table 17).

The research has shown the existence of a relationship between the price range of wine and gender, age, income and size of residence.

Based on the Chi-square test results, an Ordinal Logistic Regression model was created. The reference category was the last category – over CZK 150. All explanatory variables were included in the model except education, which is statistically insignificant according to the Chi-square test.

The results of the ordinal logistic regression are shown in the following Table 18.

Table 14. The results of the chi-square test of the question "Where do you buy wine most often?".

Criterion	χ2	Critical value	Result
gender	0.990744	5.991465	not rejected
age	21.45865	18.30704	rejected
education	0.612048	5.991465	not rejected
income	7.424061	9.487729	not rejected
size of residence	16.73919	15.50731	rejected

Source: own processing.

Table 15. The results of the multinomial Logistic Regression of the question "Where do you buy wine most often?".

Model	R^2_N	χ^2	df	p
4	0.02	31.79	20	0.0456

Source: own processing.

Table 16. Omnibus Likelihood Ratio Tests of the question "Which wine do you prefer?"

Predictor	χ^2	df	p
size of residence	17.66	8	0.0239
age	13.00	12	0.3689

Source: own processing.

Table 17. The results of the chi-square test of the question "In what price range do you most often buy wine?".

Criterion	χ2	Critical value	Result
gender	17.41022	7.814728	rejected
age	67.97642	12.59159	rejected
education	3.231538	7.814728	not rejected
income	36.23751	15.50731	rejected
size of residence	137.8922	21.02607	rejected

Source: own processing.

Table 18. The results of the ordinal logistic regression of the question "In what price range do you most often buy wine?".

Model	R^2_N	χ^2	df	p
5	0.02	36.69	15	0.0014

Source: own processing.

Table 19. Omnibus Likelihood Ratio Tests of the question "In what price range do you most often buy wine?".

Predictor	χ^2	df	p
Age	9.9	6	0.1288
Size of residence	3.63	4	0.4588
Gender	0.2	1	0.6566
Income	25.21	4	<.0001

Source: own processing.

Based on the result of the Likelihood Ratio test, we accept the alternative hypothesis, i.e. at least one predictor is statistically significant at the 5 % significance level. Nagelkerk's pseudo R^2 of 0.02 indicates a very small effect of the predictors on the explanatory variable.

Table 19 summarises the impact of the individual predictors. The table shows that at the standard 5% significance level, only income has an effect on the dependent variable.

4. DISCUSSION

Wine is one of the most frequently consumed alcoholic beverages in the Czech Republic. There can be several motivations for wine consumption; Anchor and Lacinova [18] points out that one of the strong motives for wine consumption is social respect, which occurs especially in the young generation. However, it is possible to go even further, and Oyinsey's et al. [19] article, for example, is suggestive, as it takes into account a multidimensional experiential framework that seeks to uncover the dimensions that shape the experience of wine consumption. Over the last 20 years, the Czech Republic has shown significant and sustained growth in consumption, which is faster than growth in wine production. However, domestic production still exceeds wine consumption. The growing consumption of wine is also reflected in the growing demand for wine imports. However, this is not just a matter for the Czech Republic, but as Bonn [20] shows, as awareness grows, so too does demand, globally [21]. The growing consumption of wine is also reflected in the growing demand for wine imports. From the point of view of the structure of the foreign wine trade, imports of sparkling wine are growing the fastest, but the largest item of foreign trade is the import of still wine. Straková [22] adds that with the growing frequency of wine drinking, the consumption of Moravian and Czech wines prevails over foreign ones.

Knowledge of the consumption and purchase motives of citizens of the Czech Republic, especially the young generation, is especially important for understanding the Czech wine market, as these people are the current and future consumers of wine [23]. The research has shown the following conclusions: the frequency of wine drinking depends on gender, age and education. Here it can be further noted that gender not only affects consumption, but also preferences and customer satisfaction, for example Mitchell and Walsh [24], Atkin et al. [25]. The same is also true in the case of age- in addition to consumption, it has an impact on both of the above, for example Thach and Olsen [26] or Olsen et al. [27]. There is a relatively higher frequency of wine drinking among women than men, wine consumption increases with age and there is higher wine consumption among people with lower education. In the case of testing wine type preferences, dependence on gender, age, education and income was confirmed. Consumption is clearly dominated by the consumption of white wine. White wine is clearly preferred more by women, it also dominates across all age categories. Consumption of white wine also increases with increasing education and decreases with increasing age. On the fact that age can play an important role in preferences, for example, the article by Hammond et al. [28] which states age is important in wine consumption, but also in wine preferences, on consumption behavior. Consumption of semi-sweet wines clearly dominates in the decision-making on wine consumption in relation to the sugar content in wine. The dependence of the consumption of individual types of wine on education and income was proven. With increasing education, the consumption of sweet wines decreases and consumer preferences are shifting in favour of dry wines. Consumption of dry wines also increases with income, whereas consumption of sweet wines decreases with increasing income. In terms of the place of purchase of wines, supermarkets clearly dominate. The research has shown a relationship between the choice of place to buy wines and age and the size of residence. With age, the amount of purchases from the wine-maker increases and the number of purchases in supermarkets decreases. Němcová and Stankova [29] confirms that the most common places of purchase for generation Y are supermarkets and wine shops. From the point of view of the price category of wines, the consumption of wines in the price range of CZK 100–150 dominates the most. The results confirm, among other things, the research of Chládková et al. [3], who identified the most important factors influencing wine consumption in the form of consumer disposable income, product price and the existence of available substitutes (she considered beer in particular). Here, however, is the limit of this article, as it does not distinguish between the price a consumer would prefer when buying wine for themselves and when buying wine as a gift. As Cholette and Castaldi [30] point out, the price when buying wine as a gift tends to be higher. As Yu et al. [31] finds, this difference can be as much as ten times greater.

If we compare the results of the presented research with the findings of the research carried out in Italy, we observe certain differences. Consumer preferences when buying wine in Italy using the "best-worst" scaling method have shown that direct, especially sensory experiences of consumers are key when choosing wine

in retail stores. The local statistical analysis showed that the age of consumers plays a role in the selection of wine in retail stores, the geographical location has not been proven [32]. Gil and Sánchez [33] analysed the factors shaping demand in Spain, especially between two different regions, Aragon and Navarre, using a weighted least squares approach. The research focused on three attributes, namely the price, origin and vintage of the grapes. Surprisingly, the presented results (at least in comparison with the results of research from the Czech Republic) showed that the most important attribute of wine purchase is its origin, followed by the vintage.

5. CONCLUSIONS

Although the Czech Republic is described as a beer country, the popularity of wine and its consumption shows clear and long-term stable growth. We also observed a positive development in the production of vines, which has a long tradition in the Czech Republic. The question of the future direction of the Czech wine market is promising and further development of the market in terms of production of domestic wine-makers as well as overall consumption and growth of competition can be expected. Related to this is the need for wine producers to submit more to the wishes of demand (customer orientation) and thus the need to know the demand, its structure, preferences, expectations and factors that affect it becomes more important.

ACKNOWLEDGMENT

This work was supported by the Faculty of Economics and Management, Czech University of Life Sciences in Prague under Grant "The impact of climate change on the economic performance of the viticulture and wine-making sector in the Czech Republic" number 2020B0002."

REFERENCES

[1] Bentzen, J., Smith, W. (2009): Wine Production in Denmark: Do the Characteristics of the Vineyards Affect the Chances for Awards? Available at http://www.vdqs. net/search/chrono.asp?refer=recherche (accessed September 2020).

[2] Marquardt, V., Hanf, J.H. (2012): Assessment of foreing influence on the Armenian wine business. Enometrica **5**, 27–44.

[3] Chládková, H., Gurská, S., Tomšík, P. (2009) The development of main factors of the wine demand. Agric. Econ. – Czech. **55**(7), 321-326.

[4] Kučerová, R., Žufan, P. (2008) Market position of selected competitors of the Czech wine market. Agric. Econ. – Czech. **54**(7), 343-346.

[5] Chládková, H. (2007): The competitive strength factors of the company. Agricultural Economics – Czech **53**(7), 312–317.

[6] Pyšný, T., Pošvář, Z., Gurská, S. (2007): Analysis of selected demand factors of wine market of the Czech Republic. Agricultural Economics – Czech **53**(7), 304–311.

[7] Butkus, M., Cibulskiene, D., Maciulyte-Sniukiene, A., & Matuzeviciute, K. (2018). What is the evolution of convergence in the EU? Decomposing EU disparities up to NUTS 3 level. Sustainability, **10**(5), 1552.

[8] Škorpíková, A. (2003): Podnikání na trhu vína v ČR – případová studie. PEF MZLU, Brno. http//www.eu.cz

[9] Melecký, L., Staničková, M. (2011): Hodnoceni konkurenceschopnosti regionů Česke republiky v kontextu Lisabonske strategie. (Evaluation of the Czech Republic regions competitivenes in the context of the Lisbon strategy.) Ekonomicka revue – Central European Review of Economic Issues **14**, 183–200.

[10] Chládková, H., Gurská, S., Tomšík, P. (2011): Wine Environment in the Czech Republic. Available at http://www.vdqs.net/search/chrono.asp?refer=recherche (accessed September 2020).

[11] Verner, T. (2011): Ekonomicky růst, konkurenceschopnost a kvalita života. (Economic growth, competitiveness and quality of life.) Ekonomicka revue – Central European Review of Economic Issues **14**, 157–166.

[12] Svatoš, M., Smutka, L. (2012): Development of agricultural trade and competitiveness of the commodity structures of individual countries of the Visegrad Group. Agricultural Economics – Czech **58**, 222–238.

[13] Tomšík, P., Prokeš, M. (2011) New strategic alliances of wine producers in the Czech Republic. AGRIC. ECON. – CZECH. **57**(12), 573–579.

[14] Tomšík, P., Sedlo, J. (2013) Management of wine production with regard to its implementation into the wine markets of the Czech Republic. AGRIC. ECON. – CZECH. **59**(5), 202-210.

[15] Hambalková, M. (2006) The factors of competitiveness and the quantification of their impact on the export efficiency of grape and wine in the Slovak Republic. Agric. Econ. – Czech. **52**(8), 389-394.

[16] Chládková, H., Pošvář, Z., Žufan, P. (2004) Consumer habits in the Czech wine market. Agric. Econ. – Czech. **50**(7), 323-330.

[17] Kelley, K., Hyde, J. and Bruwer, J. (2015) U.S. wine consumer preferences for bottle characteristics, back label extrinsic cues and wine composition: A conjoint analysis, Asia Pacific Journal of Marketing and Logistics **27**(4), 516-534. https://doi.org/10.1108/APJML-09-2014-0140

[18] Anchor, R. J., Lacinová, T. (2015) Czech wine consumers: maturing with age. Ekonomie a Management. **18**(1), 169-182. DOI: 10.15240/tul/001/2015-1-013.

[19] Oyinseye, P., Suárez, A., Saldaña, E., Fernández-Zurbano, P., Valentin, D., & Sáenz-Navajas, M. P. (2022). Multidimensional representation of wine drinking experience: Effects of the level of consumers' expertise and involvement. Food Quality and Preference, 98, https://doi.org/104536. 10.1016/j.foodqual.2022.104536

[20] Bonn, M. A., Cho, M., & Um, H. (2018). The evolution of wine research: A 26 year historical examination of topics, trends and future direction. International Journal of Contemporary Hospitality Management.

[21] Bruwer, J., & McCutcheon, E. (2017). Marketing implications from a behaviourism perspective of consumption dynamics and socio-demographics of wine consumers. Asia Pacific Journal of Marketing and Logistics.

[22] Straková, A. (2017). Výroční zpráva Vinařského fondu za rok 2016. Brno: Vinařský fond. Retrieved from http://vinarskyfond.cz/wpcontent/uploads/2017/05/VZ-Vinarsky-fond-2016-web.pdf.

[23] VinIntell. (2013). Future Scenarios for the South African Wine Industry: Part 5 – Generation Y: the new market colossus. SAWIS. Retrieved from http://www.sawis.co.za/info/download/VinIntell_June_2013_part_5_issue_16.pdf.

[24] Mitchell, V. W., & Walsh, G. (2004). Gender differences in German consumer decision-making styles. Journal of Consumer Behaviour: An International Research Review, 3(4), 331-346.

[25] Atkin, T., Nowak, L., & Garcia, R. (2007). Women wine consumers: information search and retailing implications. International Journal of Wine Business Research.

[26] Thach, E. C., & Olsen, J. E. (2006). Market segment analysis to target young adult wine drinkers. Agribusiness: An International Journal, 22(3), 307-322.

[27] Olsen, J. E., Thach And, L., & Nowak, L. (2007). Wine for my generation: exploring how US wine consumers are socialized to wine. Journal of Wine Research, 18(1), 1-18.

[28] Hammond, R., Velikova, N., & Dodd, T. H. (2013). Information sources used by millennial restaurant wine consumers. Journal of Foodservice Business Research, 16(5), 468-485.

[29] Němcová, J., Staňková, P. (2019). Factors influencing consumer behaviour of generation Y on the Czech wine market. Ekonomie a Management **22**(4), 145-161. DOI: 10.15240/tul/001/2019-4-010.

[31] Cholette, S., & Castaldi, R. (2005). Analyzing the US retail wine market using price and consumer segmentation models (referred). San Francisco University (24). Recuperado de http://academyofwinebusiness.com/wpcontent/uploads/2010/05/AnalyzingUSRetail. pdf.

[32] Yu, Y., Sun, H., Goodman, S., Chen, S., & Ma, H. (2009). Chinese choices: a survey of wine consumers in Beijing. International Journal of Wine Business Research.

[32] Gil, J.M. and Sánchez, M. (1997), "Consumer preferences for wine attributes: a conjoint approach", British Food Journal **99**(1), 3-11. https://doi.org/10.1108/00070709710158825