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Characteristics of the wine industry in Poland and in the world - analysis based on a selected entity in the supply chain

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Abstract: This paper presents the wine industry, taking into account the analysis of the wine market in Poland and in the world. The characterization of the industry was carried out taking into account the perspective of producers as an important link in the supply chain. The aim of the article is to describe and analyze the situation of the wine industry in Poland and in the world, together with the presentation of possible development directions for a selected entity in the supply chain. The analysis of production trends occurring in the wine industry was used to make the inference, taking into account additional non-numerical factors affecting the existing numerical data. The main conclusion resulting from the analyzes carried out is the identification of various trends in wine production depending on the geographical area, which results in the necessity to apply different competitiveness strategies operating in these areas of the supply chain entities.

Keywords: wine market; polish wine market; wine production; wine supply chain; trends in wine industry; trend analysis

1 Introduction

Wine is the oldest alcoholic drink known to mankind. The grapevine that occurs naturally in the Mediterranean basin and Asia Minor, along with the colonization and settlement of people on new lands, has been spread and is cultivated almost all over the world. Due to the fact that wine produced in different regions of the world has unique organoleptic characteristics, a need has arisen to consume wine from a region other than that of the consumer's residence. This need made it necessary to create increasingly complex and complex supply chains with many links (Garcia et al. 2012). An extremely important link in the entire supply chain is the link that

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supplies the finished product, wine. Without wine producers, there would be no product, and therefore no world wine market (Hornsey, 2007, Varriano, 2010).

In the wine market, as in any other market, various types of trends, both consumption and production, are common. Consumption of low- or non-alcoholic beverages is gradually increasing, necessitating producers to take appropriate steps to adapt the product to consumer needs.The marketing of experience is also noticeable (Bouszewicz-Kreft, 2006), which in the wine industry manifests itself in the form of enotourism - visiting a vineyard, learning about its history and people working in it, and tasting wines produced in a given vineyard. An important trend in the wine industry is the ecological trend. Due to the increasing environmental awareness of both consumers and producers, more and more attention is being paid to the ecological aspects, reduction of the carbon footprint and sustainable production techniques in the production process and throughout the entire supply chain.

With the warming of the climate and the possibility of growing grapes in countries that were previously considered too cold for cultivation, the wine market is enriched with new wines, and countries where grape growing and wine production were considered a hobby are becoming wine countries. An example of such a country in which global warming allows for the cultivation of grapes on a larger scale is Poland, which in the 2020/2021 economic year obtained the status of a wine country due to exceeding the limit of 500 ha of grapevine cultivation. The new, emerging wine countries represent an extremely interesting aspect in the context of the development of the entire wine market and the creation of new wines.

Grape-growing and wine-producing on almost every continent in the world are clearly concentrated in a few centers. Due to the significant influence of climatic conditions on the crops, it is extremely difficult to make accurate forecasts of the yield and the final wine production. The inability to make accurate forecasts makes it almost impossible to perfectly match the volume of world wine production with its consumption. The aim of this article is to investigate the world wine market in terms of quantity regarding production trends and confirm the existence of wine overproduction, as well as to identify non-quantitative aspects affecting wine production.

2 Literature review

There are many trends in the world wine market, both in terms of consumption and production. Wine producers have to adapt their offer to all customer needs. Knowledge of the local and world market plays a key role in the wine production planning process. Knowledge of the volume of wine consumed in the home country, the willingness of foreign customers to import wine from a specific location,

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consumer preferences regarding the country of origin of the wine, or the price range of wines purchased in the home country allow the planner to plan a marketing and pricing strategy (Popescu, 2019).When analyzing trends, it is also important to know the region under analysis, as the habits and behavior of consumers differ not only between distant regions of the world, but also between neighboring countries. Therefore, it is important to analyze the market of individual countries in order to obtain such basic information as the type of wine preferred by consumers or the region from which wines are most often imported, as well as the ratio of wine import to export (Stoian et al. 2013, Ma, 2017).

In addition to trends, wine producers and grape growers must take into account climate and weather conditions and their variability in the production process. The weather and the climate in which the grapes are grown influence many factors regarding the quality characteristics of a wine. Therefore, it is important for wine producers to be aware of the importance of advancing climate change on the global wine market (Ashenfelter – Storchmann, 2014).

Consumers of developed countries, especially in the European Union and the USA, show greater concern and awareness of their own health. They also believe that wine consumed in adequate amounts is a healthy product (Vecchio et al. 2017, Paschall – Lipton, 2004). This is a manifestation of the trend of taking care of your own health.

A similar phenomenon is the desire to consume alcoholic beverages with a lower alcohol content or alcohol-free, the so-called non-alcoholic beers or wines, which should taste the same as their alcoholic counterparts, but without the negative effects of alcohol on the body. The desire to consume low-alcohol equivalents of proper wine is growing in popularity, especially among young consumers in developed countries (Bucher et al. 2018, Castellini – Samoggia, 2018). It is worth noting that low-alcohol wines are more appreciated by consumers who are less knowledgeable about wine, and consumers are not very well informed about the differences in naming and distinguishing between low-alcohol and low-alcohol drinks (Saliba et al. 2013, Meillon et al. al. 2013). Additionally, among some consumers, a reduced alcohol content in wine may result in an aversion to purchasing a given product (Stasi et al. 2014).

In times of advancing climate change, consumers and producers pay more and more attention to the sustainable production of their products and the ecological aspects of their operations (Rabadán – Bernabéu, 2021). The use of appropriate, organic production and distribution methods allows to significantly reduce the carbon footprint of the product and the impact of production on the climate (Niccolucci et al. 2008). However, the multitude of labels regarding various solutions and ecological standards used by producers confuses customers and can potentially cause them negative emotions related to a given terminology (Bhaskaran et al. 2006).

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Enotourism is a good way to gain new customers and introduce them to a given wine. Enotourism, or wine tourism, consists of visiting vineyards and wineries, talking to the hosts and tasting the wine produced in a given place. It is an important element of tourism, especially in wine regions. Thanks to enotourism, individual regions are more attractive to visitors, and wine producers have the opportunity to gain new customers and keep them for longer thanks to experience marketing (Alant – Bruwer, 2004, Hall – Mitchell, 2000). Enotourism is also extremely important for new wine regions and places that were already associated with wine but were not particularly visited by enotourists (Bramble et al. 2007, López-Guzmán et al. 2009).

An interesting subject in the analysis of wine trends are countries where the wine drinking culture is not widespread and deeply rooted, as well as new wine countries. A country that meets both of these criteria is Poland, which only became a wine country in 2021, and wine in Poland is not the most consumed drink. The conducted research (Schaefer et al. 2018) shows that the level of wine consumption does not depend on demographic factors but on the specific characteristics of a given consumer. This is an important observation, which does not exclude the statement that Poles are reluctant to consume wine because they consider it to be an expensive drink, a high-end product and a product that you need to know about in order to enjoy it properly (Rekowski, 2013). At the same time, in recent years, the total alcohol consumption has been increasing, and fluctuations in the structure of wine consumption can be noticed (PARPA, 2021, Podstawski et al. 2017). The SARS-COV-2 coronavirus pandemic, which contributed to a general decrease in the frequency of drinking alcohol, also had an impact on alcohol consumption in Poland (Szajnoga et al. 2021). To become an attractive wine market, Poland must experience far-reaching social changes regarding the type of alcohol consumed, its quantity and frequency of drinking.

3 Methods

The method chosen to carry out the research is the analysis of statistical data for the period 2016–2020 on the basis of data on world consumption and wine production, with the use of the trend analysis tool resulting from the linear regression function and comparison of secondary data presented by international organizations (Zięba, 2013). The selected mathematical methods make it possible to clearly and objectively describe the situation of world wine production and consumption, to determine the increase or decrease in production and consumption over the years, and to calculate and accurately determine the overproduction or shortage of wine production in relation to world consumption. The quantitative and numerical nature of the selected methods allows to draw objective conclusions, but at the same time, does not allow for the direct inclusion of non-numerical factors in the analysis.

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These factors need to be analyzed separately in order to draw conclusions about their impact on world wine production and consumption.

All the calculations in this paper were done in Microsoft 365 Excel. The data provided by the organizations was properly ranked and then summed up. The sums for the production and consumption of wine were copied to the new tables, and then a graph was created from them, on the basis of which the linear regression lines and the corresponding formulas for linear functions were determined. Using the linear regression function, it is possible to determine a trend line based on appropriately sorted data. In the discussed case, the data was arranged according to the country of consumption and production and the year of data origin. The trend line not only allows for some kind of data averaging and better visualization, but can also be used to forecast data in the future. In the trend line formula of the form $y = ax + b$, the coefficient a determines the direction of the rate of growth or decline, while the intercept b allows us to determine a certain constant change in production or consumption. An analysis was conducted using the data prepared in this way and the literature on the subject.

4 Results

The datasets used for the research are presented in Tables 1, 2, 3 and 4. Table 1 shows the consumption of wine in millions of hectoliters in selected countries. Table 2 presents data on wine production in millions of hectoliters in selected countries. Table 3 presents a comparison of the production and consumption of wine in various parts of the world. The data in Tables 1, 2 and 3 is secondary data provided by the OIV (Organization of Vine and Wine).

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Table 1 Wine consumption in the world (m hl)

Country	2016	2017	2018	2019	2020	Change 2020 to 2019
USA	31,3	31,5	32,4	33	33	0,00%
France	28,3	28,6	26	24,7	24,7	0,00%
Italy	22,4	22,6	22,4	22,8	24,5	7,50%
Germany	20,2	19,7	20	19,8	19,8	0,20%
UK	12,9	13,1	12,9	13	13,3	2,20%
China	19,2	19,3	17,6	15	12,4	-17,40%
Russia	10,1	10,4	9,9	10	10,3	3,00%
Spain	9,9	10,5	10,9	10,3	9,6	-6,80%
Argentina	9,4	8,9	8,4	8,9	9,4	6,50%
Australia	5,4	5,9	6	5,9	5,7	-3,70%
Portugal	4,7	5,2	5,1	4,6	4,6	-0,60%
Canada	5	5	4,9	4,7	4,4	-6,00%
Brasil	3,1	3,3	3,3	3,6	4,3	18,40%
Romania	3,8	4,1	3,9	3,9	3,8	-1,90%
The Netherlands	3,6	3,7	3,6	3,5	3,5	-0,30%
Japan	3,5	3,5	3,5	3,5	3,5	-0,80%
South Africa	4,4	4,5	4,3	3,9	3,1	-19,40%
Switzerland	2,7	2,7	2,6	2,7	2,6	-1,60%
Belgium	2,8	2,8	2,7	2,7	2,6	-3,10%
Austria	2,4	2,4	2,4	2,3	2,3	2,20%
Sweden	2,4	2,3	2,3	2,3	2,2	-2,30%
Czech Republic	2,1	2,2	2,1	2,1	2,1	2,00%
Other	34,8	33,1	37,3	37,7	32,2	-14,70%
World total	244	246	244	241	234	-2,80%

Source: OIV, 2021

The first five countries listed in Table 1 account for almost 50% of world wine consumption. These are the United States, France, Italy, Germany and the United Kingdom, respectively. In the United States, wine consumption slowly increased during the analyzed period, while in France it decreased, while in the other three countries it was at a relatively stable level. At the same time, worldwide, wine consumption gradually decreased over the period considered.

The situation in China has significantly contributed to the decline in world wine consumption. It can be noted that during the analyzed period, wine consumption

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decreased from 19.2 million hl in 2016 to 12.4 million hectoliters in 2020. Seven million hectoliters corresponds to almost three percent of consumption in 2020, which makes it possible to conclude that there is a significant decrease. A possible reason for the decline in wine consumption is the very restrictive national quarantine that took place in China in early 2020 and caused significant drops in national consumption. However, given that it is the third consecutive year that Chinese wine consumption has declined drastically, it is possible that the significant increase in wine consumption that began at the beginning of this century is about to end (OIV, 2021).

Figure 1 shows the global consumption of wine with a marked consumption trend. The trend has been represented by linear regression and can be written by the formula of the linear function: $y = -2.5x + 249.3$. The value of the function means that wine consumption can be expected to drop steadily by a certain amount each year. This information is particularly important for wine producers who, when planning production for the next year and the potential development of their business, should take into account the decreasing demand for wine.

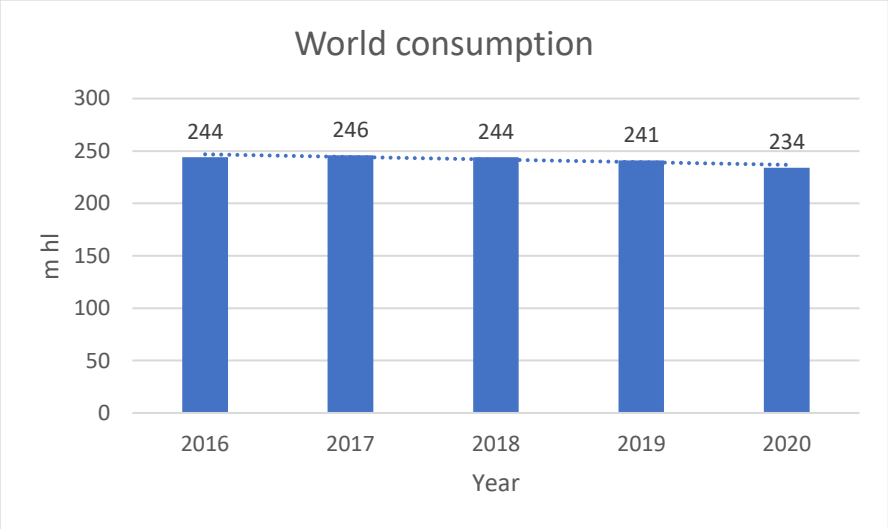

Figure 1
Wine consumption in the world (m hl) (OIV, 2021)

World wine production and the associated grape production can be divided into several areas. The first is the Old World area, mainly covering the territory of the European Union and the Mediterranean region. The so-called New World stands out as the second-most important area of the wine market. The concept of the New World includes North and South America and Australia. In North America, the main wine producing countries are the United States, while in South America, Chile and

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Argentina. China should also be distinguished, whose share of the world wine market is constantly growing (Rekowski, 2013).

Table 2 Wine production in the world (m hl)

Country	2016	2017	2018	2019	2020	Change 2020 to 2019
Italy	50,9	42,5	54,8	47,5	49,10	3%
France	45,4	36,4	49,2	42,2	46,60	11%
Spain	39,7	32,5	44,9	33,7	40,70	21%
USA	24,9	24,5	26,1	25,6	22,80	-11%
Argentina	9,4	11,8	14,5	13	10,80	-17%
Australia	13,1	13,7	12,7	12	10,60	-11%
South Africa	10,5	10,8	9,5	9,7	10,40	7%
Chile	10,1	9,5	12,9	11,9	10,30	-13%
Germany	9	7,5	10,3	8,2	8,40	2%
China	13,2	11,6	9,3	7,8	6,60	-16%
Portugal	6	6,7	6,1	6,5	6,40	-2%
Russia	5,2	4,5	4,3	4,6	4,40	-4%
Romania	3,3	4,3	5,1	3,8	3,60	-7%
New Zealand	3,1	2,9	3	3	3,30	11%
Hungary	2,5	2,5	3,6	2,7	2,40	-12%
Austria	2	2,5	2,8	2,5	2,40	-3%
Greece	2,5	2,6	2,2	2,4	2,30	-6%
Brasil	1,3	3,6	3,1	2	1,90	-5%
Georgia	0,9	1	1,7	1,8	1,80	2%
Other	16,8	16,5	18,1	16,6	15,40	-7%
World total	270	248	294	258	260,20	1%

Source: OIV, 2021

When analyzing wine production, it is worth looking at the division of production into larger regions—the Old World, the New World and China—as well as the separate division into continents. When divided into larger regions, the share of production of the Old World countries (as well as Georgia and Russia) in the total wine production in the world is 65%. On the other hand, the share of the New World and China in total production is almost half of that of the Old World (29%). The remaining 6% of world wine is produced throughout the rest of the countries designated by the International Organization of Vine and Wine (OIV) as "other countries." The division of production into continents is equally interesting. In this case, in Europe (Russia and Georgia are also taken into account here), the share of

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world production is the same as in the previous division, at 65%. The share of North America, mainly the United States, is 36, which is 9% of world production. The same is true of the production from South America. Australia and New Zealand produce 5% of all world wine, and China and Africa, 3% and 4%, respectively. The missing 6% of production is produced in other countries.

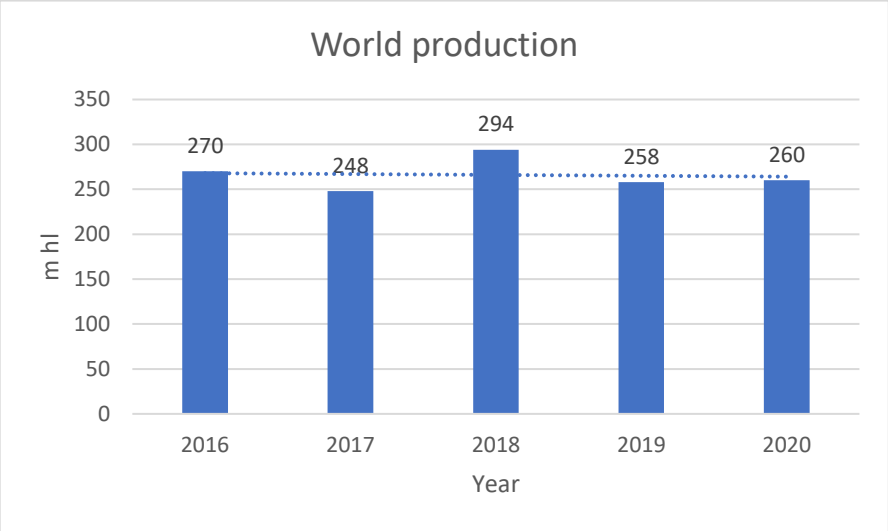

Figure 2
Wine production in the world (m hl) (OIV, 2021)

Figure 2 shows the world's wine production with the consumption trend marked. The trend has been represented by linear regression and can be written by the formula of the linear function: $y = -0.96x + 268.92$. The value of the function means that less and less wine is produced each year. This means that wine producers are gradually adapting to the decreasing consumption and demand for wine. It is worth noting the dependence of the volume of wine production on weather conditions, because with favorable weather conditions throughout the year, the harvest of grapes, and hence wine production, will be significantly greater, as can be observed in 2018. However, in the event of unfavorable weather conditions resulting in a poorer grape harvest, wine production will decrease significantly, which could be observed in 2017. The dependence of wine production on the prevailing weather conditions makes reducing the production volume to the level of consumption an extremely difficult and virtually impossible task without exposing society to shortages of the product.

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Table 3 Comparison of world production and consumption of wine (m hl)

	2016	2017	2018	2019	2020
world production	270	248	294	258	260,2
world consumption	244	246	244	241	234
difference	26	2	50	17	26,2

Source: OIV, 2021

Having data on consumption and production, it is possible to check whether there is an economic equilibrium or whether there is an excess of demand or supply, i.e. consumption or production in this case. When calculating the difference between production and consumption in the years 2016-2020, the following results will be obtained for each year, respectively: 26, 2 50, 17, 26 million hectoliters. Relatively high results were obtained after performing the calculations. Keep in mind that one unit in this case is one million hectoliters of wine, which is equivalent to over 133 million bottles of wine with a capacity of 750 ml. On the basis of the analyzed data, it can be concluded that there is a significant overproduction on the world wine market, amounting to an average of 24.2 million hectoliters of wine over the last five periods examined.

Such a large overproduction on a global scale means that millions of hectoliters of wine may not find a recipient, and thus will become waste. In order to minimize the waste of the final product, manufacturers should take steps to reduce the production volume. Possible solutions to reduce wine production could be:

• reducing the area of crops,

• the use of grapes for the production of products other than wine,

• reducing the intensity of cultivation.

At the same time, it should be remembered that wine production is extremely dependent on the prevailing climatic and weather conditions. Thus, even with a significant reduction in the area and intensity of grape cultivation, during a "good" year for farmers, wine production may significantly increase, which could be observed in 2018, when wine production was exceptionally high.

Wine producers should bear in mind that, according to the calculations made, wine consumption decreases about twice as fast as wine production.

An interesting case of a wine country is Poland, which became a wine country in 2021, because a wine country is considered to be a country with at least 500 hectares of grape cultivation. Due to the better and better conditions for growing grapes caused by the progressive warming of the climate, more and more people in Poland are deciding to cultivate grapes not only as a hobby. In Table 4, the creation of new farms, increasing the cultivation area and the increase in wine production over the years are presented.

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Table 4 Wine production in Poland (hl) (

Year	Number of wine producers in Poland	Vineyard surface (ha)	Wine production (hl)
2009/2010	21	36,01	412,49
2010/2011	20	37,02	437,13
2011/2012	26	51,28	428,47
2012/2013	35	96,87	903,05
2013/2014	49	99,49	1 978,95
2014/2015	76	134,35	2 737,10
2015/2016	103	194,24	5 135,35
2016/2017	150	221,23	6 993,82
2017/2018	201	331,38	5 207,13
2018/2019	230	394,84	12 750,48
2019/2020	294	475,35	14 361,34
2020/2021	329	563,97	14 171,65

Source: KOWR, 2021

Based on the data contained in Table 4, it is possible to conclude that the Polish wine market is constantly growing. Using the arithmetic mean method, it was calculated that one producer has 1.71 ha of grapevines, producing 43.1 hl of wine. It should be noted that vineyards differ significantly in terms of the area of grapevines, production methods and cultivated species. At the same time, vineyards with a small area prevail in Poland, and the largest Polish vineyards do not exceed 40 ha of arable land, which makes Polish grape cultivation highly decentralized.

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Figure 3
Wine production in Poland (hl) (KOWR, 2021)

On the basis of the presented data, it is possible to conclude that Polish winemaking is constantly developing at a relatively fast pace. According to the KOWR (KOWR, 2021) data, since 2009 there has been a more than fifteen-fold increase in the cultivation area and an almost 15-fold increase in wine production. The progressive warming of the climate is also supporting the cultivation of grapes because, due to the increasingly milder winters, more entrepreneurs in almost all regions of Poland will be able to cultivate the cultivation. It is also important to exceed the threshold of five hundred hectares of grape cultivation because, thanks to this, Polish vineyards will be taken into account in the European Union statistics on the wine market.

5 Discussion

The mathematical analysis carried out allows for the conclusion that there is a significant overproduction in the world wine market. The analysis of the trend and the comparison of production and consumption justify the decisions of institutions aiming to limit wine production and reduce the cultivation area in order to limit production (Giacomo – Romano, 2021, Brodnicka, 2019, Poczta – Zagrocka, 2016, Rekowski, 2013). Based on the presented data, it is not possible to determine the impact of production and consumption trends on the volume of production and consumption.

Conclusions

Despite the declining trend of wine production and consumption from a global perspective, individual regions are characterized by growing wine production due to changing climatic conditions. An important aspect that allows you to gain new customers is the use of enotourism as a marketing tool. By including an element of experience and contact with production in the marketing message, new customers will be more likely to reach for a given product in the future, and existing customers will strengthen their ties with the brand. By associating wine with a pleasant experience, consumers will be less willing to change consumer habits.

At the same time, the ever-expanding segment of the low- and non-alcoholic wine market is becoming more and more attractive in developed countries, especially among young consumers and consumers with less product knowledge. However, it is still many years before the technology for producing low or non-alcoholic wines is at a level such that it can serve wines with a lower alcohol content and the same other characteristics as traditional wines. Producers who want to expand their offer with wines of this type should bear in mind the need for continuous improvement in technology and the relatively small size of the market segment at present.

Ecological trends will play an increasingly important role in the global wine market, mainly due to the increasing environmental awareness of consumers and the need to shorten supply chains or modify them in order to minimize logistical costs. Both ecological cultivation and proper certification of the finished product can be important when acquiring new customers, especially those who do not have extensive knowledge about wines.

Potentially attractive for investors and consumers may be new wine markets located in areas where, due to climatic conditions, there was no previous industrial wine production. An example of such a new wine market is the wine market in Poland. Growing grapes and wine production in Poland are constantly growing at a rapid pace, and the economic conditions in the European Union allow for additional development of enterprises, despite the need to maintain appropriate procedures related to food safety. Finding customers for the finished product can be a potential problem in emerging markets. Due to the lack of an origin-related brand, foreign customers may not be particularly interested in a product from the new wine region, and it will take time to attract new foreign customers. The situation on the domestic market is also not optimistic, as there is no culture of drinking wine in Poland and wine is still considered an expensive drink, not for everyone and not perceived as an "everyday" alcoholic drink. Changing Poles' views on wine requires time, educating the public, and changing eating habits in terms of drinking alcohol, which may take many years.

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