

USE OF KNOWLEDGE IN THE HUNGARIAN WINE REGIONS

J. TÓTH and Á. TÖRÖK*

Department of Agricultural Economics and Rural Development, Corvinus University of Budapest,
H-1093 Budapest, Fővám tér 8. Hungary

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The paper examines the relationship between the use of specific knowledge and success among the Hungarian grape growers and wine makers. In the recent decade Hungary has been left behind by the world trends representing an increasing share of premium and superpremium wines (which materialize higher knowledge) in export development. According to our survey, the non-appropriate usage and management of knowledge and skills that would be ‘condition sine qua non’ for wine making might be behind that. However, the use and spread of skills is a basic component in explaining the differences among companies, it is not unambiguous in formulating the business success measured by different indicators. At the same time we can conclude that the Hungarian wine enterprises – keeping the idea of generation, as well as its further development, elaboration, and adequate usage within the frame of the company – can achieve market success.

Keywords: use of knowledge, innovation, Hungarian wine sector

The capacity of SMEs for innovation is very limited. The development and the maintenance of capacities are usually facing the limit of these companies. On the other hand, there are some industries (e.g. winery) where the high level of competition requires having an innovative management attitude. The limited internal resources and the unused economics of scale force the enterprises to use external resources for the extension of the organizational knowledge (BIRCHLER & BÜTLER, 2007) and for the effective use of the results of the innovation (KÜHNE & GELLYNCK, 2010a). It is a general concept that the SMEs use their innovative capacities in order to gain and maintain competitive advantages (ALSTON, 2010).

This paper examines whether in the Hungarian wine sector (vine and wine production also included) the innovative management attitude is common and whether it takes part in the success of the company. The examined time period (2004–2006) overlaps the years when the EU had to face the aggressive market penetration of new wine producing countries (e.g. Australia, Chile, and South Africa), calling for reforms. The new EU framework is more market oriented and competitive, therefore for the Hungarian wine sector – with almost only SME companies – fostering, adapting, and spreading the innovation is more crucial than ever.

After summarizing the empirical results of the innovation among agricultural SMEs the paper analyses the international wine market in order to underline the importance of the premium wines and the innovation embodied in them. Afterwards, the hypotheses are drafted with the help of the information economics. The third part describes the questionnaire used for the empirical survey with some general statistics. In the fourth part the methodology and the results are stated, and in the last part the paper draws conclusions with the discussion of the results and their limitations.

* To whom correspondence should be addressed.

Phone: +36 (1) 482-5317; fax: +36 (1) 482-5428; e-mail: aron.torok@uni-corvinus.hu

1. Analysis of the Hungarian wine sector

1.1. Innovation among agricultural SMEs

At the end of the 20th century the role of knowledge has been appraised in every field of the economy, the decreasing success rates of the capital intensive industries promoted the emergence of the knowledge intensive organizations and their services (DOBRAI & FARKAS, 2009). Not only theoretical assumptions but also empirical researches prove that the knowledge intensive services are the key for the success in every field of modern business. The small- and medium-sized enterprises use these services generally as external resources.

The agricultural SMEs producing traditional products use vertical and horizontal integration to overcome their deficiency in the field of knowledge and information. The research of KÜHNE and GELLYNCK (2010b) focusing on Belgium, Hungary, and Italy showed that though 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.

The success of the agricultural SMEs requires many preconditions. Because of the size-limits these companies – operating usually as family run businesses – have to be very flexible. In North-Carolina – where the number and proportion of family run businesses is over 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 product differentiation (special products, diversified activities) the authors state that the access to knowledge is the sixth most important key of success. The smaller organizations can only turn their flexibility to advantages if they are in possession of the required knowledge.

MIHAILOVIC and co-workers (2009) made a research for the former socialist countries and found that the knowledge gained from researches and education could lead the agricultural SMEs towards innovation and technological development. On the other hand, the inherited knowledge in the former Eastern Block is hardly could be transform to innovative advantage, as far the centralized researches were 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.

Based on the Czech experiences of the project called “Best European Practices” the knowledge share of the universities and the research institutes have an important role to increase the level of competitiveness (TICHÁ & HAVLÍČEK, 2008). Therefore these institutions are under a growing pressure in order to fulfill such needs.

It is a general concept that the SMEs use their innovative capacities in order to gain and maintain competitive advantages (ALSTON, 2010).

1.2. Recent changes in the wine export markets

During the last two decades both the worldwide wine consumption and production show a modest growth, between 1992–1995 and 2000–2003 the production increased by 4.5%, while between 1992 and 2004 the level of consumption got higher with 4.9% (LEHOTA & FEHÉR, 2007). On the other hand, there is a significant and relevant difference between the level of production and consumption: the rate of overproduction was 9–23% in these years (see Fig. 1). This phenomenon has two main effects on the international trade of wine. First, on the demand side the price level is getting lower and lower while the alternate use of wine

(bio-fuel, industrial wine, distillation etc.) becomes more important. Secondly, the structure of the markets is changing: wines with higher value-added are elbowing the standard wines out of the markets and pushing them into the alternate use. On the other hand, there are significant differences between the most important exporting countries (Table 1).

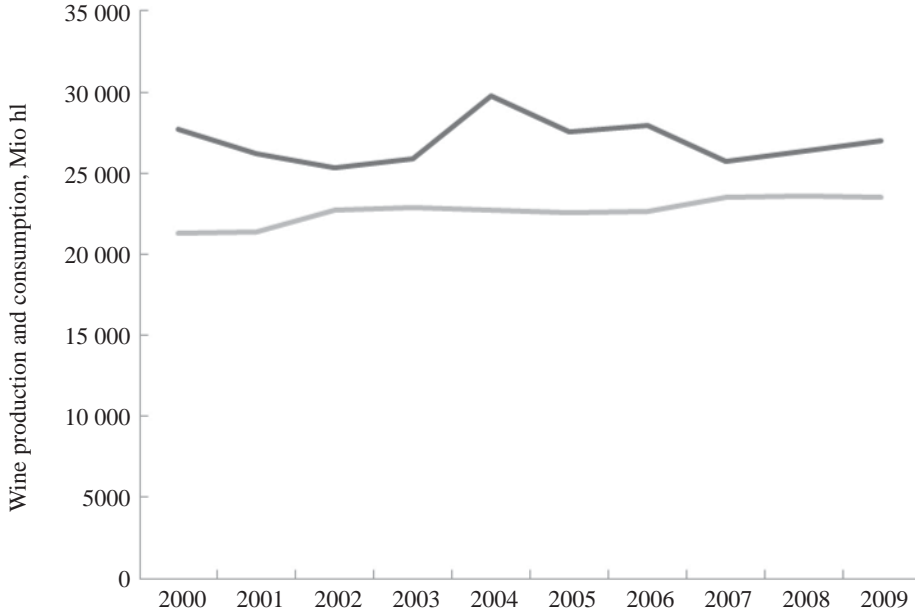


Fig. 1. Wine production and consumption in the world (2000–2009) (mio hl).

— : Wine production; — : wine consumption

Source: own composition based on ANDERSON and NELGEN (2011)

Table 1. The share of the most important players of the international wine export market

Country	Ranking		Change	Growth of export (%)
	2000	2009		
France	1.	1.	–	53
Italy	2.	2.	–	117
Spain	3.	3.	–	104
Australia	4.	4.	–	101
Chile	5.	5.	–	138
Germany	8.	6.	+2	188
USA	6.	7.	–1	65
Portugal	7.	8.	–1	62
South-Africa	9.	9.	–	193
New Zealand	12.	10.	+2	616

Source: FAOSTAT (2012)

A partial equilibrium model made by Australian researchers (WITTWER & ROTHFIELD, 2005) shows the expected structure of the international wine export market for 2003–2010. The results clearly show that the share of the “old exporters” (France, Italy and Germany) is decreasing because of the sweep of the “new exporters” (Australia, New Zealand, Chile, Argentina and USA). Moreover it was also clearly indicated that the importance of premium and superpremium wines will be strengthened while the export of standard wines will decrease significantly (Table 2).

Table 2. The structural change of quality in wine export (Partial equilibrium model, 2003–2010, mhl)

	Premium	Superpremium	Standard
France	–860	2020	–1080
Italy	–1600	80	–3060
Germany	–280	60	–260
Australia	6040	1510	–300
New Zealand	340	780	–
Chile	4080	520	–180
Argentina	140	–	240
USA	2260	20	740
Total	10 120	4990	–3900

Source: own composition based on WITTWER and ROTHFIELD (2005)

The experience of the last decade confirms the forecast of the equilibrium model. The vineyards planted in the new wine producing countries (North and South America, South Africa, Australia and New Zealand) at the beginnings of 90s started fruiting these years in mass amount. Therefore the share of export in these countries has doubled (from 20% to 40%), while in the traditional European exporters the growth was more modest (from 30% to 35%). At the end of the decade the realignment totally took place (Table 3).

Table 3. The ranking of the most important wine exporters¹ in 2009

Rank	Country	Million US\$	(%)	Rank	Country	Million US\$	(%)
1.	France	7690.1	30.5	11.	Argentina	636.0	2.5
2.	Italy	4861.0	19.3	12.	United Kingdom	500.2	2.0
3.	Spain	2175.9	8.6	13.	Belgium-Luxemburg	425.2	1.7
4.	Australia	1802.1	7.1	14.	Singapur	193.6	0.8
5.	Chile	1374.2	5.4	15.	Austria	165.8	0.7
6.	Germany	1020.7	4.0	16.	Moldova	128.2	0.5
7.	USA	876.0	3.5	17.	Danemark	116.1	0.5
8.	Portugal	762.7	3.0	18.	Netherlands	110.0	0.4
9.	South Africa	711.0	2.8	19.	Hong Kong	98.0	0.4
10.	New Zealand	637.3	2.5	20.	Switzerland	89.5	0.4

¹: Reexport is also included

Source: ANDERSON and NELGEN (2011)

Table 4 shows the change in the export structure towards the superpremium wines, which also confirms the equilibrium model. The data are from year 2009.

Table 4. The share of the different quality groups

Country	B	P	SP	Ch	B	P	SP	Ch
	Volumen of export (%)				Value of export (%)			
France	20	45	24	10	5	31	33	32
Italy	34	53	6	7	9	65	15	11
Germany	15	74	4	7	9	72	8	12
Australia	39	56	3	2	14	75	8	3
New Zealand	22	38	38	1	9	30	60	1
USA	46	49	3	2	24	66	7	3
Argentina	26	71	1	1	8	86	4	2
Chile	42	54	3	0	16	76	8	1
World total	37	50	7	6	11	56	17	16
EU-15	34	48	9	8	9	50	20	21

P: premium; SP: superpremium; B: standard quality; Ch: champagne

Source: ANDERSON and NELGEN (2011)

The European countries responded to the tendencies in different ways. For this paper the most important changes are how the realignment of the wine sector towards the higher value added wines influenced the market price of the exported wines. Beyond the higher selling prices higher level of innovative competencies are observed (HARMSSEN et al., 2000), and the price tendencies clearly indicate the objectives of the national wine strategies. In Fig. 2 the average of the Hungarian wine export prices from the last decade are compared to the prices of some leading (France, Italy) and to some following (Romania, Bulgaria) wine exporters.

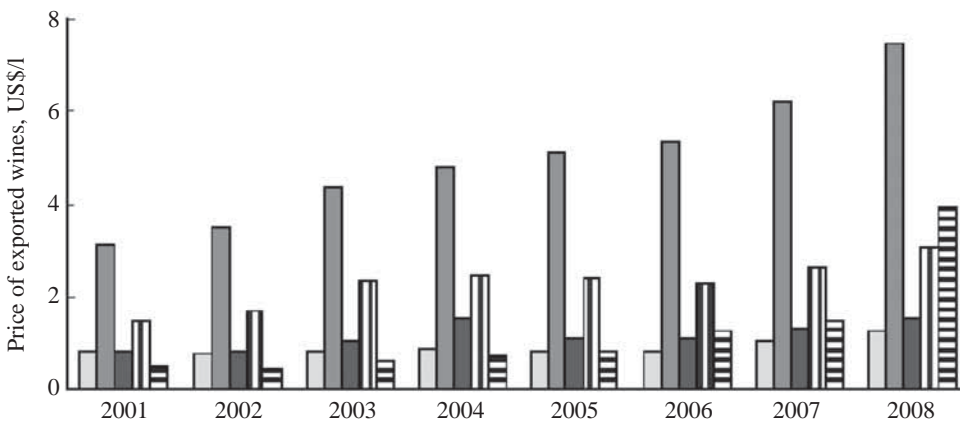


Fig. 2. Change in price of exported wine in selected countries (US\$/l)

■: Bulgaria; ■: France; ■: Hungary; □: Italy; ▨: Romania

Source: own composition based on FAOSTAT (2011)

Remarkable tendencies and results could be observed. France shows the clear signs of growing tendency and exports wines on the highest prices. These results underline and also complete the tendencies observed in Tables 1 and 2. As many other researches (HARMSSEN et al., 2000; MAUREL, 2009) also confirmed, both innovation and the external relationships of the companies have a great influence on the level of export. Analysing the falling share of the Hungarian export comes the question: what is the role of innovation in the Hungarian wine sector?

1.3. The economical role of knowledge and innovation

The knowledge accumulated and used in the organizations 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 economical resources. Any kind of knowledge regarding facts or processes could become part of the organizational knowledge if it generates a proper action (BIRCHLER & 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 that is expected by the decision maker once becomes aware of the information. The knowledge and the generated proper action is the adequate way of efficient coordination (TÓTH, 2009). Regarding the Hungarian wine regions the following considerations could be made:

- Are the capture, development, usage and spread of knowledge observable in the Hungarian wine sector? Compared to the leading wine exporters it is obviously noticeable only in a modest manner. An empirical research is to prove the assumption. (H1 hypothesis)
- Based on the assumptions of the information economics we can expect that the adequate way of using knowledge has a positive influence on success. The same empirical research is to prove this assumption. (H2 hypothesis)

2. Surveying the innovative management attitude of the wine market (methodology)

2.1. The survey used for the research

The survey was carried out in 2005 in the 22 Hungarian wine regions, as part of the T 046882 OTKA (TÓTH, 2009) research with the assistance of the National Council of the Wine Regions. Altogether 119 questionnaires were completed meaning an average value of 5 questionnaires in every wine region. As the statistical representative results of the wine regions could not be achieved, the research is on the country level.

Though the cluster-based cooperation strengthens the efficiency of the knowledge use (MAUREL, 2009), the role of clusters does not play a central role in this research. In case of the wine industry the borders of the clusters usually are the same like the borders of the selected wine region, which usually do not equal with the statistical regions. The main question therefore is not the position of these borders but whether the wine regions (usually with resource-based, fordist attitude) could achieve knowledge-based efforts, going beyond the competitiveness based on comparative advantages.

Analysing the empirical results we investigated the relationship between the success of the companies and their knowledge-based approach. The success of the companies was measured by their net profit in 2005.

Results will be summarized in the following tables. Every question could be answered in a 1 to 7 Lickert-scale. This type of Lickert scale has already been used in several innovation- and knowledge-questionnaires. The reason is that it has got a definite middle value (4) and allows the respondents to express their opinion symmetrically both on low (from 1 to 3) and high (from 5 to 7) part of the scale.

Table 5. New production methods or improved processes

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

Based on Table 5 it could be stated that the Hungarian wine regions are rather knowledge users. Though based on this single statement further recommendations could not be made, this result reminds the sector's dependency on external innovation and resource allocation.

After analysing the statistical results some other conclusion could be made:

- 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 of Hungary could quickly close up in this field, this is not a 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 Hungarian wine industry does not take all the advantages available in the work of research institutes.
- The secondary education in the Hungarian wine industry is highly needed.
- A local shortfall of professional workforce is observable.
- The importance of specialized 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 spread of knowledge, which is crucial in the fundamental concept of the clusters.

- The question regarding the spread of knowledge is quite unanswered, therefore we can say that this is not an important topic among the responders. It is an interesting phenomenon that the companies with the smallest profit think that the intra-company knowledge spread has an important role. The non-institutional methods are uncommon in the industry, and the spread of tacit knowledge is very limited.

- There is a remarkable information flow between the different companies, even if they are competitors. It is part of the synergy observed in the wine regions; therefore we can say that economical coordination is more than a simple market competition.
- The knowledge share with the suppliers is more important and often than with the competitors.
- The Hungarian wine industry has to face with many competitors in the international trade. The competition is quite intensive both for big and small companies.
- The physical proximity of suppliers gives advantages for the industry.
- For quality production the quality input is the most important factor but the majority of the Hungarian wine producers assess such resources.
- The legislative background is rather an inhibitory factor and do not help in the R+D activities.

2.2. Data analysis

As far in the questionnaire more than 100 questions were asked and there is a limited theoretical and empirical knowledge regarding knowledge creation and use, first we used the method of data exploration. Therefore we carried out a Principal Component Analysis (PCA), based on a covariance matrix, which is very sensitive for the outliers (VERARDI, 2009). In our sample a high number of outliers was expected, because: (a) there is a wide range of companies in terms of their size: from very small family run businesses to professional vineyards, (b) for sensitive questions regarding income and profit the responders usually gave only an estimation. The Lickert scale questions refer to the expression of personal opinions and experiences, which are not sensitive ones. The sensitive questions are all about the financial and profit conditions which are expressed in categories. For these reasons we used the robust PCA estimation (VERARDI & CROUX, 2010), where first we stipulated the covariance matrix with the Minimum Covariance Determinant (MCD) method, afterwards with the correlation matrix we made the PCA.

Secondly, with the principle components we made regression calculations: independent variables were the principle components while the dependents net income and the profit after tax. (The first two steps are to validate our H1 hypothesis.)

Thirdly, 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 on the market). The adequate use of knowledge in this case means that the companies develop and use the knowledge (coming from anywhere), and it is sold on the market by the company itself and benefits from it. It could be tested by the ordered logit regression and the questions were:

- What is the share of the idea generating process fully carried out within the company? (independent variable)
- What is the share of the idea developing process fully carried out within the company? (independent variable)
- What is the share of the marketing process fully carried out within the company? (dependent variable)

The four different categories 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.

When a dependent variable has more than two categories and the values of each category have a meaningful sequential order where a value is 'higher' than the previous one, then we

can use ordered logit. Ordered logit regression is a nonlinear regression model that forces the output (predicted values) to be the lower or higher category. In binary case logit models estimate the probability of the dependent variable to be 1. This is the probability that some event happens.

The possible answers for every questions were: “0–25%, 25–50%, 50–75%, 75–100%”. The four different categories 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. We used Stata 11 for the calculations.

3. Surveying the innovative management attitude of the wine market (results)

3.1. The knowledge use exists and plays an important role in the success of the Hungarian wine industry

Because of the questions regarding income and profit were answered only by 40–50% of the responders, for the PCA the variables were filtered and therefore too many observations were disregarded. The disregarded variables were representing the subjective opinion of the responders and not a quantitative estimation in an ordered scale. All the variables like: “Is there any need of secondary education in the wine industry?” were disregarded.

Based on the robust PCA estimation two principal components cover the 91% of the total variance: PC1 – “Professional qualification” and PC2 – “Size”. The first one contains three, while the second one contains two variables. (Other variables are disregarded because of the collinearity. All other variables are from the questionnaire.) In PC2 the size was well described by net turnover and the number of employees, while in PC1 the professional qualification was described by the skills and education of the employees. It is an interesting phenomenon that in our sample the big companies with big turnover had less profit than the smaller ones that is the reason why the sign was opposite (Table 6).

Table 6. Principal components

Variable	PC1	PC2
Net turnover (thousand HUF), 2005	-0.2141	0.5951
Net profit (thousand HUF), 2005	-0.3496	-0.4854
Number of employees, 2005	-0.1620	0.6202
Number of current employees with secondary (high school) education	0.5194	-0.0819
Share of employees speaking foreign language (%)	0.5176	0.0973
Share of employees able to use computer (%)	0.5176	0.0973

PC1 covers 60.8%, while PC2 covers 30.2% of the variance. The principal components indicate the presence of professional knowledge and the relevance of the answers. Their role in success is examined by regression estimation which is summarized in Table 7. In Table 7

the dependent variables are the Turnover and Profit both in 2003 and 2005, while the independent variables are the Principal Components (PCs).

Table 7. OLS regression results

	Net turnover, 2003	Net turnover, 2005	Net profit, 2003	Net profit, 2005
PC1	-168304.8**	-251707.2***	2629.7**	-1248.41**
PC2	131727.7**	187224.4***	-3024.579***	-1659.726***
Constant	334013.5***	363129.7***	858.6648	3199.519***
R ²	0.4321	0.4765	0.8940	0.9968
No of obs.	46	47	47	47

Significance level: 1% (***) and 5% (**)

Based on the analysis of the questionnaires our first hypothesis was partially confirmed by the identification of the principal components and 61% of explanatory strength. On the other hand, in the principle components the role of the higher education (representing a higher qualification) is less than the role of secondary education (representing a more practice oriented qualification), meaning probably the limitations of the capacity of innovation absorption. The regression calculations also confirmed that the professional qualification is significant but their sign is the opposite than it was expected (the only exception is the independent variable "Profit after tax 2003"). In the growth of income the "Size" plays an important role, confirming our neofordist expectations in the wine regions.

3.2. The acquisition and development of knowledge results in success

The results of the ordered logit regression are summarized in Table 8.

Table 8. Effect of adequate action on market success

	Parameter	Odds ratio
What proportion of idea Commercialization 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% (*)

Results show that the higher is the share of idea generation and development done within the company, the higher is the share of the own commercialization. In case the share of own development is one category higher, there is seven times higher chance, that the share of own commercialization is also one category higher. Therefore our second hypothesis is fully confirmed.

4. Conclusions

In this paper it was clearly indicated that the trends of the worldwide wine industry face 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 last decades. Based on our research we think that one of the major reasons could be the non-efficient knowledge use in the wine sector.

Based on the survey it became clear that use and spread of knowledge is a significant factor of the heterogeneity of the companies, but it is not unequivocally significant in the success. The Hungarian wine regions are rather only knowledge users and even though the communicational networks are well developed, the infrastructure faces many deficiencies which lead many times to the failure of innovation and 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 practical knowledge than of the higher qualified knowledge derived from universities.

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 an adequate manner. The ordered logit regression stresses that in case a Hungarian wine producing SME invests more efforts and resources to the developments carried out inside of the company, in the marketing it could expect a much greater position. Therefore we can say that potential success in the marketing of the own developments is expectable in the Hungarian wine sector, which could be a break out possibility even on the international level.

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References

- ALSTON, J.M. (2010): *The benefits from agricultural research and development, innovation, and productivity growth*. OECD Food, Agriculture and Fisheries Working Papers, No. 31, OECD Publishing.
- ANDERSON, K. & NELGEN, S. (2011): *Global wine markets, 1961 to 2009: a statistical compendium* – E-book, University of Adelaide Press, <http://www.adelaide.edu.au/wine-econ/databases/GWM>, downloaded: 20.06.2011.
- BIRCHLER, U. & BÜTLER, M. (2007): *Information economics. Vol. 2*. Routledge, New York, 488 pages
- DOBRAI, K. & FARKAS, F. (2009): Knowledge-intensive business services: a brief overview. *Perspectives of Innovations, Economics & Business*, 3, 15–17.
- FAOSTAT (2011): <http://faostat.fao.org/site/535/default.aspx#ancor> (Downloaded: 02.05.2011.)
- HARMSSEN, H., GRUNERT, K. & DECLERCK, F. (2000): Why did we make that cheese? An empirically based framework for understanding what drives innovation activity. *R&D Management*, 30, 151–166.
- KÜHNE, B. & GELLYNCK, X. (2010a): Chain networks as a leverage for innovation capacity: The case of food SMEs. *Int. J. Fd System Dynamics*, 1, 279–294.
- KÜHNE, B. & GELLYNCK, X. (2010b): Horizontal and vertical networks for innovation in the traditional food sector. *Int. J. Fd System Dynamics*, 1, 123–132.
- LEHOTA, J. & FEHÉR, I. (2007): Borexport-marketing: Nemzetközi borkereskedelem és marketing. (Wine-export marketing: International wine trade and marketing.) SZIE GTK, Gödöllő
- MAUREL, C. (2009): Determinants of export performance in French wine SMEs. *Int. J. Wine Business Res.*, 21, 118–142.

- MIHAILOVIC, B., HAMOVIC, V. & PARASIC, V. (2009): *Knowledge economy and innovations as factors of agrarian competitiveness*. Paper presented at the 113th EAAE Seminar “The role of knowledge, innovation and human capital in multifunctional agriculture and territorial rural development”, December 9–11, Belgrade, Republic of Serbia.
- TICHÁ, I. & HAVLÍČEK, J. (2008): Knowledge transfer: A case study approach. *APSTRACT: Applied Studies in Agribusiness and Commerce*, 2, 15–19.
- TÓTH, J. (2009): Regionális klaszterek versenyképessége az élelmiszergazdaságban. (Competitiveness of regional clusters in food economy.) OTKA T 046882 final report, Budapest
- VERARDI, V. (2009): Robust principal component analysis in Stata, <http://repec.org/usug2009/Verardi.ppt> (Downloaded: 23.01.2012.)
- VERARDI, V. & CROUX, C. (2010): Robust regression in Stata. *Stata Journal*, 9, 439–453.
- WITTWER, G. & ROTHFIELD, J. (2005): Projecting the world wine market from 2003 to 2010. *Australasian Agribusiness Rev.*, 13, 1–18.
- YEBOAH, A.K., OWENS, J.P., BYNUM, J.S. & BOISSON, D. (2010): *Validation of factors influencing successful small scale farming in North Carolina*. Selected paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, February 6–9, Orlando, FL.