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Examination of profitability in the Hungarian wine product chain

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1. INTRODUCTION

Since 2000, the grape and wine sector of the world has gone through many changes. The growing areas of the traditional wine growing countries have decreased, and the areas of the so-called “new world countries” have increased rapidly. The vine growing and wine consumption of the world have altered. While the vine-lands of the European countries have lessened, China has almost doubled its vine-growing areas. Argentina, Chile, South Africa and Oceania represent a growing share in the global wine market. Similarly to the leading wine producing countries of Europe, a decrease of vineyard areas can be experienced also in Hungary. The trend has had impact also here.

The topicality of research matter is given by the fact that although some positive progress, discussed below, happened in the sector over the past years, in spite of that the area of vineyards in Hungary decreased by half during the last 25 years. Thus, we can take advantage of our favourable natural endowments decreasingly for producing excellent wines. Based on my experiences and the conversations with professional representatives, producers I think that the appropriate buying-in price of grapes and wine has a very important role in it. This may be the key to give a major boost to the sector.

Basically, a farmer carries out growing activities to earn a living from them. However, if it is not possible, he changes and makes another activity generating profit and providing a secure living for him. It is no different in the case of vine either. Few people can afford to carry on an activity in the same way, with the same enthusiasm and investment if it produces a loss or does not create the necessary conditions for a stable living.

Traditionally, Hungary is a wine producing country having lost a lot from its prestige and mainly from its wine-growing areas over the past decades. Wine consumption and wine quotes have become inseparable from Hungarian culture, and it proves that the wine has always played an important role in the life of the Hungarian people. It is enough to look back to that there was vine growing in the Great Hungarian Plain already in the 13th century or what kind of wine-related philosophies Jókai, Vörösmarty and Sándor Márai committed to paper. It is worth carrying this culture further to allow our grandchildren of tasting these delicious drinks and getting acquainted with aromas and flavours given by the Hungarian wine.

The subject of this thesis was clear because the sector has an effect on the life of more than forty thousand people directly, and it influences the life of many

processors and millions of consumers indirectly. The leaders of the country also have the opinion that this sector has hidden reserves, and they to promote the Hungarian wines. Furthermore, currently the European Union gives financial assistance to vineyard restructuring and winery equipment purchases. It would be worth taking advantage of these opportunities. This latter is possible only if there are farmers, who believe in the future and would like to grow vine that is based on appropriate income earning. We can think about wine growing in prospects only then if appropriate quality and quantity of grapes is provided in the long run. A guaranteed and predictable grape buying-in price of appropriate level can ensure the way to the profitable vine growing, which covers costs, producer wages incurred, necessary investment funds and depreciation alike.

In some member countries of the European Union there is already an example of determining the buying-in price of grapes in practice. If it is operational there, establishes mutual cooperations in the product chain, promotes the reconciliation of interest and resolves the conflicts of interest, we could think that this win-win approach works well also in Hungary. Unfortunately, it is not so easy in practice, though since 2014 the National Council of Wine Communities (HNT) has produce grape price forecasts to solve the problem. In spite of this the grape prices are still very low, and they cover the expenses only rarely. In 2017 the inter-trade organization make also the contractual system obligatory on the vine growers, wineries and buyers producing or buying up wine grapes in quantities above 10 tonnes. However, the problem still exists, therefore it is worth examining the vine grower - grape buyer relationship to allow that the creation of a win-win situation be a reality. It is also an important aspect whether the vine grower markets the grape only as fruit or produced goods. In the latter case the profitability may be even multiple, which can help to survive.

With my work I would like to strive after the prevalence of the thought formulated by the founding member and honorary grand master of Pannonia Wine Sisterhood to wine writer Bertalan Sztanev (Keményné in Sztanev, 2014 pp 14) that "... honest work and optimistic attitude do bear fruit in the long term."

Research issues I want to examine:

- Radical decrease of vineyard areas in Hungary since 1970. Our country has very favourable climatic conditions to vine growing (so the harmony of the acid and sugar is given), and yet areas covered with vines are decreasing. What are the reasons behind it?

- The development of Hungarian wine sector has influence on the livelihood of about 60 thousand vine growers, the profitability of which is questionable. How could it be profitable and sustainable?
- A positive change has already started in the sector; however, it is enough for symptomatic treatment only. The operation in reality requires more. What are these factors?

If the situation of the "Hungarian wine" grows worse, it may pose a risk also to the Hungarian culture and community. Therefore, I have formulated the following initial targets to answer the above questions.
Objectives of my research:

- Giving an overview on the past 20 years of the Hungarian wine market and an introduction on its share in the global wine market.
- Exploring the factors behind the reduction of vine growing areas.
- Showing the factors influencing the buying-in prices of grapes.
- Overviewing the contractual systems between the vine growers and the buyers buying grapes up.
- Giving assistance in reducing the vulnerability of vine growers.
- Showing alternatives to vine growers in the interest of a profitable and sustainable viticulture.

2. REVIEW OF RELATED HUNGARIAN AND INTERNATIONAL LITERATURE

I started my literature survey with the grape and wine production data and wine consumption of the world, since according to Ricardo wine is a global business. After this, I narrowed the field down to the European countries, and then I examined the values of Hungary.

On the whole, the area of vineyards is decreasing at global level, while grape production shows a slight upward trend. It is probably due to the rearrangement of wine market, since in the "new world countries" (USA, Argentina, Chile, Australia, New Zealand and South Africa) a bigger output can be expected in many cases. Through other technology and varieties, the weather affect less adversely in these areas. In addition, it is important that now such emerging countries should be considered in the world of wine as China, India and Turkey.

If the current trend continues to be, by about 2030 non-EU countries will take over leadership in the grape and wine sector at global level. This scenario is supported by the key figures from 2013 to 2015.

1. Table: Growing area of vine and wine consumption in the world

Growing area	Globally	Decreasing
	Traditional wine producers (Europe)	Decreasing area, but still leading role
	"New world countries" (USA, Argentina, Chile, Australia, New Zealand, South Africa)	Increasing or stagnating
	East (China, India)	Rapidly increasing
Wine consumption	Globally	Minimally increasing
	Traditional wine producers (Europe)	Decreased by approx. half, in some countries stagnated
	"New world countries" (USA, Argentina, Chile, Australia, New Zealand, South Africa)	Increased
	East (China, India)	Increased

Source: Edited by the author based on data of OIV 2015a, OIV 2017a, OIV 2017b, 2017c and OIV 2017d

2. Table: Changes of vineyard area in the most important wine producing EU countries (in Thousand hectares)

Countries	2004	2013	2015	Change 2004/2013	Change 2004/2015
Spain	1166.7	945.7	n.a.	-18.94%	
France	851.8	760.6	802.9	-10.71%	-5.74%
Italy	786.7	702.1	650.7	-10.75%	-17.29%
Portugal	209.0	179.5	198.6	-14.11%	-4.98%
Greece	115.2	101.3	103.3	-12.07%	-10.33%
Romania	202.8	176.9	183.7	-12.77%	-9.42%
Hungary	93.2	72.3	65.0	-22.42%	-30.26%

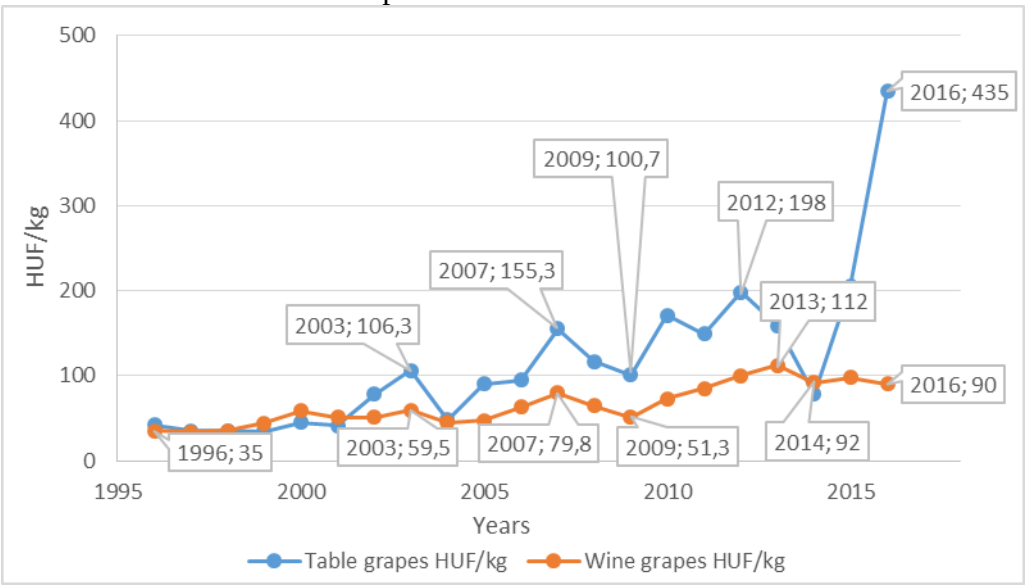
Source: Edited by the author based on data of CSO (2004, 2013) and Eurostat (2017b pp 13)

Table 2 shows the data of 2004 in comparison with years 2013 and 2015 (most recent). The direction of change is unambiguous in case of every country. It can be seen distinctly that the growing areas of Hungary decreased in the biggest degree. To it the grubbing-up premiums have also contributed. However, the huge reduction in area can be attributed to more reasons than this, which confirms the motivation behind the research objectives. Based on Eurostat data (2017b, pp 21) Hungary had a share of 2.6% and 2.01% in 2009 and 2015 respectively from the EU wine production. According to National Council of Wine Communities (HNT) Hungary belongs to medium wine producing countries at European level.
Between 2011 and 2016, the vine growing area of Hungary reached the minimum value with its 51,659 hectares in 2012 (HNT, 2017a). Since then it has been increasing slightly. In respect of production, the vintage has a very decisive role. Between 2011 and 2016, the average yield was around 359 thousand tons. In wine production we can reckon with a minimum of 177 million litres and a maximum of 282 million litres regarding the above period.

According to ministerial commissioner for wine sector development Eliza Kiss, appointed since 2013, we might just as well drink the wine produced in Hungary, however it would be beneficial to its reputation if it finds its way abroad (in Sztanev, 2014).

Examining the product chain, it can be said based on data of Ábel & Hegedűsné Baranyai (2017) that 41,798 farms dealt with vine growing or wine making in 2016, from which 85.9 % with only vine growing, 3.09 % with only wine making and 11.01 % with both.

In Hungary the cooperation is poor among the supply actors of the grape - wine product chain. The producers are vulnerable; therefore, the majority of the income is concentrated at the processors and the traders.



1. **Figure: Average buying-in prices of wine grapes and table grapes in Hungary between 1996 and 2016 in HUF/kg**

Source: CSO https://www.ksh.hu/docs/hun/agrar/html/tabl1_6_1_7.html 2017.11.21

Figure 1 and the above thoughts throw light on what kind of incomes are implied by vine growing, and that the majority of grapes are bought up, on account of which the buying-in price of grapes is a key factor. If we take into consideration that the input prices are increasing steadily, while we should be happy if the average yield reaches 6 to 6.5 tons/ha in Hungary (according to FAO data it is 10.5 tons/ha at global level and 8.2 tons/ha in the EU) and the cost price is about HUF 110 to 120 per kg calculated based on the above, it can be confirmed easily that the decrease of vineyard areas can be attributed to the loss-making growing.

The economic and political rearrangement led to that the economic operators, who comprised the whole product chain formerly, were wound up over time. Privatization took place. During that the growers and the producers separated in many cases, and among them conflicts of interest appeared. The grape and wine sector can bear it very poorly. The sectoral strategy made final in February 2017 tries to remedy this situation, which has the vision of “marketable and sustainable vine and wine growing.

The strategy itself makes a case for responding to the research objectives and applying the following methods in order to ensure that all operators in the sector could make a living from it fairly.
A further argument for the subject is that the sector has a priority role in the financial cycle 2014-2020 as it can use HUF 20 billion resources allocated (Kis, 2015). Later this amount was raised to HUF 40 billion with reference to new plantations (Györe, 2018). It is very important whether this amount will be observable in the sector, and if yes, how?

3. DATABASE AND APPLIED METHODS

3. Table: Summary table of research questions, hypotheses and methods

Research question	Research objective	Research hypothesis	Applied methods
Will our country remain in the wine market map of the world?	Overviewing the past 20 years of the Hungarian grape and wine market.		Relevant literature Regression model Presentation of changes and the expectable vision of the future by trend fitting
What is behind the decrease of Hungarian vineyard areas?	Indicating the factors behind the reduction of vine growing areas. Surveying the most important **sectoral risks and issues**.	**H1: Vine growing has an uncertain profitability in Hungary, and it is also the cause of the decrease of vineyard areas.**	Presentation of changes and the expectable vision of the future by trend fitting Semi-structured in-depth interviews
How is the grape buying-in price working?	Examining the grape buying-in price formula used since 2014. Examining the related contractual system.	**H2: Hungarian vine growers could support the introduction of a mutually acceptable and predictable grape price.**	Semi-structured in-depth interviews Comparison of the relevant literature and the current theory and practice.
Could vine growing be more profitable through cooperation?	Presenting Hungarian and foreign cooperations in the sector.	**In Hungary there is little real cooperation in grape - wine product chain.** **H3: The lack of confidence is one of its root causes in the Csongrád region.**	Semi-structured in-depth interviews Presentation of "best practices" in integrations Cooperative attitude survey and its results

How could vine growing be profitable and sustainable?	Finding a sustainable vine growing process.	**H4: Hungarian vine growing could be profitable.**	Modelling based on data from own research in 2009, 2016 and the FADN data of the Research Institute of Agricultural Economics (AKI) Sensitivity analysis Cost analyses for grape processing alternatives (grape juice, wine, pálinka)

Source: Edited by the author

3.1. Overview of the secondary databases

3.1.1. Figures of Hungarian grape and wine sector and the reasons behind them

This chapter gives an overview on a wide range of statistical data available from the Central Statistical Office (CSO) about the sector for the period between 1996 and 2015 regarding Hungary and comes to the conclusion from the figures. It observes the trends and its effects, as well as it tries to find the reasons behind the figures. For analysing I used linear correlation, and then regression analysis in accordance with Sajtos & Mitev (2007) and Székelyi & Brown (2002).

3.1.2. Cooperations in the product chain in Hungary and in the world

This chapter is intended to present the successful forms of cooperation and organization within the sector. There are well functioning examples that may serve as a basis for that the coveted and after a while forced cooperations and integrations come into being. I try to find an answer to that how these organizations are created in practice.

3.1.3. Presentation and evaluation of grape buying-in price and contractual system

My intention is to value the formula that has been issued and improved annually since 2014 from the grape growers' point of view. In this respect, I give insight into the contractual system introduced in August 2017 both in terms of theory and practice, about which I wrote during my former research work that it was favourable.

3.2. Primary research

3.1.1. Cooperative attitude survey - qualitative research

The qualitative research method examines the relations between the participants by means of questions grounded from professional and psychic points of view, requiring to be familiar with both professions. This research has resulted in a sociogram presenting the confidence map between the respective parties. In many cases it explains also the differences between formal and informal relations. The research is of qualitative character, for this reason there is no lower limit for the number of items. Although the method is not representative, it helps to interpret and explain the individual experiences and motivations explored by the quantitative researches. Therefore, it is an integral part of and complement to those researches.
I carried out the research on 22 January 2014, in Csongrád, in community centre, among the local vine growers. Usually it makes room for the assemblies of the wine community. It helped to create a homely atmosphere and the familiar conversation. The participants were people having signed the letter of intent about joining the Wine Cluster of Csongrád, and who came on the third occasion. Previously the date had to be postponed two times because of low participation. At that time 6 persons were present representing about 30% of the Csongrád Wine Community as compared to the active population. However, it should also be noted that the active 30%. Most of the wine community members belongs to the older generation, who play rather passive role within the wine community.

The indicators related to confidence index are in connection with the economic situation of the country including the willingness to invest. Its importance was shown in that the Wine Cluster of Csongrád had the goal to build a processing plant that would reduce the growers' vulnerability.
In the methodology I compiled the questions necessary to the research from professional and psychic points of view based on the A-1 survey form introduced by István Fehér (Mérei, 1998). Then I had them checked by practising psychologist Marianna Dékány. Otherwise it is the most widely used survey form type, thus it can be used safely.

The various aspects of consideration comprise questions relating to sympathy, community function, individual properties, abilities and skills as well as position in the community and popularity. The outcome of the research is a connection network, a so-called sociogram that is presented on the basis of mutuality.

The survey was completed with a personality test based on Lányi (2008), with which selecting of leading personalities and mapping of resoluteness and effectiveness were intended.

3.1.4. Comparative cost analysis and sensitivity analysis

I tried to compare the model based on own research carried out in 2009 and its data with the data from own semi-structured in-depth interview research in 2017. Since, the analysis cannot be representative based on the data received, because neither financial resources nor conditions supporting the research were available during it was carried out, I made also a sensitivity analysis. This latter gives a kind of help in connection with the average yield of grapes, cultivation cost per hectare and buying-in price of grapes. Although it is not possible to show all the three dimensions together, but by means of transforming the values oftwo dimensionsinto one data the three dimensions can be displayed in some cases, which represents a real and approximative practical value definitely. The point is that based on the average yield and the probable buying-in price the growers see how much money they can spend on their vineyard per hectare if they want to gain profit. For this it could be a great help if owing to the contract the growers know in advance what amount of buying-in prices they can calculate.

3.1.5. Processing AKI data by SPSS - analysis of variance

Worthy of a dissertation I made an analysis by means of SPSS Statistics software, which is intended to show the uncertain price of grapes and the relation between expenditure and revenue. This research method is included among the primary researches, because the data were requested in accordance with my own requests from the Farm Accountancy Data Network (FADN) database by farms, and they count basically as raw data. As far as I know nobody has conducted this kind of study, in this form with this database.
The database I requested from the Research Institute of Agricultural Economics (AKI) includes the figures by sector and by farms for years between 2001 and 2016, from which farm sizes, costs and buying-in prices are relevant. Owing to lack of space and for representativeness I show only the calculations made on sectoral data. In the paper entitled “An Analysis on the Profitability of Wine-Growing Estates” Ábel & Hegedűsné Baranyai (2017) give a good summary on the results of FADN data.

From the IBM SPSS Statistic 20 software package I used the descriptive statistics, the homogeneity of variance test to be performed compulsorily before the analysis of variance and then actual analysis of variance.

“The analysis of variance serves for comparing the expectable values of two or more varieties, and practically it examines whether there is any difference between the means of two or more groups.” (Sajtos & Mitev, 2007 pp 160)
After having performed the analysis of variance, by means of the software I queried the cost prices and the selling prices of grapes (HUF/kg) and wine (HUF/l) by farm size as well as the data belonging to descriptive statistics for these four items regarding all the 16 years. Based on the above, using mean and median, I created price-cost charts for all cases. It is to be remarked that in the case of wine I could not create chart for all cases.

3.1.6. Cost analysis of grape processing alternatives

The determining factor of many researches and in-depth interviews is that vine growing can be profitable if we cover the entire product chain. While for that there are several processing alternatives.
By using a set of factual and practical information experienced in 2016 and 2017 I carried out cost analyses for the possible end product categories representing value added to grapes. Based on this, I show the processing alternatives of wine, pálinka and 100% grape juice box. During the survey I discuss also the practical difficulties and finance requirements, with which one has to reckon in case of realization.

3.1.7. Semi-structured in-depth interviews

I conducted in-depth interviews at the beginning of the research, in 2013 and 2014 in the subject of cooperations and cooperative and then in 2016 and 2017 regarding profitability and contractual system, which were facilitated by a semi structured questionnaire for an easier appraisal. Some respondents were relevant data sources only in one topic, while others gave answers to questions covering not only one filed.

4. RESULTS

4.1. Hungarian vine growing and wine production and the main reasons behind the changes

According to the data of the Central Statistical Office (CSO) there is a negative relation between yielding vineyard areas and years, which shows a decrease of growing areas with the increase in years. It is interesting that virtually there is no connection between production and growing area. Presumably it can be explained by the strong negative relation between average yields and growing areas. Relying upon these findings when the growing area is decreasing, the average yield is increasing, and productivity shows an upward trend. There is moderate relation between production and average yield. Although average yield has an upward trend basically, this increase can no longer compensate for the production loss of the areas lost since the downward trend is precipitous.

Based on the data it can be stated categorically that the Hungarian production is enough to supply the domestic wine consumption, and even it is able to produce to export despite the continually decreasing vineyard areas. The reason for this is that the wine consumption per capita is decreasing, and the population is also dwindling. The latter may change tendency later on owing to the family-friendly measures.

4.2. Risks and cooperations

The vine growers must face up to financial risks, uncertainties of payment terms, continuous changing of support system. In the course of growing a significant risk is posed by the more and more extreme weather conditions, the overrides of laws and regulations and inadequate preparedness of operational background necessary for them, as well as the shortage of appropriate labour showing up in all fields even at vintage.

These are all issues that compel the farmers to give up farming or at least to share the risk and do not want to make a living only from viticulture. In sphere of business there is no long-term perspective for those living only from wine growing unless they can minimize these risks through cooperation.

The world wine trade is concentrated; therefore, cooperation is inevitable also in Hungary to maintain competitiveness. Currently, even if there are cooperations, they are very weak, which can be attributed to distrust mainly. In case of the traditional wine producers mainly the cooperatives, while in the

"new world countries" usually the clusters are the most important forms of cooperation.
Gábor Szabó (2010) holds that first of all we should focus on cooperation; form and name are virtually irrelevant. What is important now is to have an organization holding the growers, i.e., the members together, which represents them in the market to give bargaining power to them. If it succeeds, the income from farming can increase and it can mean more money in their pocket.

The success factors determining also the good quality brand include homogeneous goods in large quantities, high market share, secondary cooperations, interdependence, voluntary form, advocacy, development and innovation, long-term strategy, government support (financially and by regulations), economies of scale and good value for money.

4.3. Buying-in price of grapes and the contractual system

"About 72 thousand vine growers and 2 to 3 thousand wine makers are active in the sector. As yet the wine makers have been able to market their wine somehow, and as yet they have been able to keep above the water more or less. However, the vine growers have been able to do it utterly not. One more year like this, when the price of grapes decrease to one half and they fall to the ground absolutely. The vine growers have been always balanced on a knife edge till now." (S. Kispál, 16-07-2014) Then he adds that therefore only the trade gains as they swallow the margin and ensure the survival for themselves. The goal is to obtain grape prices that are predictable on a contractual basis and provide decent living.

"A grape price that should provide right living to the growers is the basis - and the neuralgic point - of a sustainable viticulture." (Brazsil, 2017 in Viniczai, 2017 pp 8)

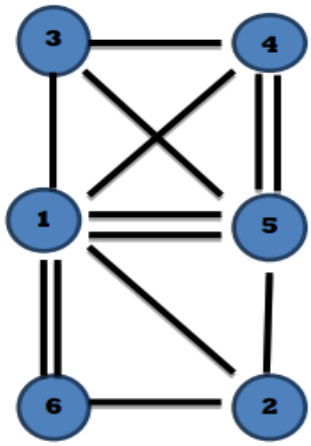
The above citations show most of all how large a role the appropriate grape price and the appropriate contractual system play in the sector. The National Council of Wine Communities (HNT) has been producing grape price forecasts since 2014, to which an obligatory contractual system as an additional market measure was added in 2017.

The forecasts include the acquisition costs of grapes basically well. However, they are only suggestions and not defensive prices, thus they cannot provide secure living. For the average yields, not the national average was used, thus in specific cases they are lower than the actual one. Most of the buyers shun correct contracts (as it allows less financial leeway for them). In practice,

generally they put a piece of paper afterwards in front of the growers to sign. The prices and the conditions related to them change unilaterally, as it is true also for the date of collection. Moreover, there is no part payment until the "pile of paper" is complete. The mutuality is wanting from the contracts. Thus, the measure is far behind from a right cooperation base. The document templates are created by the wine makers, and they can amend them to their liking unilaterally. Thus, the vine growers continue to be vulnerable and are in trouble even more than till now. The partial feature, such as the buyers shall pay for the grapes still in the subject vintage year, achieved in 2017 and beneficial also to the growers has ceased to exist.

4.4. Survey of cooperative attitudes

The number of people arrived was far less than expected. It put not only the research to be carried out at risk, but also founding the cluster. This negative outcome can be considered as a result. The number of total choices is 120, and the number of mutual choices is 17. The distribution index has a value of 2 on the average. Generally, each person checked off the names of other two persons based on a given criterion.



2. Figure Sociogram of the members of the planned Wine Cluster of Csongrád

Source: Based on Mérei (1998, pp 59-60), edited by the author

The lines represent a mutual connection at the criteria of the likeable choices. Figure 2 displays only those ones that apply to the same criterion. The more persons of favourable position are in a formation, the better can be the social atmosphere of the formation. Thus, there are more chance of the success. From that it can be concluded that the company is favourable for all stakeholders, as

everybody has mutual connection. Moreover, the half of the group has an at least average value indicated by the number of mutual positive connections.

The respondents are positioned in a fully closed, rectangular formation. There is no one who would be lonely. This fact is positive. Everybody in the formation has at least two connections. Central position is characteristic of persons with numbers 1, 4, 5. While persons with 2, 3, 6 belong to the common zone under the influence of the centre. The C-M index (central-marginal position) has a value of 50 to 50, i.e., 50% of the persons belongs to the centre, while the other 50 % is in the zone under the influence concerning it.

The indices characterizing group cohesion look favourable. However, it includes that the number of participants was much less than planned.
No public opinion was developed. The choices were not directed by group norm, any more than the common opinion taken over through identifying with the leader. The answers are subjective, governed by emotions and not concerted. Either, there are no established community roles. The reason for this is that the "vine grower society" was virtually disappeared by the privatization, and the new one has not settled yet. Based on the personality test completing the survey, it can be said that the participants rather positive than negative, and at least two persons are suitable to be a leader as well.

4.5. Comparative cost analysis and sensitivity analysis

"The researches should get closer to the growers and give answers also to the issues of the day-to-day vine growing. The inter-trade organization must be involved in framing research programs." (HNT, 2016b pp 15)
In accordance with the above quotation I drew up a questionnaire on profitability to the wine community members. However, my possibility was limited to distribute it, thus the answers can be considered only as a starting point. The respondents (13 people) strongly agreed in that the buying-in price of grapes is acceptable from HUF 130-131 per kg taking into account the costs, depreciation and also the cultivation for the year after.
As a result of comparing a survey of Csongrád in 2009 with the recent data (2017 to January 2018) it can be said that the situation has improved a bit (1.846 instead of 1.042) taking into account the financial security of vine growers. The unit loss is less of (in 2009 and 2017 the loss was up to 40 % and 19 % respectively).

The sensitivity analysis calculates also with the costs, but it is Based on this, the profitability is determined by the average yield of grapes (4 to 15 tons per ha), their cost spent for a hectare (HUF 350 thousand to 1.5 million) and the buying-

in price of grapes (HUF 45 to 155 per kg). To make profit the loss should be minimized by reducing costs, and the income should be maximized by rising average yield and buying-in price. The formula of factors thought over by practical means gives actually the profit or loss. Thus, by means of a sensitivity analysis, for example it can be said, knowing the average yield between 2013 and 2017, what the maximum amount of money is that can be spent for a hectare of vineyard. Owing to lack of space, here I show only a part of one table.

4. Table A part of one of the sensitivity analysis tables

		Cultivation cost of vine (Thousand HUF/ha)														
		350	400	450	500	550	600	650	700	750	800	850	900	950	1 000	1 050
Average yield (100 kg/ha)	Buying-in price of grapes (HUF/kg)	Cost price incurred from the cultivation cost of vine (HUF/kg)														
40	155	88	100	113	125	138	150	163	175	188	200	213	225	238	250	263
45	150	78	89	100	111	122	133	144	156	167	178	189	200	211	222	233
50	145	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210
55	140	64	73	82	91	100	109	118	127	136	145	155	164	173	182	191
60	135	58	67	75	83	92	100	108	117	125	133	142	150	158	167	175
65	130	54	62	69	77	85	92	100	108	115	123	131	138	146	154	162
70	125	50	57	64	71	79	86	93	100	107	114	121	129	136	143	150
75	120	47	53	60	67	73	80	87	93	100	107	113	120	127	133	140
80	115	44	50	56	63	69	75	81	88	94	100	106	113	119	125	131
85	110	41	47	53	59	65	71	76	82	88	94	100	106	112	118	124
90	105	39	44	50	56	61	67	72	78	83	89	94	100	106	111	117
95	100	37	42	47	53	58	63	68	74	79	84	89	95	100	105	111
100	95	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
105	90	33	38	43	48	52	57	62	67	71	76	81	86	90	95	100
110	85	32	36	41	45	50	55	59	64	68	73	77	82	86	91	95

Source: Edited by the author

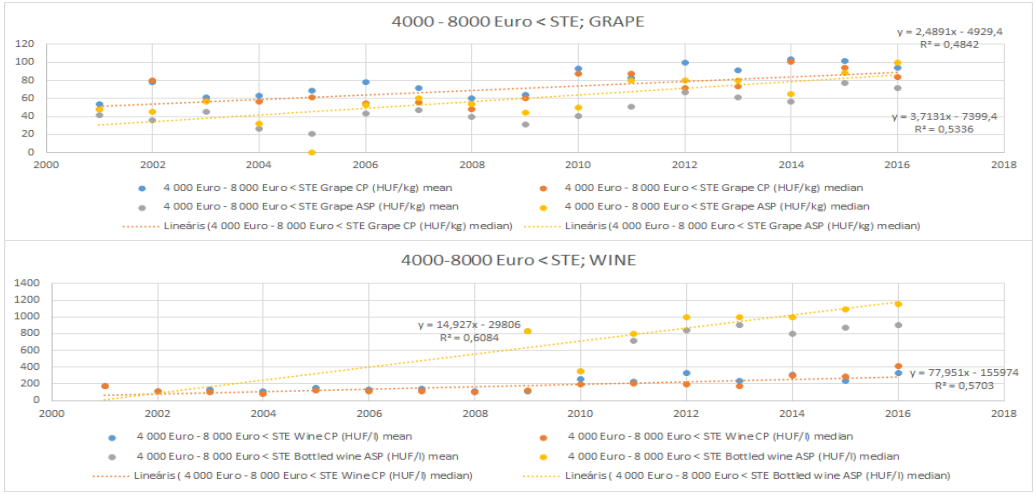
In the green zone the money spent to the vineyard shows returns, while in the red zone it does not. Thus, it can be read that in the case of an average yield of 7.5 t/ha the cost price could be HUF 120 per kg even with a buying-in price of HUF 120 per kg to avoid the loss. It means an expenditure of HUF 900 thousand per hectare.

4.6. Analysing AKI database by analysis of variance

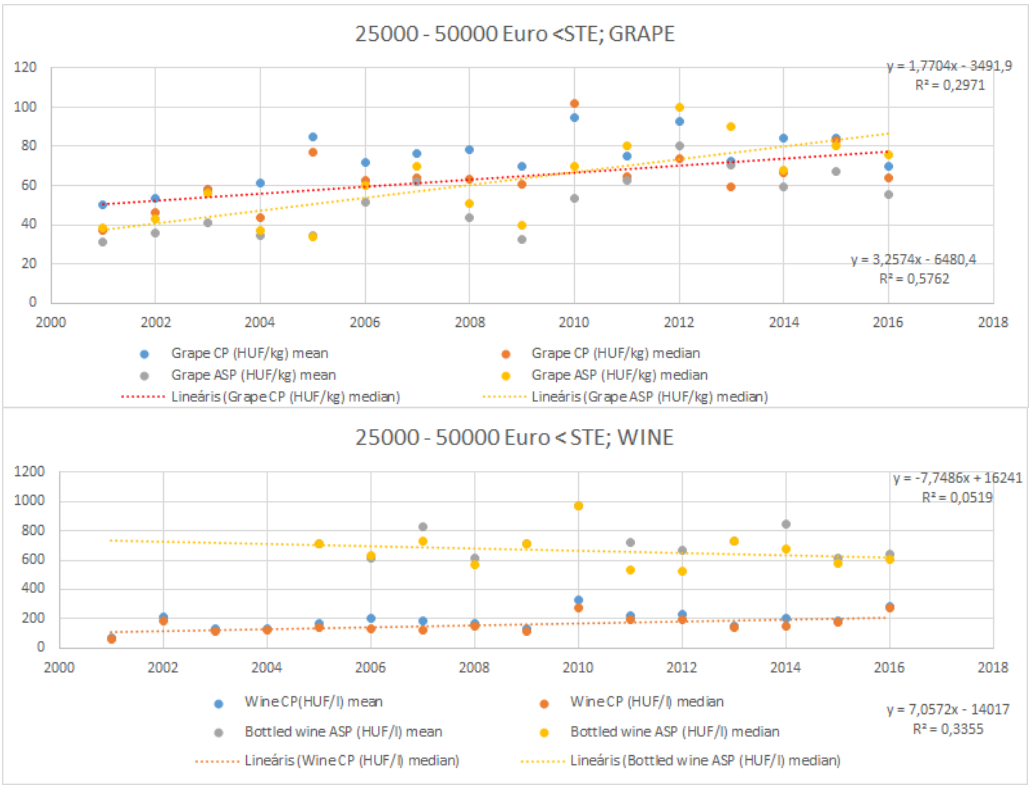
First, I cleaned the database off, and then I filtered the missing data out. The analysis leaves the cost prices of HUF 200 per kg for grapes and HUF 800 per kg for wine out of consideration. Either, for the buying-in prices it does not calculate with values more than HUF 400 per kg of grapes and HUF 10,000 per litre of bottled wine. The application of bottled wine is justified, because the present processes prefer quality wine production. To the data I queried also the descriptive statistics. Prior to the analysis of variance, I made variance homogeneity regarding the cost and the buying-in price for both the grapes and the wine. I left the normality test out, because the sample occurs in nature also in itself.

For the cost prices of grapes and wine as well as the average selling prices of grapes and bottled wine the following values were used n=1913, n=807, n=3343 and n=194 respectively.
The result of the actual methodology is that for the cost price of grapes there is a significant difference in relation with years. We know it from that the significance level is zero. Consequently, the cost price of grapes changed a lot in the subject years, so it is difficult to say the average cost. The significance of wine main product cost price is also zero.

With regard to the buying-in prices of grapes and wine, the analysis shows that there are significant differences in the average selling prices of grapes as the significance level is zero. While, in case of the average selling prices of bottled wine obviously a growth can be experienced, which is natural.
Thinking backwards, although the selling price of bottled wine has an upward trend definitely, the selling price of grapes moves differently, thus the grape price does not necessarily explain the increase in the price of wine. However, also the in-depth interviews confirmed it. After that I showed the mean and the median for the average buying-in prices and cost prices of grapes and wine by farm sizes.
From the 6866 cells I left the mean and median cells out, where the number of farms was less than four based on farm size or there was no continuity in the size category regarding the data. I totalled the number of items by annual farm sizes up. I created all charts in a way that I fitted also a linear trend to the values of medians. For a better understanding I display the figures of grapes and wine by placing them under under one another. Here I show three size categories.



3. Figure Mean and median figures and trends for the second farm size (relatively small)
Source: Edited by the author



4. Figure Mean and median figures and trends for the fifth farm size (medium)

Source: Edited by the author

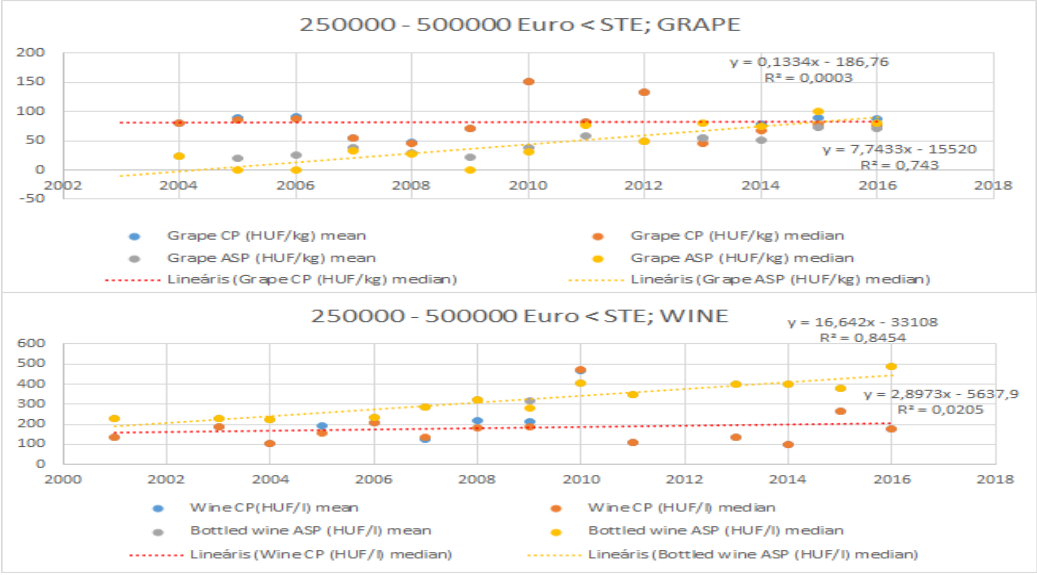
In case of the relatively small farm site, watching the trend it can be established that the cost price of grapes is throughout higher than the selling price of grapes, although they are converging. For the same size category, in the case of wine the selling price has been increasing sharply since 2002, while the cost shows only a slight increase. Consequently, only the vine growing makes loss, while wine sales are profitable. (Figure 3)

In the medium farm size category, the linear trend shows that the selling price has been exceeding the cost price of grapes since 2010. While, in the case of wine the selling price is basically much higher than the cost price of wine, and the two trend lines are converging only minimally. (Figure 4)

In the large farm size category, according to the trend 2015 was the decisive year for grapes, when the selling price reached the cost price. In the case of wine, the cost price has increased only minimally, while the selling price shows a sharper increase. (Figure 5)

In connection with the results of data by farm size it should be noted that there is a trend in the selling price of grapes, by which the small ones get usually a

"relatively high" price for grapes compared to the medium and large farms, while the medium farms get the least in value and the biggest differences as for years are generally in the case of large farms. For the average selling prices realised by small farms it can be observed that in 2004 it fell back almost to its half, which probably can be connected with the accession to the EU and can be explained by the outset of importing wine in large volumes. The outstanding result, that the medium farms can obtain the highest profit although they get "the relatively lowest" prices, can be attributed to the fact that the medium farms meet the economies of scale conditions better and they can perform cost minimization more efficiently. In case of the large farms it can be seen that they can clear about one and a half times more for the grapes compared to that they give to the small farms.



5. Figure Mean and median figures and trends for the eighth farm size (large)

Source: Edited by the author

4.7. Cost analysis of grape processing alternatives

Dealing with vine growing we should know the purpose of use. If the grapes are sold, the volume is the goal. When the grapes are intended for processing, the quality is the goal. Usually, the former means a fast payment and serves for the base of living, while the latter with value added provides an extra income and a regular source of income throughout the year.

First, I compared three evident processing modes of grapes through their characteristics, then I worked out the cost structures for these three alternatives. I established the cost components mainly from an empirical starting-point, and I looked up the necessary official fees and charges. For the items doubtful for me I turned to the in-depth interviews and the secondary sources for help.
In the case of grape juice, I showed the costs incurred during processing in three variations: firstly with the net buying-in price of 2017 (HUF 89 per kg), secondly with the grape price covering its costs (HUF 115 to 120 per kg) and thirdly the desired grape price (HUF 130 to 150 per kg). For the "bag in box" packaging I settled a price of HUF 1900 per box as an introductory price. Based on this, in the first two cases a profit can be made if we disregard of charging for the "lesson to learn". However, in the last case it is better worth selling as grapes.

For the bottled wines I turned to the data of Koch from 2015 for help, and I calculated also in three ways: variations of high, medium and low price segments determined by him. I calculated the price of grapes back from the price of wine. Relying upon these calculations it can be said that the budget can be found for a grape price of HUF 100 to 150 per kg even in the case of wines sold in the low price segment, but, for example, in case of the high price segment the realizable price can be HUF 410 per kg as well. Consequently, based on the above, the buyers could pay at least the cost price for the grapes if they wanted. If we take into consideration the inflation for the data values, we face even higher grape prices designating an interval from HUF 102.71 per kg to HUF 421.11 per kg in the various categories.

I worked out also the cost structure of pálinka making, but as under the applicable provisions only the products of a commercial pálinka distillery are allowed to be put on the market, a vine grower financially unprepared for investing can hardly find the budget for its total costs (approx. HUF 3000 to 4000 per litre for excise duty + distillery costs for 50% alcohol content and packaging). I scrapped this alternative.

5. NEW AND NOVEL RESEARCH RESULTS

1. As a novel result I systematized the issues that might have influence on the radical decrease of vineyards. On an empirical basis I put them into priority order and assigned influence value to them. Financial sustainability and appropriate establishment of payment terms are the most important issues that can be the basis for a long-term perspective as well. I also made recommendations for moderation and resolution.

2. As a new result the research shows a survey of cooperative attitudes that is purpose-made and combines the practical principles of psychology and viticulture. At the same time, it also demonstrates the lack of confidence in the critical mass as well as the existing confidence and ambition for supervisory responsibilities in the case of picked out persons.

3. The sensitivity analysis, I have created, gives a new result, which outlines the dimensions of the main factors in vine growing at an approximative level. It helps the vine growers in determining the maximum cost based on the average yield and the probable buying-in price in order to make profit.

4. Using the database of the Research Institute of Agricultural Economics (AKI) I proved by analysis of variance as a new result that there is indeed a statistically detectable difference in the buying-in prices of grapes between 2001 and 2016, while in the case of wine the increase is unambiguous. By means of charts created from the data the profitability of vine growing can be displayed by farm size categories, and it varies by size.

5. The characteristics consequent on the basic processing of grapes and the determination of costs belonging to them count as new result, which become comparable this way. Relying upon these findings the vine growers can obtain practical help with regard to processing, and they can be informed about the courses, difficulties and profit content of the competitive and economical processing.

6. SUMMARY AND RECOMMENDATIONS

The conditions formulated after studying the literature and the experiences have been proved virtually in full. In case of the first hypothesis the decrease of vineyard areas can be attributed to other causes as well, thus it is partly proved. Grubbing-up premiums and restructuring aids, aged vine grower society, rapidly changing laws and regulations, administrative burdens and more extreme weather events, aged vineyards and shortage of appropriate labour, EU accession and economic crisis, small number of cooperations as well as distrust are all issues in addition to unfavourable profitability, which have contributed to that the area of vineyards has decreased so much.

It is difficult to answer the first research question that whether Hungary will remain in the wine market map of the world. Based on the current tendency that showed an advancement after the fall due to the economic crisis till 2013 and then is characterised by constantly decreasing grape prices it could be said that it can remain. However, its current position existing in the world of wine is going most likely the wrong way in terms of vine growing unless there will be substantial and large-scale changes.

5. Table Acceptance and rejection of starting hypotheses

Hypothesis No.	Hypothesis	Result of the hypothesis
H1:	Vine growing has an uncertain profitability in Hungary, and it is also the cause of the decrease of vineyard areas.	The uncertainty is confirmed by several methodologies. Its role in the decrease of areas is partially proved.
H2:	Hungarian vine growers could support the introduction of a mutually acceptable and predictable grape price.	Proved
H3:	In Hungary there is little real cooperation in grape - wine product chain. H3: The lack of confidence is one of its root causes in the Csongrád region.	Proved
H4:	H4: Hungarian vine growing could be profitable.	Proved

Source: Edited by the author

In terms of profitability transferring the experiences of people spending their life in the vineyard, increasing necessarily the average yield, modernizing vineyards and avoiding excessive expenditures mean a huge help. By any means it is advantageous to span the whole product chain in the long run. The

research can mean help from practical points of view, as the sensitivity analysis and the description of alternative processing technologies provides a summary containing empirical factors and knowledge, I have gathered, considerably. It can serve as a kind of training wheel for resolute vine growers, who want to continue to be engaged in this traditionally beautiful, but very hard activity full of challenges and problems, which as a full-time job has often a negative impact on the standard of living.
The results show that sooner or later it will be necessary for the farmers to be integrated if only out of necessity, however much they protest against and procrastinate the cooperation, in order to able to survive, to keep at least their current position, to be more competitive and capable of progress.

I think that it is worth sending my updated online questionnaire to the wine community members on nationwide level later on, since it can provide many information for us, which further on will serve professional decisions, practical law implementation, easier administration, better transparency of costs. It is definitely useful and complements the new strategy. In my view, more emphasis should be put on better representation and prevalence of the vine growers' interests, to which the results of the questionnaires could serve as a good starting point. While about the many new changes the feedbacks can serve as information how good they are in practice, and how they affect the vine growers' live.

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