Open characters of innovation management in the Hungarian wine industry

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Abstract: The paper examines the relationship between the use of specific knowledge and economic success among Hungarian grape growers and wine makers. In the last decade, Hungary has been left behind by world trends as represented by the increasing share of the premium and super-premium wines (which utilise higher knowledge) in the export development. According to our survey, one cause of this might be the inappropriate use and management of knowledge and skills which is '*conditio sine qua non*' for wine making. The Hungarian wine regions (usually with resource-based, fordist type resource endowment) are rather knowledge users. We have found (based on the PCA estimation) that two principal components cover 77% of the total variance: 'Size' and 'Innovation capabilities'. However, although the use and spread of skills is a basic component in explaining the differences of variation among the companies, it is not unambiguous in formulating the business success measured in different indicators. Because the small and medium sized enterprises (SMEs) have limited resources in capital accumulation and knowledge creation, they need to maintain living network connections in order to expand their constrained innovation capabilities. Instead of the 'closed' type of innovation and knowledge accumulation, they utilise the 'open' way of acquiring knowledge, where they necessarily share their specific information with their partners, but at the same time, they are supplied with new knowledge which might be vital for their own progress. The majority of the Hungarian vine- and wine makers are not open enough in the different phases of the innovation process. However, our analysis proves that if they showed up mutuality especially in knowledge sharing with their competitors, they could improve their positions significantly. We conclude that the Hungarian wine enterprises – keeping the idea generation as well as its further development, elaboration and the adequate use within the frame of the company – can achieve market success.

Key words: Hungarian SMEs, open innovation, principal component analysis, vine- and wine sector

In the last decade, Hungary has been left behind by the world trends as represented by the increasing share of the premium and super-premium wines (which utilise a higher knowledge) in the export development. At the same time, the market shares of the 'old exporters' (France, Italy and Germany) has decreased at the expense of those of the 'new exporters' (Australia, New Zealand, Chile, Argentina and USA). The vineyards planted in the new wine producing countries at the start of the 1990s reached their full production during this period. Therefore, their share of exports has doubled (from 20% to 40%), while amongst the traditional European exporters, the growth has been more modest (from 30% to 35%). The realignment totally took place at the end of the decade (Anderson and Nelgen 2011).

Chládková et al. (2012) found that the major innovative element of the impact on the economy of the wine is the application of the European legislation for the common wine market. Concerning the Czech wine industry, a significant increase of the grape varieties was observable and they found that the profitability of the sector highly depends on the domestic consumption and the cultivation of grapes with the emphasis on the quality improvement.

The European countries have responded to these trends in different ways. For this paper, the most important changes are how the realignment of the wine sector towards the higher value added wines has influenced the market price of the exported wines. Beyond the higher selling prices, higher levels of innovative competencies are observed (Harmsen et al. 2000), and the price trends clearly indicate the objectives of the national wine strategies. During the period from 2001 to 2008, the average price of wine exported from France increased from around

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USD 3 per litre to over USD 7 per litre according to the FAOSTAT data. The average export price of Italian wine increased from around USD 1.5 per litre to USD 3 per litre during this period, while for the Romanian exported wine the increase was even larger, from about USD 0.5 per litre to USD 4 per litre. By contrast, the average price of wine exported from Hungary increased from a little under USD 1 per litre only to around USD 1.5 per litre.

The massive surplus in the world wine production and the shift to the premium direction means that an intensive use of knowledge is essential within the industry. An innovative management attitude is required. But the wine industry is typically composed of small and medium sized enterprises (SMEs), and the innovation capacity of SMEs can be very limited. The development and the maintenance of such capabilities are usually at the limits of these companies. Their limited internal resources and the unused economies of scale force them to use external resources for the development of their organisational knowledge and for the effective use of the results of innovation (Kühne and Gellynck 2010a). It is a general concept that the SMEs use their innovative capacities in order to gain and maintain competitive advantages (Alston 2010).

At the end of the 20th century, the role of knowledge has increased in every economic field. Knowledge-intensive organisations and their services have prospered, as the importance of the capital-intensive industries has declined (Dobrai and Farkas 2009). It is widely assumed in both neoclassical and evolutionary economic theory that the market selection rewards the most innovative firms: ensuring more markets and/or increasing the market shares of the innovators. However, this approach is not unambiguously supported by the empirical research: the empirical evidence on whether innovative firms perform better than the non-innovative ones remains inconclusive (Demirel and Mazzucato 2009).

Not only theoretical assumptions but also the empirical research shows that the knowledge intensive services are successful in every field of the modern business. However, the empirical conclusions about the impact of innovation on profit and firm growth are mostly mixed, especially for the latter. Several studies find persistent differences in the determinants of profitability for innovators and non-innovators (Stoneman and Kwon 1996; Freel 2000; Leiponen 2000). The empirical results with regard to the effect of innovation on the firm growth are more mixed. According to Adamou and Sasidharan (2008), firms with higher R&D intensity ratios (i.e. R&D/sales) grow faster. In contrast, from Del Monte and Papagni (2003) we learn that R&D has a positive impact on the firm growth but that this is more pronounced in the traditional industries than in the most 'high-tech' ones. In a Swedish sample, Heshmati and Lööf (2006) did not find a significant impact of the R&D expenditure on the firm growth. Oliveira and Fortunato (2005) showed that physical investments have a much higher impact compared to R&D investments, especially for the 'high-tech' firms.

The knowledge accumulated and used in the organisations is an important resource. In order to achieve the goals, a usable knowledge is needed to combine not only the technical, but also the financial and economic resources. Any kind of the knowledge of facts or processes could become a part of the organisational knowledge if it generates a proper action (Birchler and Bütler 2007). The value of knowledge is important, because its source is the action: the possible reaction increases the expected utility. The value of the information/knowledge leading to actions equals the surplus of utility, which is expected by the decision maker once he/she becomes aware of the information. The knowledge and the generated proper action is the adequate way of efficient coordination (Tóth 2011).

For SMEs, knowledge creation and application are essential tools in managing a developing and prosperous path. SMEs have limited resources in capital accumulation and knowledge creation (e.g. the existence of their own R&D section within the organisation), therefore they need to maintain living network connections in order to expand their constrained innovation capabilities. Instead of a 'closed' type of innovation and knowledge accumulation, they utilise the 'open' way of knowledge acquisition, where they necessarily share their specific information with their partners, but at the same time, they are supplied with new knowledge which might be vital for their own progress.

Agricultural SMEs usually operate as family run businesses and, because of their size limits, their success depends on many preconditions. For example, in North Carolina, where the number and percentage of family run businesses is above the average of the USA, the success of local farmers depends mainly on six factors (Yeboah et al. 2010). In addition to important management skills (clear goals, management experiences, financial expertise) and the efforts of the product differentiation (special products, diversified activities) the authors state that the access to knowledge is the most important key of success. The smaller organisations can only turn their flexibility to advantage if they are in possession of the required knowledge.

As many researchers (e.g. Harmsen et al. 2000; Maurel 2009) have shown, both innovation and the external relationships of companies can have a great influence on the level of exports. Analysing the falling share of Hungarian exports on the world market poses the question: What is the role of innovation in the Hungarian wine sector? This paper examines whether in the Hungarian wine sector (vine and wine production) the innovative management attitude is common and whether it contributes to the progress of the company. The examined time period (2004–2006) is when the European Union (EU) had to contend with the aggressive market penetration of new wine producing countries, taking wine reforms in force. The new EU framework is more market oriented and competitive, therefore, for the Hungarian wine sector, which is composed almost entirely of SMEs, fostering, adapting and spreading innovation is more crucial than ever.

METHODOLOGY

First we want to describe the very characteristic survey outcomes in order to give a comprehensive picture about the infrastructural and legislation environment surrounding the innovation of the vine growers and wine makers. Therefore, we calculated the mean, median and skewness for the main questions which were put in the questionnaire.

Because the answers were given on a 7 point Lickert scale (meaning 1 the lowest and 7 the highest level of agreement or valuation), the mean and median are necessarily between 1 and 7. Skewness means the direction and degree of asymmetry among the answers. Positive skew (heavier right tail) results in skewness > 0; negative skew (heavier left tail) resulta in skewness < 0. If the mean is greater than the median, the majority of respondents tend to evaluate the situation worse than the average. If the mean is less than the median, the situation is just the opposite.

Our research is based around three hypotheses. The survey to test these hypotheses was carried out in 2005 in 22 Hungarian wine regions. Altogether 119 questionnaires were completed meaning an average of five questionnaires in every wine region. As the statistical representativeness of the companies could not be achieved, the research results cannot be referred to specific types of firms or even wine regions. However, they are valid for the Hungarian wine industry as a whole.

Our first hypothesis (H1) is that the innovation capabilities play a determining role in explaining the differences among the firms in the wine sectors.

As in the questionnaire more than 100 questions were asked and there is a limited theoretical and empirical knowledge regarding the knowledge creation and use, firstly we used the method of data exploration. We carried out[1] a Principal Component Analysis (PCA). As for the selection, first we have included all the variables which were the firm-specific ones: legal form, age, net turnover in 2003 and 2005, number of employees, number of employees with college and university degree, share of employees speaking foreign language and able to use computer. After creating the principal components, we have checked for the sampling adequacy using the Kaiser-Meyer-Olkin (KMO) test and we have dropped those variables which did not achieve a certain (0.7) level of the KMO. At the same time, we also considered the explaining power of the components. For determining the number of principal components, we used the Kaiser criterion.

Our second hypothesis (H2) is as follows: *the acquisition and development of knowledge result in business success*. Based on the assumptions of information economics, we can expect that an adequate way of using knowledge has a positive influence on success. Our expectation is that independently from the place where the idea was generated, the appropriate step after having learned the new idea is that the SME tries to get it marketed within the boundaries of the firm.

We tested whether there is any connection between the place of idea/knowledge acquisition (inside or outside of the company), the place of idea/knowledge development (inside or outside of the company) and the success (the idea/knowledge is sold in the market) by the ordered logit regression. The adequate use of knowledge in this case means that the companies develop and use the knowledge (coming from anywhere), and it is sold in the market by the company itself and the company benefits from it. The regression variables were as follows (a) what is the share of the idea *generating* process fully carried out within the company? (independent variable); (b) what is the share of the idea *development* process fully carried out within the company? (independent variable); and (c) what is the share of the *marketing* process fully carried out within the company? (dependent variable).

The possible answers for each question were: 0–25; 25–50; 50–75; and 75–100%. The four different cat-

[1]With the mathematical-statistical programme package 'Stata 11.0'.

egories also determine an order whereas the ordered logit regression shows the odds ratio of the change in the category of independent variables influencing the change in the category of the dependent variable.

Our third hypothesis (H3) is that the *'open' type of innovation exists in the Hungarian wine sector*. For testing this hypothesis, we utilised the information which we derived from the question 'How frequently does your firm use input from an institution for idea generation, development and commercialisation?' We were asking about the role of the following institutions: universities, colleges, research institutes, regional customers, competitor firms from your industry, regional suppliers, venture capital, business incubators, industry or cluster associations, and chambers. The possible answers were: 'never', 'sometimes' and 'often'. We recoded the answers into dummy ones, creating 0 if the answer was 'never' or 'sometimes' and 1 if the answer was 'often'. Based on these pre-calculations, three different cluster analyses were carried out in three different phases of the innovation process (generating, developing and marketing).

The acquisition, development, use and spread of knowledge in the Hungarian wine sector are carried out by the SMEs. In order to overcome the resource constraints, the companies utilise their mutual and networking relations when acquiring, developing and marketing new ideas. To test this, we applied the cluster analysis for determining homogenous company groups in the idea generation, development and marketing phases of the innovation process. Our aim was to develop a framework where we can identify the groups which show similar characters of openness in different stages of the innovation process. We used the Calinski-Harabasz index in order to determine the number of clusters to be used in the analysis.

After having determined the clusters, we employed them as the predictor (independent) variables (among others) in proving the role of openness in different stages of the innovation process. We determined this predictor as equal to 1 if there was any outside consultation during the phase in question and 0 otherwise. The dependent variable was the dummy of the turnover increase, and the profit increase from 2003 to 2005, respectively.

In case of categorical dependent variables, the appropriate estimation method is the Maximum Likelihood, where we need to have an assumption about the nature of the probability distribution function of the error terms. Logit models use the standard logistic probability distribution, while probit models assume the standard normal distribution (Park 2008). As we do not have a strong assumption about the standard normal distribution feature of the error terms, we have used the semi-nonparametric ordered probit regression instead.

RESULTS

Quantitative characteristics of main survey questions

From the survey, it became clear that the use and spread of knowledge is a significant factor of the heterogeneity of the companies, but it is not unequivocally significant in their success. The Hungarian wine regions are rather only the knowledge users and even though the communicational networks are well developed, the infrastructure faces many deficiencies which frequently lead to the failure of innovation and the lack of success. In the Hungarian wine sector, the physical distance between the wine producers and the research institutes is very important. The results of the principal component analyses state that the Hungarian wine producing companies are rather in need of the practical knowledge than of the higher qualified knowledge derived from universities.

Further after analysing the statistical tabulations, some other conclusions could be made (Table 1):

- The infrastructural conditions of the Hungarian wine regions are disadvantageous, even in the profitable firms. As far the wine industry is very logistic-sensitive, the export in bigger quantities faces a big barrier.
- On the other hand, in the communicational infrastructure the circumstances are much better. Because Hungary could quickly close up in this field, this is not the main limitation to become profitable.
- The physical proximity of research institutes is very important and the physical distance could not be substituted by own capacities.
- The importance of specialised knowledge is crucial for the companies. Usually the bigger companies possess such knowledge, though almost every firm considers at least one specialty as their own knowledge.

The next conclusions are connected with the spreading of knowledge, which is crucial in the fundamental concept of this paper.

- The question regarding spreading of knowledge is mainly not answered; therefore, we can say that this is not an important topic among the respondents. It is an interesting phenomenon that the companies with the smallest profit think that the intra-company knowledge spreading has an important role. The non-institutional methods are uncommon in the

industry, and spreading of the tacit knowledge is very limited.
– There is a remarkable information flow between different companies, even if they are competitors. It is part of the synergy observed in the wine regions; therefore, we can say that the economic coordination is more than a simple market competition.
– The knowledge share with the suppliers is more important and occurs more often than with the competitors.
– The Hungarian wine industry has to face many competitors in the international trade. The competition is quite intensive both for big and small companies.
– The physical proximity of suppliers gives advantages to the industry.
– The legislative background is rather an inhibiting factor and does not help in the R+D activities.

The determining role of innovation capabilities

The main question for the sector is whether the wine regions (usually with resource-based, Fordist type resource endowment) could achieve the knowledge-based progress that goes beyond the competitiveness based on comparative advantages. The success of the companies was measured by their turnover and net profit increase in 2005 compared to 2003[2], while the innovation attitude was captured by different indicators. Table 2 summarises the main innovation characteristics of grape and wine producers in Hungary. It can be stated that the Hungarian wine regions are rather knowledge users. Further recommendations cannot be derived from this single statement but the result reminds us of the sector's dependency on the external innovation and resource allocation.

Although these statements derived from the individual tabulations underpin the validity of our first hypothesis, the results of the principal component analysis (Table 3–5) are more pronounced in this respect. Based on the PCA estimation, two principal components cover 77% of the total variance: PC1 – 'Size' and PC2 – 'Innovation capabilities'. The first contains five, while the second contains three variables. In the PC2, the capabilities for absorbing new knowledge were well described by the percentage of the foreign language speaking- and active computer using employees as well as by the number of employees with the college/university degree, while in the PC1, the size was depicted by the net turnover in 2003 and 2005, the number of employees in the two

Table 1. Main statistics based on the results of the survey

	Mean	Median	Skewness
The overall quality of infrastructure (roads and energy network) fits our needs the region	3.77	4	0.35
The communications infrastructure (including internet access) in our region fully satisfies our business needs	4.15	6	–0.73
Specialised facilities for research in the wine sector (e.g. science laboratories) university research institutions and technical libraries) are readily available	4.06	4	–0.04
The institutions in our region that perform basic research frequently transfer knowledge to our industry	3.74	4	0.06
There is an essential need for skilled workers in the wine making industry	5.24	5	–0.69
The regional supply of skilled (secondary educated) people fits our needs	3.72	4	0.01
Our company needs specific, exclusively owned knowledge	5.52	6	–1.11
Reciprocity among competitors in knowledge sharing: we inform each other 100%	3.50	3	0.16
Reciprocity with the chain (suppliers and buyers) in knowledge sparing we inform each other 100%	3.99	4	–0.19
Competition in our field of activity is very intense	5.48	6	–0.67
Regional specialised suppliers of our business' materials, machinery and services mostly available inside your region	4.09	4	–0.11
National and local regulations affecting our activity are adequate, helpful	3.16	3	0.39

Source: own composition

[2]We used a dummy variable for indicating success. If the turnover/net profit in 2005 was not less than in 2003, we considered the company to be successful with the dummy variable 1, otherwise the company was given the dummy variable 0.

Table 2. New production methods or improved processes (number of respondents)

Net profit (2005)	Missing	Coming from outside	2	3	4	5	6	Developed in our wine region	Total
Less than HUF 100 thousand	3	6	18	20	14	15	5	3	84
HUF 100 thousand < HUF 1 million	1	1	0	2	1	1	2	0	8
HUF 1 million < HUF 10 million	1	2	4	3	6	0	2	0	18
More than HUF 10 million	0	1	1	2	2	1	1	1	9
Total	5	10	23	27	23	17	10	4	119

Source: own composition

observed years and the number of employees with primary education.

PC1 covers 59.7%, while the PC2 covers 17.9 % of the variance. Table 3 refers to the loadings of the principal components, which express the variance explained by the PC1 and the PC2. In this table, we also can read the communality values. Communality refers to the percentage of variance for the variable that is explained by the components. All in all, more than 75% of the total variance is explained by the two components. The less explained variables are the "Net turnover, 2005", where 67.6%, and the "Number of current employees with university/college degree", where 66.2% of the total variance is illuminated by the components. The second principal component indicates the presence and relevance of innovation capabilities.

Table 4 shows the component scores (or loadings). We can see that the third component accounts for 8.8% of the variance, which is a relatively high ratio. However, we did not take this component into consideration when exploring the components, because we have followed the rule of the Kaiser criterion (below the Eigenvalue 1.0 the component is dropped).

For testing the consistency of our data reduction, we applied the Kaiser-Meyer-Olkin test of sampling adequacy (Tables 5 and 6.). From this record, we can conclude that our data from the point of the sampling adequacy is above middle, almost meritorious (overall 0.79), so the data reduction is reasonable[3]. Consequently because of the clear structure shown by the two components, we regard our *first hypothesis proven*.

Table 3. Principal components (scoring coefficients or loadings); number of obs. = 67

Variable	PC1	PC2	Communality*
Net turnover (HUF thousand), 2003	0.4092	0.0784	0.8077
Net turnover (HUF thousand), 2005	0.3737	0.0826	0.6763
Number of employees, 2003	0.4387	0.0705	0.9253
Number of employees, 2005	0.4264	0.0343	0.8693
Number of current employees with primary education	0.4088	–0.061	0.803
Number of current employees with university/college degree	0.3446	0.2579	0.6616
Share of employees speaking a foreign language (%)	–0.135	0.657	0.7041
Share of employees able to use a computer (%)	–0.121	0.692	0.7536

*Communality is the weighed sum of square of loadings. It indicates the proportion of variance shared by the item with the principal components

Source: own composition

[3]The Kaiser-Meyer-Olkin measure of sampling adequacy compares the correlations and the partial correlations between variables. If the partial correlations are relatively high compared to the correlations, the KMO measure is small, and a low-dimensional representation of the data is not possible.

Table 4. Communalities of principal components

Component	Eigenvalues	Proportion	Cumulative
Comp1	4.77198	0.5965	0.597
Comp2	1.429	0.1786	0.775
Comp3	0.70697	0.0884	0.864
Comp4	0.54145	0.0677	0.931
Comp5	0.37004	0.0463	0.977
Comp6	0.11962	0.015	0.992
Comp7	0.03703	0.0046	0.997
Comp8	0.02391	0.003	1

Source: own composition

Table 5. Cornbach's Alpha of the original variables

Variable	KMO
Net turnover (HUF thousand), 2003	0.755
Net turnover (HUF thousand), 2005	0.717
Number of employees, 2003	0.793
Number of employees, 2005	0.804
Number of current employees with primary education	0.918
Number of current employees with university/ college degree	0.814
Share of employees speaking a foreign language (%)	0.709
Share of employees able to use a computer (%)	0.625
Net turnover (HUF thousand), 2003	0.755
Overall	0.789

Source: own composition

The acquisition and development of knowledge

The results of the ordered linear regression show that the higher is the share of the idea generation and development undertaken within the company, the higher is the share of own commercialisation (Table 7). When the share of own development is one category higher, there is a seven times higher chance that the share of own commercialisation is also one category higher. Therefore, our *second hypothesis* is fully confirmed.

Table 6. Cornbach's Alpha after variable reduction

Test scale	
Average interitem covariance	258.454
Number of items in the scale	2
Scale reliability coefficient (Cornbach's Alpha)	0.9658

Source: own composition

Existence of the 'open' type of innovation

In the phase of idea generation (Table 8), the majority of the selected firms do not have any external connection[4]. On the other hand, half of the other firms (% of the total sample) cooperate with local buyers, while the remaining half cooperates with local suppliers.

After the idea generation, during the phase of the idea development, the majority of the companies (73%) still do not have any external consultation and communication (Table 8). Among those that have, the horizontal (9%) and vertical (18%) interactions could be measured. In the first group, the local suppliers and Chambers of Agriculture are the most relevant partners while among the latter group, there are the research institutes.

In the last phase, during the marketing of the developed ideas, four different clusters could be distinguished. Still the majority of the sample does not have any external relationships (63%), while 17% of them cooperate with buyers, 6% with local suppliers, and 14% with the whole supply chain (Table 8).

Table 7. Effect of adequate action on market success

	Parameter	Odds ratio
What proportion of idea *commercialisation* is done entirely within your firm, as opposed to by/with any of outsider institutions? (dependent variable)		
What proportion of idea *generation* is done entirely within your firm, as opposed to by/with any of other institutions? (independent variable)	0.7715262*	2.163065
What proportion of idea *development* is done entirely within your firm, as opposed to by/with any of other institutions? (independent variable)	1.950272***	7.030601

Significance level: 1% (***) and 10% (*)

Source: own composition

[4]Because of the cluster creation procedure, the values 1 or close to 1 mean that the cluster has taken ideas from that given source.

Table 8. Results of cluster analysis in the process of idea generating, processing and marketing (group means)

	Nr of firms	University	College	Research centre	Local buyers	Competitors	Local suppliers	Venture capital	Incubator houses	Industry organisations	Chambers
Generating											
Cluster 1	58	0.17	0.07	0.31	0	0.09	0.1	0.02	0	0.02	0.12
Cluster 2	22	0.05	0	0.18	**1**	0.27	0	0.05	0	0.05	0.05
Cluster 3	19	0	0	0.21	**0.74**	0.11	**1**	0.21	0.05	0.16	0.11
Total	99	0.11	0.04	0.26	0.36	0.13	0.25	0.06	0.01	0.05	0.1
Processing											
Cluster 1	9	0.22	0.33	0.44	0.22	0.11	**0.78**	0	0	0.33	**1**
Cluster 2	70	0.06	0.04	0	0.17	0.06	0.1	0.04	0.01	0.06	0
Cluster 3	17	0.29	0.24	**1**	0.24	0.06	0.12	0	0	0.12	0.18
Total	96	0.11	0.1	0.22	0.19	0.06	0.17	0.03	0.01	0.09	0.13
Marketing											
Cluster 1	16	0.06	0.06	0.13	**1**	0.5	0	0.19	0.13	0.06	0.13
Cluster 2	13	0	0	0.23	**1**	0.62	**1**	0	0.08	0.15	0.15
Cluster 3	6	0	0.17	0.17	0	0	**1**	0	0	0.33	0.33
Cluster 4	60	0.05	0.07	0.15	0	0.02	0	0	0	0.02	0.03
Total	95	0.04	0.06	0.16	0.31	0.18	0.2	0.03	0.03	0.06	0.08

Source: own composition

Based on the results of the cluster analysis, it is clear that the majority (60–73%) of the firms in the Hungarian wine sector do not cooperate with external players of the industry during the process of innovation. On the other hand, some efforts can already be observed, especially during the phases of the idea generation and marketing.

Semi-nonparametric ordered probit regression calculations were carried out in order to measure the influence of several factors on the turnover and

Table 9. Results of snp analysis regarding turnover and profit

	Turnover	Profit
Mutuality in knowledge share among the competitors	1.053***	0.803***
Mutuality in knowledge share in the supply chain	–0.730***	0.026
% of the leaders of local suppliers is known personally	–0.386*	0.393**
% of the leaders of local buyers is known personally	–0.057	–0.636***
% of the leaders of local competitors is known personally	1.310***	1.602***
% of the leaders of related offices is known personally	–1.166***	–1.290***
Trust and reliability is important when the partner is selected	–0.570	–0.936***
The biggest deals are with well-known partners	0.331	1.229***
I_gen = 1 if the idea generating relies on external relationships	2.764***	–1.129***
I_dev = 1 if the idea developing relies on external relationships	–0.112	–1.795***
I_mket = 1 if the idea marketing relies on external relationships	–0.787**	0.215

Turnover D = 0, if Turnover 2005 < Turnover 2003; = 1, if Turnover 2005 ≥ Turnover 2003
Profit D = 0, if Profit 2005 < Profit 2003; = 1, if Profit 2005 ≥ Profit 2003
*p < 0.1, **p < 0.05, ***p < 0.01

Source: own composition

profit. There is a high and positive connection between the turnover and mutuality in the knowledge share among the competitors, the high number of local competitors' leaders known personally and whether the idea generation relies on external relationships (Table 9).

Knowing personally the leaders of local competitors and doing business with well-known partners are the two most important factors regarding profit (Table 9). On the other hand, knowing the key persons of the bureaucratic institutes surprisingly does not have any positive contribution to the turnover or to profit. The results of the semi-nonparametric ordered probit regressions underline the importance of the personal and mutual knowledge of the leaders in the industry. Therefore, we can conclude that personal networks play an important role in the profitability of the Hungarian wine industry.

DISCUSSION AND CONCLUSION

In this paper, it was clearly indicated that the trends of the world-wide wine industry tend towards the premium and super premium categories. In Europe, this is very well represented by France, but on the other hand, all the new wine producers are in this line. On the contrary, Hungary was out of step in the recent decades. Based on our research, we believe that one of the major reasons could be the ineffective use of knowledge in the wine sector.

Mihailovic et al. (2009) found that in the former socialist countries the knowledge gained from research and education could lead agricultural SMEs towards innovation and technological development. On the other hand, the inherited knowledge in the former Eastern Bloc could hardly be transformed to innovative advantage, as the centralised research was not carried out according to the needs of the market. Therefore, the first step should be the establishment of such cooperation where the public research capacities are working together with the private sector.

Kühne and Gellynck (2010b), focusing on Belgium, Hungary and Italy, showed that although some examples exist of both vertical and horizontal integration, the cooperation usually fails because of the lack of trust, the inefficient capital and other resources and the scepticism of cooperation.

Based on the Czech experiences of the project called 'Best European Practices', the knowledge share of the universities and the research institutes play an important role in increasing the level of competitiveness (Tichá and Havlíček 2008). Therefore, these institutions are under a growing pressure in order to fulfil such needs.

Our analysis underlines that the innovation capability is an important topic for the Hungarian wine producers: this measure explains about 18% of the total variance among them. These companies, because of their limited resources in capital accumulation and knowledge creation, would need to expand and utilize their network relations in order to increase their constrained innovation capabilities. This attitude would require the open approach from the managers, but they are not open up to the necessary extent. Their openness changes along the innovation process (in the idea generation phase 41%, in the idea development 27% and in the commercialization stage 37%) and it can be regarded as a relatively low level.

On the other hand, we can also say that there is a great potential of the Hungarian enterprises if they could manage and use the knowledge in the adequate manner. The ordered logit regression stresses that in the case a Hungarian wine producing SME invests more efforts and resources to the developments carried out inside the company, in the marketing it could expect a much better position. Therefore, we can say that the potential success in the marketing of own developments is expectable in the Hungarian wine sector, which could be a break out possibility even on the international level.

Finally, we can see that the presence of open innovation is still very limited; the firms do not have a frequent external connection during the process of innovation. On the other hand, the personal networks (knowing the leaders of the most important players of the sector) still play an important role in the success of the firms.

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