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EVALUATION AND ECONOMIC ANALYSIS OF THE SITUATION OF OLERICULTURE IN HINGARY

THESES OF DOCTORAL (PhD) DISSERTATION

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1. INTRODUCTION

The geographical and natural conditions of Hungary provide excellent possibilities for olericulture, and owing to its location, our country can target thousands of potential vegetable consumers. The importance of this branch is also backed by the fact that there are neither quotas nor limits for production and trade set up by the European Union. Field growing of vegetables can be fitted well into the sowing structure, and the machinery and tools (cultivation, supplement of nutritive materials, tools of plant protection) used in plant-growing could also be used in vegetable-growing. By doing so, the utilization of machinery and tools could be improved.

As for the future, it is quite encouraging that the vegetable-growing branch has managed to remain sustainable, has even improved its position amongst other, greatly subsidised agricultural branches, under the harsh market economic circumstances of the past 20 years, barely subsidised by either the European Union or the government of Hungary. By 2010, thanks to the favourable governmental decisions, vegetable-growing has become a subsidised branch. Even more dynamic improvement can be expected in the branch owing to the budgetary term between 2007-2013 determined by the New Hungary Development Plan.

1.1. Importance and actuality of theme

Based on the experiences of the last decade, it can be claimed that the Hungarian vegetable-growing branch cannot utilize its ecologic and economic advantages in the scope of market economy.

The presence of wider and wider choice of import vegetables means a serious problem. The chemical contamination of vegetables produced in countries beyond Europe means a great health risk time and again. The consumers are becoming more and more health-conscious, and the safe origin of food also has a greater and greater importance; because of these two factors the possibility of tracking the origin of food has become an inevitable condition of trade.

Analysing these facts and also based upon them I found it very important to deal with the economic analysis of the domestic olericulture in detail. During research work, analyses of data collected regionally and also in farms were also carried out.

One of my motivations to do this scientific study was that I have been working in this field for a long time. Also, as for my experiences, the specialized scientific literature obtainable deals with this theme only insufficiently.

Farms, dealing with vegetable-growing and vegetable forcing do not usually publish economic data. These facts made me motivated enough to conduct empiric and scientific researches and examinations.

Growing vegetables is dynamically increasing all over the world, and the importance of vegetables in domestic nutrition is determinant. Quick-paced production and consumption feature mainly developing countries while in developed ones this growth is more moderate.

The role of this branch can be made more important by increasing the Hungarian vegetable consumption and expanding the inland market. At the same time, the unemployment rate could also be flattered. I do believe that this is the opportunity to create more workplaces in the fastest and cheapest way.

Small farms have a significant role in vegetable-growing. The main obstacle of improvement is the instability of selling and the lack of a stable consumer demand and market. Selling problems could only be solved by combined efforts from the producers' side. The most important tool of this is preferring Producers' Marketing Organisations (PMOs). Integration pressure is inevitable; success could only be reached by co-operation. PMOs are subsidised by the European Union, subsidies can be won by PMOs depending on their rate of return. As investments and improvements can only be done with the help of these subsidies, they are highly important for farms to be able to stay competitive.

The system of regulations, with the loopholes of the rules involving the farming licence in Hungary, concerning the branch gives advantages to the resourceful in many cases. In case of an unchanged system of regulations, the ones working in the black economy will still be in a more advantageous position in contrast to the fair ones. The producers who made investments, innovations, improved their farms and methods, and introduced the latest technology are now facing hardships, as the present economic crisis made the monthly instalments of the loans taken out much more expensive and unmanageable. Also, the Hungarian regulations are unfavourable in many cases.

An economic mechanism encouraging and rewarding performance and eliminating the base of the black economy should be introduced.

Replacing well-qualified professionals is one of the most severe problems. The current environment (decreasing sources) with its little-supported innovations does not mean perspectives for the young. There are very few well-trained professionals and consultants. The cold-storing and packing house infrastructure is a great base for improving the logistic system. If it is well-developed, a profitably-working producing and trading system can be built, which could multiple the capacity of the branch in the coming years, contributing to easing the problem of unemployment.

Strengthening the PMOs is crucial, as these can sell the farmers' produce grown in smaller sized arable lands. Selling can be carried out in bulks in the markets by these organisations. The vertical coordination of the lifetime of gardening produce is not satisfactory; better organisation of the producers' side is needed. This could make their competitiveness better and influence their farm management and financial conditions positively.

1.2. Objectives

The objectives of my research were as follows:

- 1.) I wanted to examine the fact that the number and land size of vegetablegrowing farms and their own consumption decreased in the past years, mainly in the Transdanubian region. On the other hand, owing to concentration the quality of vegetable-growing and the average yield went up.
- 2.) I wanted to analyse economically the growing of 4 types of vegetables. The analysis considers 5 years' data. I also wanted to examine a simplified economic model of field growing of vegetables. The following data were used: 4 types of vegetables, 5 and 20 hectares of land under irrigated and non-irrigated circumstances.
- 3.) I wanted to examine based on completing a questionnaire what qualifications and skills are important as for the entrepreneur / owner depending on the size of enterprise, the number of employees and the return from sales.
- 4.) I would like to determine the factors found important by the producers. For this, I will use questionnaires and deep interviews. I would also like to determine the proportion of these factors, which are relevant for the improvement of olericulture. Based on the data, I will make suggestions so that the competitiveness of olericulture could be better.
- 5.) I would like to determine the offensive, diversified, defensive and changeoriented strategies and the supportive situations by conducting a SWOT analysis and a strategic analysis based on the results of it.

The following hypotheses summarise the expectations, preceding the research and determining its objectives:

- **H**₁: A relevant concentration has taken place in vegetable-growing; the producers' own consumption has decreased, the average yield has gone up and the production of particular vegetables has been concentrated in particular regions.
- **H₂:** Experienced and traditional vegetable-growing farms run profitable businesses. According to the models, increasing their size of land and volume, and irrigation would mean less manufacturing costs
- **H₃:** As for the entrepreneur / owner different skills are inevitable; namely professional skills, IT skills, conflict management skills, and there are also some important qualities needed (e.g.: cooperation skills, problem solving skills, communication skills and other ones, which are important to reach success).
- **H**₄: By conducting a questionnaire-survey and deep interviews, I will verify that competitiveness in olericulture is mainly determined by the quantity and quality of yield, the sales and the technology.
- **H₅:** Olericulture is a strategic field of agricultural production. It can contribute to the increase of value produced in one unit land, the improvement of employment and the utilisation of the comparative advantages in regions blessed with good conditions for vegetable-growing.

2. THEME AND METHOD

I strived to be systematic and tried to use the proper methodical approach while writing my dissertation. My research plan includes the single research phases. Based upon these the dissertation can be built up. These are the following:

- determining the research problem, setting the objectives,
- studying the earlier and known results, and the specialised scientific literature,
- wording hypotheses, knowing the objectives and the literature
- choosing the examination methods,
- primary and secondary collection of data,
- data evaluation by applying statistic methods and analysis.

The objectives of the research and the hypotheses were introduced in Chapter 1.2.

In the first, analytic part of my research the regional distribution of growing particular vegetables is described. Then consequences are drawn, concerning the types of vegetables that are worth producing and processing in different regions. While drawing my consequences, I took the data of unemployment into consideration. To reveal the changes, a trend calculation and analysis were also conducted.

2.1. Primary research

In the first phase of the second part of my research, primary data collection, i.e. primary research was carried out amongst randomly chosen vegetable-growers and producers all over the country. To reach my goal I chose the questionnairebased survey. The objective of my research was to examine the problems concerning the improvement of vegetable-growing, from the producers' point of view. Data collection lasted from November 2009 to August 2010. Approximately 400 questionnaires were sent out and 156 of them were sent back, thus 156 were processed. Pre-tested questionnaires were used in the survey.

Figure 1 shows the regional distribution of questionnaires sent out, and the ones sent back with usable information.



Figure 1: Regional distribution of farms taking part in the survey Source: own compilation

The questionnaires were sent to farms where vegetable-growing had a relevant role in production. The survey was conducted all over the country, but as the Northern and Southern Great Plain have greater importance in vegetablegrowing, more questionnaires were sent to those areas. I paid special attention to regional representativeness in the survey

I made contact with a significant number of farms during my research work. I chose 400 randomly from them, paying special attention to regional distribution. When choosing the sample only the criterion involving regional distribution was considered, other aspects (form of business, size of farm, range of activity) were not, so the sample can be held a stratified one.

Depending on size index, the production and proprietary structure, and the traditions, both different and identical opinions could characterize the problem: improving vegetable-growing. Therefore the main objective of the research plan and methodology is to show the characteristics of the different and identical interests of production and opinions given by the producers.

Evaluation was done by using objective statistic methods, thus the simple, non-causal summary of the examination of the improvement problems of olericulture could be avoided

The structure of the questionnaire is in accordance with the objective of the research plan. According to this, the examination of producer clusters, the classification of producers, the differences in opinions, connections and relations could be verified.

The methods applied are used to handle the random variables, so slightly different results, gained in a different structure and circle of people filling in a questionnaire in a similar field of study, could also be acknowledged.

2.2. Method of statistic analysis and evaluation

Causal relations were sought between the variables during my study. I wanted to determine (if possible) how changing one variable influences the change of another one. The character of the relation between variables can be manifold. When the change of one variable obviously determines the change of another one, the relation is called *function-like*. When the change of a variable influences the change of another one, but the effect is accidental, the relation is called *stochastic*. There is a third case, of course, when there is no correlation between the indexes.

The data in the questionnaire were evaluated by using statistic analysis based on scientific methods in order to support the conclusions of the dissertation in a proper way and quality. After recording the data, the statistic process was done by SPSS 15.0 program. The figures, diagrams and tables were created by using Microsoft Excel.

The following statistic methods were used in my analyses:

- Main component analysis
- Kruskal Wallis test

I applied two probations to compare the patterns related: the Friedman and the Kendall methods.

- One-variable analyses

I conducted the following calculations in the scope of one-variable analyses:

- Distributions
- Average
- Dispersion

2.3. SWOT analysis

The SWOT, Strength, Weaknesses, Opportunities, Threats, analysis is a method used in strategic planning. This analysis is one of the tools of problem definition and exploration. During this type of analysis the inner features and the change of the outer environment are examined. The model of the SWOT analysis is as follows:

	Inner	Outer
Positive	strengths	opportunities
Negative	weaknesses	threats

The SWOT analysis can be conducted in two phases. In the phase exploring the situation, the following questions can be answered: "Where are we?", "What do we have?", "What are we short of?", "What outer conditions could help us?" and "What outer conditions could harm us?".

In the second phase, the following questions can be answered: "What field should we concentrate our efforts on?", "Where should we try to carry out changes?", "In which fields is not it worth making efforts?", Where could forces be rearranged from?", "Where is it worth improving with due consideration and sensitively amongst the particular improvement alternatives?". In the long run this phase gives the answer of the question: "Where do we want to get?"

Comparing the opportunities and the weaknesses, a change-oriented strategy can be drawn, while comparing and analysing the opportunities and strengths, an offensive strategy can be prepared. Analysing the strengths and threats is suitable for defining a diversified strategy, while analysing weaknesses and threats is suitable for defining a strategy supporting defensive situations and acts. The agro technical data of the vegetables examined and the production technology applied were compiled on the basis of the data collection in the farms examined. Local and national indexes were also compared.

2.4. Qualitative method

This phase of my examination is completed with a qualitative method. To confirm the results of the research, deep interviews were made. 28 deep interviews were made between November and December 2009.

The interviewees were practising professionals working in farms, dealing with field vegetable-growing, having a leading position in Hungary or professionals

managing such farms. These farms are competitive even in the European market. These professionals could share such technological, marketing, economic and workshop organisational data that could serve as good examples for the contemporary dealing with field vegetable-growing.

When having the interviews, I could study the questions of my questionnaire and I also wanted to explore cause-result relations by having a casual talk with the interviewees. The interviews were unstructured, informal and personal, lasting for approximately an hour. The economic examination of the farms was carried out by using the information, shared during the deep interviews. Model calculation was also conducted involving 4 important vegetables, considering size of land and irrigation.

A deep interview is a qualitative method in private. The aim of a deep interview is to get to know the deepest motivation and unconscious incentives of the people asked. A special feature of an interview made with empiric research targets is the possibility of great adaptation to the person. This method is more informal than the questionnaire. The main goal during a deep interview is to explore the personality and living conditions of the person, through the lens of a kind of research problem.

3. RESULTS

Between 1991 and 2008 vegetables had a smaller proportion of arable land compared to grains. The proportion of vegetables was 1.9 - 2.9 percent. The traditional vegetable-growing areas can be found mainly in two regions of the Great Plain, having different proportions as for the kinds of vegetables grown. 1/8 of total vegetable-growing land in 2008 could be found there. 1,798 thousand tons of vegetables were grown in the country. The total production harvested rose compared to the one in the previous years.

3.1. Analysis of the situation of olericulture

Examining the fiver-year averages of production harvested in a 20-year period, it can be stated that the quantity of particular vegetables grew, significantly in some cases. The production harvested significantly grew in case of maize, watermelon and green peas, while as for other vegetables the production harvested decreased relevantly. The most important vegetables (tomato, cucumber, onion, paprika) show a significant fall as for production harvested. Table 1 reveals the exact data.

Table	1:	Total	production	harvested	of	the	most	important	vegetables
		(the	ousand tons)						

Vegetable	1991-1995	1996-2000	2001-2005	2009
	average	average	average	
Onion	164	145	120	61
Carrot	102	113	94	66
Parsley	53	48	39	31
Tomato	275	264	244	193
Cucumber	97	115	89	52
Watermelon	72	108	198	220
Green pea	63	67	92	99
French bean	30	30	25	26
Cabbage	123	159	152	76
Green pepper*	128	107	92	149
Maize			462	422
Paprika			51	-

* together with bonnet pepper until 1999

Source: own compilation based on published by the HCSO

As for the average production harvested, the growing of averages can be seen in cases of almost all vegetables. The causes of it are the introduction of new species, the improvement of technology and the fiercer competition.

3.1.1. Vegetable-growing farms

The number of vegetable-growing farms has decreased significantly. Between 2005 and 2007, nearly 40,000 farms stopped growing vegetables.

Both individual farmers and farms increased the volume of their production. The proportion of production grew bigger and the consumption from their own produce continuously decreased.

Examining the annual data beside the averages of five-year terms, it can be seen that the farms doubled their total production harvested in a ten-year term (in hundreds of hectares of land; vegetable-growing that could be machined easily, often irrigated). As for individual farmers, they show a great decrease in the volume of production after the accession to the European Union. Production for the market also fell, but their own consumption decreased to less than its ¹/₄ in the period examined. These facts indicate the market penetration of supermarket chains and the local markets driven into the background.

Relevant changes have happened in vegetable-growing.

The two vegetables produced on the greatest arable land are maize and green peas. Their arable land used increased by 29 and 39 percent compared to the ones in 2000. Thus these were produced in 27,000 and 18,000 hectares in 2007. The production harvested of maize increased by more than 8/10, to 535,000 tons, in 7 years. 57 percent of this yield was harvested by farms (economic organizations). The amount of green peas harvested was 93,000 tons in 2007, one and a half as much as in 2000. The arable land used for growing green pepper, onion and tomato decrease in 7 years. The size of land used for growing tomato went down from 7,000 hectares to 2,000 hectares, but the production harvested increased by 12 percent to 228,000 tons.

3.1.2. Regional pattern of growing some of the main vegetables

In the first part of my examination the regional distribution of the single vegetable species is shown. To show the changes linear trend calculation was conducted and then conclusions were drawn, concerning the types of vegetable species which are worth to be produced in certain regions.

At regional level the volume of production significantly rose in Northern and Southern Great Plain compared to the volume in 2000. In the other regions, however, decrease of production can be registered. Drastic decrease can be seen in Western and Southern Transdanubia. The trend of changes is shown in Figure 2.



Figure 2: **Regional trends of total vegetable-growing (2000-2008)*** *without paprika, green peas weighed in peas Source: own compilation based on published by the HCSO

Vegetable-growing could only be successful if the whole vertical market is built and the ones processing the produce are relatively close to each other. In the less preferred vegetable-growing regions, many vegetable processing units were closed down resulting in a spectacular decrease in the volume of vegetablegrowing. In case of Northern and Southern Great Plain the process of vegetables is proper, the vertical market is well-developed.

3.2. Economic evaluation of some of the main vegetables

In my examination the economic analysis of French bean, onion, watermelon and green pea is conducted. A short and general technologic representation is also written. Where possible data are also revealed, and the data of testing units of the branch by the 'AKI' (Agro Economic Research and Informatics Institution) are also shown. The fluctuation of yield and cost data in vegetablegrowing is significantly more extreme between years than the ones in field plant-growing. The effectiveness of the input is crucially influenced by the outcome of average production.

The farms and units shown could be evaluated by data collected throughout several years. The producers chosen were successful in producing the species of vegetables examined.

3.3. Model for varieties of field growing of four vegetables

While creating the model, only the important aspects were considered; otherwise, compiling all the variations would have meant hundreds of tables.

Objectives:

- The possibility of determining the production cost, the result expectable and the earnings,
- The possibility of measuring the immediate and the total production costs, the earnings and the reserves per vegetables and varieties,
- To gain data involving economies of scale and production cost,
- The possibility of drawing conclusions from the results.

Two sizes were taken into consideration and the calculations were conducted with 5 and 20 hectares of land. In case of both sizes, variants irrigated and non-irrigated were calculated. The quality of soil was considered as identical in case of all vegetables.

The calculations were conducted on the basis of 'AKI' data from 2009. Calculation was done using the average production volume of important farms producing for the market.

Irrigation needs a relevant investment. The construction of a linear irrigation system costs HUF400,000-700,000 per hectare. In smaller lots (30-50 ha) the investment cost per hectare can exceed HUF1.5 million. The opportunities of irrigation are significantly influenced by the conditions of the arable land.

While analysing the data and the changes, my own experiences and professionals' opinions were both used. Increasing the size of arable land from 5 hectares to 20 hectares means decrease in the costs of machinery, the amount of wages and taxes and incidental charges of wages. The increase of the size of arable land improved the results of branch and the production cost of the main crop decrease. In case of the costs mentioned 10% decrease was considered on average. With irrigation the yield and the production value grow significantly; however, the costs of artificial and organic fertilizers, plant protection chemicals and machinery also go higher. Here, a 40% increase was considered.

Naturally, the costs of irrigation must also be taken into consideration, which can range between higher and low values, depending on the extent of development and the distance of carriage. In this field average data were considered as for the single vegetables. The increase of wages and taxes and incidental charges of wages can be significantly different in models depending on the opportunities of using more machinery. In the calculations conducted **60% was considered in case of onion and tomato, and 20% as for maize**. Quality change was ignored, and neither extremely droughty nor extremely rainy years were considered. In summary, the following can be stated:

- the results were positive in all variants,
- during the increase of the size of arable land, the production cost of the main crop decreased,
- irrigation resulted in a significant cost reduction in case of onion and green pepper, while in case of maize and tomato, it resulted in a slight production cost increase,
- on the basis of the previous fact, irrigation has grounds only if significant yield increase is present. Approximately calculated value of this can be determined by using a model,
- average relations can be modelled by using the data calculated they do not cover all the variants possible – but the tendencies are strongly marked.

3.4. Introduction and evaluation of the opinions given by olericultural workers, branch strategies

In this chapter all the results of the primary research, the statistic analysis and the deep interviews, the strategy worked out based on the SWOT analysis are revealed and my hypotheses are evaluated. The primary data collection with questionnaire – the summary of the experiences of those involved – has a determining importance as for my conclusions and suggestions.

3.4.1. Analysis and statistic evaluation of questionnaire

My questionnaire was compiled to explore the neuralgic points of vegetablegrowing to get to know the situation of the participants of the branch. Detailed information is given in the chapter of Theme and Method as for the compilation of the questionnaire, the number of elements of the sample, the method of process and evaluation. The results got by using SPSS 15.0 program give a detailed analysis. 92 figures and 82 tables are shown, so only the figures and tables relevant from the point of the most important conclusions are revealed and analysed, owing to the restricted size of the dissertation. Based on the data, it can be claimed that the normal distribution is not characteristic, therefore parametric methods were used to examine the relations and differences. The normal distribution is not a condition of these methods (Kruskal – Wallis probation, Kendall probation). The number of employees in enterprises means significant differences shown in Table 2.

Table 2: What skills are thought to be important for the entrepreneur / owner? (Test statistics a, b)

Denomination	Special professional skills	Organisational skills	Managerial skills	Co operational skills	IT skills	Independent working skills	Foreign language skills	Creative mind	Conflict management	Problem solving skills	Knowledge of market	Communication skills
Chi-Square	2,86	1,73	7,14	19,10	9,32	5,83	4,11	4,15	8,51	5,35	1,59	10,89
df	4	4	4	4	4	4	4	4	4	4	4	4
Asymp.sig.	0,582	0,785	0,128	0,001	0,054	0,212	0,392	0,385	0,075	0,253	0,810	0,028

a. Kruskal-Wallis Test

b. Grouping variable: Workforce at the enterprise

p= significant difference between the groups under 10% level of fault

Source: own calculation

Significant differences occurred in variants where the distribution of opinions was greater, thus the opinion of the ones answering the questions is not homogenous. Such differences can be seen in case of IT skills and conflict management.

The other important index is the rate of return from sales. Four groups were created here, and the differences between them were examined. The point of view of managerial skills is much more homogenous. Significant differences were only experienced in special professional skills and problem solving skills. In enterprises with a smaller rate of return from sales, the possibility of gaining specific professional skills is more moderate. Owing to this, in case of the 33 enterprises with over HUF30million return from sales, the lack of special professional skills could be a greater source of relevant losses. Therefore the importance of these is high (Table 3).

Up to this point, the examination showed how the criteria and variables were ranked by the people filling in the questionnaire.

Table 3: What skills are thought to be important for the entrepreneur / owner? (Test statistics a, b)

Denomination	Special professional skills	Organisational skills	Managerial skills	Co operational skills	IT Skills	Independent working skills	Foreign language skills	Creative mind	Conflict management	Problem solving skills	Knowledge of market	Communication skills
Chi-Square	9,478	1,139	2,683	4,161	2,595	3,869	4,537	3,097	4,567	12,749	2,038	1,969
Df	3	3	3	3	3	3	3	3	3	3	3	3
Asymp.sig.	0,024	0,768	0,443	0,245	0,458	0,276	0,209	0,377	0,206	0,005	0,565	0,579

a. Kruskal Wallis Test

b. Grouping variable: Size determined by rate of return

significant below p=5% level of fault

Sources: own calculation

I studied the inner relations of organisational skills to support the interpretation of the criteria, indicating them. The result will help to clarify how and how similar the participants of the study interpreted the criteria.

This is a methodically beneficial complementary of the primary study as well. I applied the method of the Principal Component Analysis (PCA) based on the correlation. The relation of the twelve variables is co-ordinated by five principal components, meaning that the twelve variables can be reducible to five background variables.

The fourth table contains the correlation coefficients, which express the relation between the original variables and the hypothetic background variables after the PCA's varimax rotation. The coefficients over 0.6 draw the attention to a stronger relation than the average. It is also remarkable, that there are no opposing criteria (negative abilities) in the system. The insignificant coefficients (close to zero) with the minus sign also prove that.

The first principal component's elements are the computer skills and the conflict management.

The second principal component unites the most original variables. This can mean that the co-operation skills can be paired with the communication skills and the problem solving skills. The special professional skills can also be interpreted as the background of the creative mind (Third principal component).

The fourth principal component shows the relation between the organising skills and the independent working skills. The knowledge of the market, as a unique factor is important in the fifth principal component.

Denomination	Principal Component Variables								
	1	2	3	4	5				
Special professional skills	0,052	0,115	0,653	0,240	0,269				
Organising skills	0,060	0,131	-0,007	0,827	-0,091				
Managerial skills	0,667	0,132	0,018	0,242	0,054				
Co operational skills	0,304	0,677	0,185	-0,103	0,085				
IT skills	0,760	-0,004	0,070	0,127	0,054				
Independent working skills	0,067	-0,168	0,079	0,655	0,110				
Foreign language skills	0,352	-0,096	-0,314	-0,238	0,571				
Creative mind	-0,015	-0,015	0,845	-0,091	-0,079				
Conflict management	0,783	0,156	-0,082	-0,206	-0,079				
Problem solving skills	0,107	0,726	0,121	-0,037	-0,318				
Knowledge of market	-0,084	0,093	0,287	0,127	0,798				
Communication skills	-0,082	0,777	-0,227	0,111	0,355				

Table 1: Correspondence coefficients expressing the original and the principal component variables

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 7 iterations

Source: own calculation

Table 5: Kendall W test result as for competitive factors

Denomination	Mean Rank
Size of farms	3,50
Technology applied	7,50
Benefits	3,50
Irrigation	3,00
Vegetable grown	5,75
Cost-effectiveness (cost of energy)	4,25
Sales	10,75
Quality	10,25
Regulative system	1,75
Quantity of crops	8,25
Connection	7,50

Test Statistics

Ν	4					
Kendall's W(a)	0,844					
Chi-Square	33,773					
Df	10					
Asymp. Sig.	0,000					

a. Kendall's Coefficient of Concordance Source: own calculations The value of W is low, around the value of 0.2 in the complete response group. On the other hand, as for the averages of the scores of the four groups of returns from sales, it is 0,844 (Chart 5), which refers to the significant similarity of the statements of the responsive.

A part of the variables, characterising the competitiveness is the source of a common problem. The other parts, as the test results prove as well, form the problems of the subgroups of the businesses. For the demonstration of these, I used the PCA.

From the changing group, unifying eleven competitive factors, seven can be interpreted with four principal components. According to the principal component coefficients, the regulative system of olericulture connects finely with the crop planted. The technology applied and the cost-effectiveness could be interpreted by the second principal component.

The connection of the sale and the quality - as the factors of the competition at the market - appear in the fourth principal component. The volume of production - as the size factor refers to the monopolistic position - is the determinant of the competition (Table 6).

Table 6: The connection system of the	competitive factors and the	e principal
component variables		

Denomination		Component						
Denomination	1	2	3	4				
The size of the farmstead	0,440	-0,574	0,443	-0,115				
The applied technology	0,419	0,676	0,128	0,132				
The benefits	0,372	-0,062	0,265	0,169				
The watering	-0,088	0,379	0,478	0,340				
The cultivated plant	0,794	0,217	-0,194	0,148				
The cost-effectiveness (energy cost)	0,126	0,763	0,225	0,042				
The sale	0,072	-0,056	0,039	0,816				
The quality	0,030	0,288	0,049	0,669				
The regulative system	0,802	0,104	0,106	-0,128				
The quantity of the crops	-0,060	0,058	0,834	0,208				
Connection	0,197	0,173	0,568	-0,216				

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Source: own calculation

3.4.2. Factors determining profitability

From the factors determining the business' profit, good quality, high price and beneficial market potentials influence the profit the most (Table 7). If the seller's demand is great and the product can be sold at a reasonable price, the market is beneficial.

Statistically significant and verified differences can be established by the evaluation of the factors determining the profit of the business according to the grouping of the business' company structure.

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						(percent)
Denomination	Expenses kept low	Good quality, high price	Beneficial market potentials	Utilisation of the benefits	Successful marketing activity	Wrapping, preparation, oven-readiness
Minority			1,9	3,9	5,9	
Less than average	11,8		1,9	3,9	5,9	3,3
Average	24,8	5,8	7,7	20,9	33,3	19,6
More than average	32,0	25,0	32,1	33,3	35,9	39,2
Majority	31,4	69,2	56,4	37,9	19,0	37,9
Total	100,0	100,0	100,0	100,0	100,0	100,0

Table 7: The factors determining a business' profit

Source: own calculations

Considering the average of the gradation, the result of the Kendall-W test makes it explicit. The least important factor of all is the successful marketing activity. The character of the owner/entrepreneur is determinative from the view of business success. In case of a larger return from sales, the existence of the managerial skills comes to the front. In case of minor returns, problem solving skills and communication skills are important.

The lack of co-operation is a serious problem among the national businesses. In the course of the discussions it turned out that the level of confidence is low and the possibility of the co-operation is moderate because everybody fears that the others might swindle them or they might get into financial disadvantages. In case of the workers – in accordance with the questionnaire – independent working skills, sense of responsibility and diligence are significant. The people questioned would be more likely to hire

employees with greater experience in the field of physical work. As for special professional skills the opinions differ – some find it important.

Competitiveness means keeping or enlarging market share. The people questioned emphasised the benefits, the connections, the quality and the market potential. Moreover, the well chosen crops and the quality can be important as they are the conditions of the sale.

Those who apply modern technology, earn advantages in the competition. There are many negative opinions about the market regulations of the branch. Illegal work should be abolished and mediatory trade should be suppressed by creating a new regulation system.

Most of the people questioned require the integrators who can also be the manufacturer. Some say that the common proprietary background of the manufacturer and the producer could be the solution. In my opinion marketing is not esteemed as it should be. This could be understood by analysing the questionnaires.

The positive role of the Producers' Marketing Organisation is considered to be general, but mainly theoretically because producers sell their produce to others in case of a better offer. The relatively low performance of the Producers' Marketing Organisation may be due to the isolation from co-operation.

One third of the people questioned ranked the income conditions in olericulture worse than it really is. According to the answers for the questionnaire it obviously turned out that the producers play a defenceless role in the vertical market. They also grasp the opportunities; however, they also judge the Budapest Wholesale Market negatively.

3.5. SWOT analysis

For the first exploration phase of my examinations, my literary search work, the results of the questionnaires and also the deep interviews provided help. I introduced the procession of the analysis in the chapter 'Theme and method'. For the analysis, I applied the ideas of the Department for the Agricultural Market of the Ministry of Rural Development about the "National strategy concerning sustainable maintenance programs, involving the fruit-, and vegetable market" and also the analysing material resources of the FruitVeB. The essence of the method is that a company or a branch contrasts their strengths and weaknesses with the opportunities and threats given by the environment and compose strategic actions according to the coinciding points. The strengths-weaknesses derive from the connection between the branch and its environment, and from the analysis of the fundamentals and the capacity of the branch. The opportunities-threats come from the analysis of the environment (Figure 3).



- greater average production should be reached by using smaller lands, but reliable machinery and irrigation,
- black economy should be decreased by stricter regulations,
- local markets should be improved,
- fluctuation of average production should be eliminated by irrigation,
- nieche markets should be found by less capitalintensive products,
- decreasing of the manufacturing cost in favour of the competitive price level
- manufacturing industries owned by the producers
- improvement of profitability in fruit and vegetable-growing,
- widespread introduction of the integrated and bio-production
- reasonable supplement of workforce by machinery,



4. NEW AND RECENT RESULTS

- 1. A significant selection occurred in the last five years among the vegetable-growing farms. The prosperous farms prefer production for the market instead of their own consumption. They produce in an improving standard and are concentrated in the regions of the Northern and Southern Great Plain.
- 2. The examination and the literary facts prove that with the growth of the branch, the manufacturing cost of the product decreases and the value of the product are significantly increased by irrigation. Under existing conditions, the reduction of the primary costs in irrigation can only be expected in case of outstanding increase in profit. To reach it prominent arable land conditions are needed.
- 3. According to the questionnaire I defined with a statistic analysis, which skills are important in successful farming. Examining the entrepreneurial size taken as a function of the number of the employees, the importance of co-operational skills, IT skills, conflict management and communication skills are proven. Special professional skills and problem solving skills are essential depending on return from sales determined by size.
- 4. During the evaluation of the summarised precedence of the competitive factors, it has been proven, based on the Kendall-W test, that the most significant competitive factors are sales and quality, followed by the quantity of crops, technology and connections. The concordance coefficient of the Kendall-W test indicates the similarity of the opinions. According to the opinions, the profit of the business is influenced mostly by good quality, high price and the beneficial market potential.
- 5. The results of the examination, the several years' data of the four farms examined and the set of the Hungarian Agricultural Research test unit prove that the different types of vegetables produce significant production value in a hectare. Irrigation indicates further opportunities.

As a consequence, it can be considered as a recent scientific result that olericulture is the strategic field of the agricultural production and development, and it also can participate in the increase of prices produced in the field of agricultural units and improving employment significantly.

6. According to the SWOT analysis, the offensive strategy could indicate advancement; namely, labels of origin and trade-marking of the Hungarian vegetable products, their quality control, increase of the process level, the spread of integrated production and establishing manufacturing units co-owned by producers.

4.1. Verification of hypotheses

	Hypotheses	Verification
1.	A significant concentration occurred in olericulture. Own consumption decreased, the average yield decreased and the production of single vegetables is concentrated in certain regions.	Yes
2.	The farms with experience and traditions manage efficiently. According to the models, the increase of size and irrigation result in a decrease in manufacturing costs.	Partly
3.	The entrepreneurs/owners need special skills and knowledge; namely, special professional skills, IT skills, conflict management skills and special qualities such as cooperation skills, problem solving skills, communication skills and other important factors for success.	Yes
4.	According to the deep interviews and with the questionnaire, I justify that the competitiveness in olericulture is determined mostly by the quantity and the quality of the crops, sales and technology.	Partly
5.	Olericulture is a strategic field of agricultural production. It can contribute to the increase of value produced in one unit land, the improvement of employment and the utilisation of the comparative advantages in regions blessed with good conditions for vegetable-growing.	Yes

5. CONCLUSIONS AND SUGGESTIONS

My conclusions and suggestions relate to the objectives conceived in the introduction.

In order to determine those areas where it is worth dealing with certain species and where the benefits from the concentration of the area are utilizable, I examined the concentration of the production in the case of the certain species of vegetables at a regional, also a national level.

A rapid concentration occurred lately in olericulture. The regions of the Northern and Southern Great Plain significantly increased their production. The number of the farms decreased there as well, but the quantity of the production increased. Most of the vegetables are not able to bear being transported for a long time after harvest. As a result, the cold-storage industry and the packing industry must be concentrated in these areas. The analysis of the statistic results show that in the regions where the processing industrial units closed down, the production stopped as well.

The data collected in units and the several years' economic analysis of four species of vegetables proves that the vegetable-growing farms with experience and traditions farm successfully. From the view of the examination, with the increase of the size, the manufacturing costs decrease. On the other hand, irrigation; because of its expressive expense, only decreases manufacturing costs in the case of an outstanding growth of profit and only with certain species. In spite of these, the implementation of irrigation the watering is influential in all instances, not only because of the increase in the quantity of the crops, but for quality reasons as well. The service data and the test unit data prove, that the examined vegetables can be produced gainfully and produce significant value of production in a one- unit area.

The effectiveness and the profitability can be slightly decreased by changing technologies. There is a greater opportunity in the logistic developments, the improvement of chances for the local small-scale producer markets, the derivation of production surplus and in the development of the market infrastructure. This makes the development of the competitiveness possible.

Among the vegetable growers I carried out a questionnaire survey and also confirmed the statements with deep interviews.

The result of the surveys verified that the farmers acknowledge the qualities of the entrepreneurs in reaching success. The importance of co-operation skills, IT skills, conflict management skills and communication skills has been

statistically proven. Special professional skills and problem solving skills might have a significant role as well.

The questionnaire survey adverted to the possibility of development in the competitiveness of olericulture. According to the survey, the most significant element from the view of competitiveness is quality, followed by the quantity of crops, technology and connections. The profit is influenced mostly by good quality, high price and the beneficial market potentials.

The future of olericulture is also determined by the processes going on in the world. The general tendency is the strengthening of the concentration which I have proven. However, this process is necessary because of the rapid and high degree concentration of the food industry.

I also examined the role of professional organisations. According to the opinions it would be advisable to create the agricultural inter-trade regulation in the legislation in order to make the realisation of the more efficient civil skilled work.

SWOT analysis was used to explore the situation of olericulture and setting the strategic goals. The beneficial climatic and economic conditions, the trustworthy and neighbouring market, the professional knowledge, the extraordinary taste and flavour and the sufficient manufacturing industry are listed as the strengths of the branch.

As weaknesses, disintegrated production, disorganised sales, the low rate of irrigation, the fragility of conventional discipline, the deficiency of the funds and the primitiveness of producing organisations could be mentioned.

As an opportunity, the national increase of the consumption, the increase of the export, the development of the quality, the increase of the average yield, the use of trademarks and brands, the establishment of the processing units owned by the producers and the increase of processing level come forward.

The increase of the import, the widening of the price gap between agricultural and industrial products, the reduction of the financing possibilities and the slow decrease in the market can be unsafe.

I mention only some important factors from the wide range of the significant strategic possibilities of the SWOT analysis. One of the most important would be the establishment of a viable and active Producers' Marketing Organisation. The goal of the Producers' Marketing Organisation is to manage at least 40% of the branch's sales through them. The EU also wants to increase the importance of the Producers' Marketing Organisation; furthermore, it supports the second and third level organisation of the Producers' Marketing Organisation and also their international integration. Because of the Producers' Marketing Organisation, the regrettably low unpredictability of the agricultural activity could be eliminated and the branch specific marketing activity could be established.

According to the SWOT analysis, labelling of origin and trade-marking of the Hungarian vegetables, the increasing of the processing level, the dispersal of the integrated producing, the establishment of the processing units co-owned by producers and quality control would mean an offensive strategy. Regrettably, this is mostly held up by the deficiency of funds.

The role of the producers is essential in the development. The conserve industry had an integrating role before, but nowadays, it repressed. This system should be replaced and the establishment of the processing units co-owned by producers should be aimed, which is known in the EU. The generalisation of the integrated environmentally friendly producing; which is an essential competitive factor nowadays, is connected to this.

The regulation of the labour in the 'post harvest' activity is a key issue, including the packing, the classification, commodity preparation, etc. The unanimous opinion is surprising, that the 30-40% of olericulture products reach the consumer through the black and grey market. This situation requires a complex series of arrangements as a solution.

The cultivation of some species of vegetables is concentrated in certain counties and regions. In case of the given species, concentration on productive, logistic and manufacturing developments is worthy here as well.

The increase of the vegetable consumption would be necessary, as every branch can only be successful with firm national markets. This would require local markets and the multiplication effect of local processing units. The neuralgic field of olericulture is the rapid change and the bureaucratic system of the rules of labour. These should be reconsidered and changed on behalf of the branch.

A very important statement is the preferring of the local markets in the whole world and also in Europe. All of the productions can only be successful if it has a significant buyer's market. That is the reason why it is important to develop the local markets, to dissolve the administrative obligations, to help the local governments financially and morally. Central financial resources should also be provided.

The spread of the quality control system is an important idea as well, but it needs governmental sources.

In order to make olericulture marketable, there is a need for several technological developments as well. This is mostly the characteristic of the forcing cultivation, which is only mentioned in my thesis. The use of modern technologies is also essential in field growing.

Furthermore, it is necessary to strengthen the co-operation of producers and to stabilise the market, which is the basis of the possibility of planning ahead. Despite occasionally significant profit, we have to make efforts to increase the profitability and to normalise the distribution of income between the certain entrepreneurs or producers of any kind.

On the basis of my examination, the improvement of olericulture is very important. In case of certain vegetables, constructing irrigation is also relevant. These are crucial steps to increase the value produced in one-unit of land, improve employment and utilize our comparative advantages in the regions with good conditions.

6. ARTICLES PPUBLISHED IN THE THEME OF THESIS

a) Scientific publications (books, passages in books and research reports)

Scientific articles published in Hungarian:

- Bene Cs. (2010): Marketing strategy. Market and decision. In: Test proposals and solutions in the field of economical market-gardening. (Editors: Kerek Z. – Marselek S.) Szaktudás Publishing House plc, Budapest, ISBN 978 963 9935 38 9, 67-72. p.
- 2. Bene Cs. (2010): National Fruit and Vegetable Strategy. In: Economical market-gardening. (Editors: Kerek Z. Marselek S.) Publishing House plc, Budapest, ISBN 978 963 9935 38 9, 159-171. p.
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b) Scientific articles

Scientific articles published in foreign languages:

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- 6. Bene Cs. Tégla Zs. Bozsik N. (2008): Economic analysis about the olericulture of the Agricultural Corporation of Hajdúböszörmény. 11th

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