Measuring Micro-level Competitiveness in the South Transdanubian Region of Hungary

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Abstract

Although the analysis of "competition" is as old as the human race, the concept of "competitiveness" appeared first only in the publications of Michael Porter. Lately, the aspects of regional competitiveness has been in the centre of interest. The analysis of the micro-level competitiveness on a company basis is lacking: the indices of competitiveness only deal with regional-level competitiveness but not with the company-level. In order to complete this gap, two independent researches were conducted in Hungary in 2006. Chickán introduced a competitiveness index that ranked companies. A smaller sample size (100) of SMEs in the South Transdanubian Region served as a basis to create another competitiveness index. Our goal was to present the influential factors of competetiveness and to analyze their connection with strategy. The analysed factors were R&D activities, market dynamics, attitude toward changes, marketing expenditures, participation in strategic alliances, fluctuation. After the standardization of the variables, the index was calculated with an additive weighting method, where the weigths were calculated with standard OLS regression. To test the index, we used discriminant analysis, and analysed the different competitiveness categories with the help of multivariate logistic regression. Our index is capable of measuring the conditions of competitiveness within the region but is incapable of analysing differences between the competitiveness of two or more regions.

Key words: SME, competitiveness, index, measuring

1. Introduction

A significant disequilibrium appeared in the Hungarian economy in the middle and the second half of this decade, primarily as a consequence of the government's overspending. The measures introduced in the summer of 2006 aimed at the reduction of the disequilibrium, however, their main function was to increase budget incomes instead of cutting spendings, and had manifold social and economic effects. As one of the social effects, we can mention the civil commotions in Budapest in the autumn of 2006, and as economic effects, we can mention the drop of the GDP growth rate to near 1 percent as well as the indeterminate postponement of the EMU accession date. Each one of these events raise the issue of the country's and the individual regions' competitiveness. Since the tendencies mentioned – according to our present knowledge – prove to be persistent [1], it becomes important to investigate the role of the individual countries' and regions' competitiveness and that how they are related to the individual companies' competitiveness in a globalising world.

Competition vs. competitiveness. Although analysing "competition" is practically as old as the human race – just to mention the rivalry between the antique city-states [2, 3] – it appeared in the centre of the thinking only by the emergence of the capitalist economies. "Competitiveness" as a conceptual framework, however, appeared first markedly only in the 1980s, primarily through the operations of the Commission on Industrial Competitiveness founded by President Ronald Reagan – with Michael Porter being one of its members [4,5]. (It is an often cited fact that previous prominent works on international economics do not even mention the word "competitiveness" [6 p25, 7 1999 p219]). According to Porter's original idea, competitive advantages should be analysed instead of comparative costs [8 p27, 6 p25). This question became widely investigated by the 1980s and 1990s [4 pp39-41], this field has a remarkable literature today and there are also numerous methods for classification [7, 9, 10].

Two dimensions will be mentioned here. The first one's classification method is based on the level of analysis. According to this, company-, regional and national (country-) level competitiveness can be distinguished [5, 11, 4, 12, 13, 14, 7]. The companies' competitiveness is defined as the competitiveness of their products, which includes marketability, price-competitiveness and cost-competitiveness [7]. The second dimension distinguishes supply side (production) and demand side (market) competitiveness [6 p27]. Supply side competitiveness refers to cost advantages which induce extra profit or increasing market share [6 p28], while demand side competitiveness means that the product is more marketable than the competitors' products. On the basis of these theoretical considerations, we use the following definition: "The concept of competitiveness refers to the ability to achieve dominance and steadiness in the competition between the individual companies and competitors on a micro level, and between economies on a macroeconomic level." [7 p219 on the basis of Török and Lengyel).

Corporate vs. regional competitiveness. While competitiveness "became a popular cliché" [15 p962] in the western developed countries in the past decades, this process took place only in the past years in Hungary. Budd and Hirmis [16] discusses in detail that not the individual regions themselves have competitiveness, but the competitive companies in a given region are the ones that make the region competitive. According to Czakó: "actually, an economy will be competitive when its companies are competitive" [17 p19][1].

There are two underlying methods for achieving economic development [18]: relying on external resources and stimulating foreign direct investment, or relying on local resources and

1 It is important to note that some authors [28] argue that competitiveness cannot be defined above the company level. Their main reason is that regions or countries do not appear in real markets and, for instance, they cannot go bankrupt or be liquidated.

stimulating innovation and local – typically small- and medium-sized – entrepreneurships. (A successful joint adaptation of the two methods can be seen for example in Ireland [19]). Since the accession countries' advantage in competitive wages against the Far East or Eastern Europe is melting away, the infrastructure is not well developed (for example the length of highways), and Asia's ability to attract capital is continuously improving, it will be more and more harder to rely on external resources. Consequently, the more intensive use of internal resources seems to be the more reasonable solution[2].

For this reason, the recognition of the small and medium-sized enterprises' economic role and their reassessment is expected [18]. This highlights the issue of measuring smaller enterprises' competitiveness and analysing the temporal changes in competitiveness.

In this paper, we present the results of the Complex South Transdanubian Regional Competitiveness Research (CSTRCR) which was conducted in the spring of 2006 within the framework of the National Development Plan, organised by the University of Pécs, Faculty of Business and Economics and several local non-governmental organisations and was co-financed by the European Union. The primary aim of the research was to assess the competitiveness of the companies in the South Transdanubian Region, while the main task of the conductors was to give recommendations concerning the enhancement of the region's development. In this study, we propose the use of a new, regional level competitiveness index which is based on the evidences of the research.

The remaining part of the paper is organised as follows: Section 2 presents the methodology of the micro-level regional competitiveness index creation, then, Section 3 presents some basic descriptive statistics of the sample population which served as a basis for the computations. In Section 4, we check the correctness of the index with the help of discriminant analysis and multivariate logistic regression by involving 7 variables.

2. The creation of a regional micro-level competitiveness index

In the introduction, we reviewed the literature of the theoretical researches in the field of competitiveness. One aim of our research was to create an index on the basis of the available literature which helps us analyse the competitiveness of the surveyed organisations. This practice was conducted with the help of several statistical methods through the following steps.

Regional and country-level competitiveness indexes. Before we introduce our own competitiveness index, we review the factors analysed by the most important researchers in the field of measuring the companies' competitiveness.

Porter investigated competitiveness with the help of the Business Competitiveness Index (BCI) [20]. This index serves as a means for rank country competitiveness across the world's nations. It contains two basic components: the sophistication of companies' operations and strategies and the quality of the business environment – which includes a country's financial markets, the impact of competitive pressure and support in the economy as well as public administrative effectiveness. Concerning our research, the relevant component is the first one which includes six factors (nature of the company competitive advantages, extent of innovation, sophistication of production, sophistication of marketing, organisational structures and incentives, extent of internationalisation).

Another index of competitiveness is the Global Competitiveness Index (GCI) which is also a national competitiveness index. Its nine sub-indexes (institutions, infrastructure, macroeconomy, health and primary education, higher education and training, market

2 Kalotay [29] is partly opposed to this opinion, and predicts the expansion of foreign direct investments as a consequence of the EU accession and – among others – the European principal rights. At the same time, Aristotelous [30] draws attention to these kinds of advantages of the Euro zone accession.

efficiency, technological readiness, business sophistication, innovation) can be used only to a limited extent in measuring corporate competitiveness. Similar problems occur with the IMD competitiveness index since with the help of its four components (economic performance, government efficiency, business efficiency and infrastructure) it can be used to create national ranks.

Micro-level competitiveness indexes. Surprisingly, while the competitiveness of greater geographical or administrative units is measured in several ways, a micro-level competitiveness index does not appear in the literature[3].

In order to eliminate this gap, a research was conducted by Chikán Attila et al., which created the Corporate Competitiveness Index [21] – this research was conducted simultaneously, however, in every respect, independently from ours. The latest research of Chikán et al. surveyed 4 executives from each of the 301 participating companies that employ at least 90 employee, with a total of 1204 questionnaires. With the help of their data, they created a compound index which involves both additive and multiplicative relationship. The index contains 3 main variables which are based on several underlying variables that are computed from partial variables. The 3 main variables are (with the underlying variables in parenthesis) operability (price and cost ratio, quality, time, flexibility, services), ability to change (market relations, labour skills, organisational responsiveness), market competitiveness (profit rate, market share).

The index created by the authors of this study, however, is built-up in a significantly different way. The selection of the components was determined by two considerations. On one hand, we considered the previously mentioned components of the regional or national competitiveness indexes, and on the other hand, we considered the components' weights found in the literature. Following Ádám Török, [6], we involved the characteristics of the target market(s), and the steadiness mentioned in the definition was estimated with the attitude towards changes. Following Gábor Hoványi, [22] and Porter [23, 20], we involved research and development (as an indicator of innovation) and the marketing budget ratio. We defined the existence of strategic alliances – which is lacking from Porter's index – as a determining factor since organisational networks is a means of improving competitiveness for small and medium-sized entrepreneurships [24]. The last variable involved is the fluctuation which appears not only in the official definition of the European Union for competitiveness [25], but also can be linked to Porter's competitiveness index since incentives and employee satisfaction is in a close relationship with the employees' fluctuation. In addition, we suggest that through this indicator we are able to manage the compound effect of several factors that cannot be measured directly or can be measured only with difficulties[4].

The variables appeared in the questionnaire as follows:

3 Chikán articulates the same opinion in [21] p45.

4 When fluctuation is high, problems may occur in leadership, motivation etc., while in case of low fluctuation, we assume the stability of the company.

Variable	Question in questionnaire	Possible answers
Research and development (*K*)	Were there any R&D activities conducted at the company in the past 5 years?	Yes/No
Characteristics of target market(s) (*C*)	According to your opinion, what is characteristic of your product's or service's target market?	Expanding Unchanged Slowly contracting Rapidly contracting Do not know
Attitude towards changes (*V*)	How is your organisation related to external changes?	Influenced them Predicted them and prepared to them in time Recognised but could not react Recognised and reacted subsequently Recognised lately
Marketing budget ratio (*M*)	According to your estimations, what proportion of your budget is spent on marketing activities at your organisation?	%
Participation in a strategic alliance (*S*)	Do you participate in any kind of strategic alliance or cooperative network, if yes, in what field?	Yes/No
Fluctuation (*F*)	Regarding the whole company, what was the extent of the employee fluctuation?	%

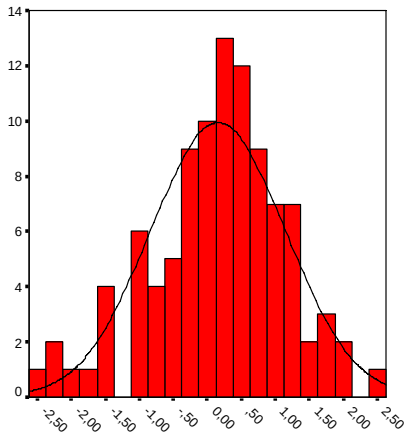
1. Table: Variables of the competitiveness index

Since the variables were measured on different ranges, before further analysis, all of them had to be standardised[5]. Following this, the index was created in two steps. In the first step, we set up an additive model of the standardised variables – technically, the standardised values of each observations were summed – through which we created the "raw" index. In the second step, we determined the weightings of the variables in the final index. This task was carried out with the help of a multivariate linear regression where the explanatory variables were the 6 above mentioned variables and the dependent variable was the "raw" index defined above. The weights were determined by the resulting coefficients of the regression, and the final competitiveness index were obtained by the products of the weights and the standardised variables. The final equation for computing the index is as follows[6]:

$$I_v = 0{,}31 \times K + 0{,}42 \times V + 0{,}349 \times M + 0{,}289 \times F + 0{,}325 \times S + 0{,}295 \times C$$

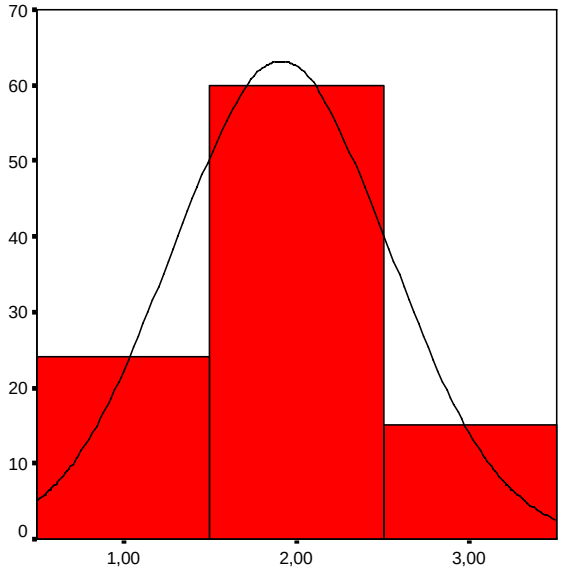
5 The method of standardisation transforms the variables to normally distributed variables with a mean of 0 and a standard deviation of 1, i.e. $X_i \Rightarrow X_{st} = \left(\frac{X_i - \overline{X}}{\sigma_X} \right)$, ahol $X_{st} \approx N(1;0)$ [33 p61].

6 As a consequence of our methodology, the coefficients' sign is positive in each cases.



1. chart: Frequencies of the values of the continuous competitiveness index

The resulting final index is continuous and normally distributed with values between – 2,5 and +2,5. Since the majority of our variables obtained from the questionnaire are discrete variables, the original continuous competitiveness index had to be categorized. A common multivariate method for the categorization is the cluster analysis, however, in case of our data set it have not provided reasonable results. To transform the normally distributed variables to Likert scale variables, we divided the whole interval into equal parts [26]. It had to be decided that how many different groups to distinguish within the whole sample in terms of competitiveness. The sample size allowed us to distinguish three or five different groups. Despite the several mathematical advantages of the normalised index, we faced the problems of thin tail distributions, and with five groups, the first and the last groups consisted of less than ten observations. This means that, for the sake of statistically correct analysis, we could only use the three-group categorization with the groups of laggards, averagely competitive companies and forerunners.



2. chart: Frequencies of the categorised competitiveness index values

In the chart above, the height of the column marked with 1 shows the frequency of the laggards within our sample population (24), the column marked with 2 shows those of the averagely competitive companies (60), while the column marked with 3 shows that of the

group of the forerunners (15). Due to the normal distribution of the original index, three fifths of the companies belong to the second category (averagely competitive), one quarter of the sample population belongs to the category of laggards and only one seventh of the companies belongs to the forerunners. Note, that our competitiveness index is suitable to measure the relative competitiveness of the surveyed organisations and not suitable to categorise organisations that are not included in the sample.
The table below summarises the main differences between the competitiveness index of the CSTRCR and Chikán's Corporate Competitiveness Index:

	Corporate Competitiveness Index[7]	**CSTRCR competitiveness index**
Sample size	large (301 companies, 1204 respondents)	small (99 respondents)
Surveyed organisations	entrepreneurships employing at least 90 employees	any kind of enterprises
Respondents	4 executives of the organisation (managing director, financial, marketing, logistics directors)	an executive of the organisation
Number of variables involved	altogether 22, in multiple stages	altogether 6, in one stage
Index creation	in multiple stages	in two stages
Assumed model	additive-multiplicative	weighted additive
Main goal	competitiveness ranks	measuring regional-level relative competitiveness
Number of categories	7 groups	3 groups

2. table: A comparison of the CCI and the CSTRCR competitiveness index

3. The selection of the sample population

In the previous section we introduced the methodology of the regional micro-level competitiveness index creation. Now we describe the underlying sample population with the help of the basic descriptive statistics of the competitiveness index.
The research surveyed the executives of 99 companies operating in Baranya, Somogy and Tolna counties, in the Southern Transdanubian Region of Hungary (*3.* table).
We used a random sampling method and the only selection criterion was the geographical location, any other limitations – such as company size, sector of operations or legal form – were not imposed. The research started at June 2005 with the help of students from the University of Pécs. The majority of the surveyed organisations is located in Baranya county and, for this reason, the results are primarily relevant for this geographical area.

	No.	**%**
Partnerships	27	13,5
Limited liability companies	59	29,5
Public limited companies	13	6,5
Total	**99**	**100,0**

3. table: The distribution of the surveyed organisations in terms of legal form

7 The research is quite diverse and has multiple results. Table 2 is based on [21] and the whole documentation of the research is available on the internet.

Average headcount	**No.**	**%**
0–9	61	61.6
10–49	19	19.2
50–249	9	9.1
250 –	10	10.1
Total	**99**	**100.0**

4. table: The distribution of the surveyed organisations in terms of average headcount

After contacting the surveyed organisations, the questionnaires were filled in a personal interview, typically by an executive or owner. The questionnaire comprised of two main sections: leadership/administration – IT, European Union, environmental protection and innovation –, and marketing and management – market environment, competitors and human resource management.
In the following paragraphs, we present some basic descriptive statistics of the competitiveness index: the frequencies of the categories and their distribution in terms of average headcount.

Categories	**Average headcount (persons)**				**Total**
	1-9	10-49	50-249	250-	
Laggards	17	4	1	2	**24**
Averagely competitive	38	12	5	5	**60**
	6	3	3	3	**15**
Total	**61**	**19**	**9**	**10**	**99**

5. table: The distribution of the organisations in the competitiveness categories in terms of average headcount

Medium-sized and large companies are overrepresented, while micro and small-sized companies weight less than optimal in the sample. Most of the forerunners are medium-sized or large companies (one third of them appears in this category), which are followed by small-sized companies, one seventh of them belongs to the forerunners' category and micro companies' ratio is the lowest in this category, with only one tenth. Within laggards, the medium-sized companies have the lowest ratio (one tenth), closely followed by the large companies and the small-sized companies (one fifth), and the worst performance is achieved by the micro companies (with a ratio of almost one third).
The following analyses shows the results of the cross-tabulations for the competitiveness index and several variables generated by using SPSS. We tested the relationship with the help of the Cramer's coefficient[8] and after it, analysed with charts. The table below presents some interesting results from more than one hundred crosstabulations.

8 Cramer's V is a modification of the χ^2 test which tests whether the values of the crosstabulation are located randomly. The null-hypothesis is that the values are randomly located. In case of a significant relationship, the null-hypothesis is rejected.

Question	Possible answers	Cramer's V	Significance (p-value)
Leadership/administration			
How much is the average headcount in your company?	1-9 persons/10-49 persons/50-249 persons/250 or more persons	.173	.428
Legal form of the surveyed organisation.	Possible legal forms	.164	.506
Is there any performance assessment system at your organisation?	Yes/no	.314	.008*
Do you have any purchased or own accounting or controlling system?	Yes/no	.280	.021*
Do you conduct internal controlling, auditing or any other controlling activities?	Yes/no	.238	.061**
Marketing and management			
Do/Did you conduct any marketing research, if yes, what kind?	Observations/Analysis of focus groups/ Questionnaire/In-depth interview/Experiment/No	.287	.096**
How frequently do you conduct marketing research?	Continuously/Weekly/Monthly/Yearly/Less than yearly	.262	.580
Does your organisation have an established brand image (logo, slogan etc.)?	Yes/no	.307	.009*

* Significant relationship at 5 % level.
** Significant relationship at 10 % level.

6. table: Some results of crosstabulations of the competitiveness index

There are two important questions in which we found negative results. The value of the created index does not depend on the company size – measured by the average headcount – and the legal form[9] which means that there is not any systematic distortion in the index[10].

The direction of the relationships that proved significant on the basis of Cramer's V can be analysed through graphical methods[11]. Conspicuously, while 70.83 percent of laggards do not have any performance assessment system and 58.33 percent of them do not have any internal auditing system, what's more, 83.33 percent do not have any accounting and/or controlling system, these figures are 20.0 percent, 20.0 percent and 40.0 percent, respectively, in case of the forerunners. 75.0 percent of laggards do not conduct any marketing research, while this indicator is 33.3 percent in case of the forerunners. Regarding the types and frequencies of marketing researches, the differences between the categories are random – which is shown by the p-value being 58 percent. Finally, while 100 percent of the forerunners and 68.3 percent of the averagely competitive companies have an established brand image, 45.8 percent of the laggards stated that there are deficiencies in this field.

9 The legal form may serve as a basic information in forming "prejudices" concerning the company size and the quality of company management.
10 This means that larger company size itself does not predict higher competitiveness.
11 The charts are presented in the Appendix.

4. Testing the competitiveness index

In this section we try to answer the following questions:

1. Is there a clear distinction between the three categories of the competitiveness index in terms of certain variables?
2. How many observations are classified correctly – i.e. belongs to the relevant competitiveness category – in terms of the analysed variables?

To answer these questions we used the method of discriminant analysis[12] and then the method of logistic regression[13]. Seven variables were involved in these analyses:

Characteristics of the target market*
Attitude towards changes*
Average headcount
Established image
Performance assessment*
Controlling system (purchased/own)
R&D*

* Significantly affects the classification at 1% level

7. table: Variables involved in the discriminant analysis

Out of the variables specified in Table 7 we selected four variables (characteristics of the target market, attitude towards changes, performance assessment and R&D) that significantly affect the classification, by using the Stepwise method[14]. In the new ANOVA table, each remaining variables have significant effect at 1% level concerning the classification. The strongest effect is attributed to the attitudes toward changes, the second strongest is the R&D, which is followed by the characteristics of the target market, while the variable with the weakest effect is the performance assessment system.

We tested for multicollinearity since it has an important role in the discriminant analysis and found that globally it does not appear to an excess extent.

We have two discriminant functions[15] and their main characteristics are presented in the table below.

Function	Wilks' Lambda	Khi squared	Degree of freedom	p-value
1	0.318	107.183	8	0.000
2	0.882	11.725	3	0.008

8. table: Wilks' Lambda table of the discriminant analysis

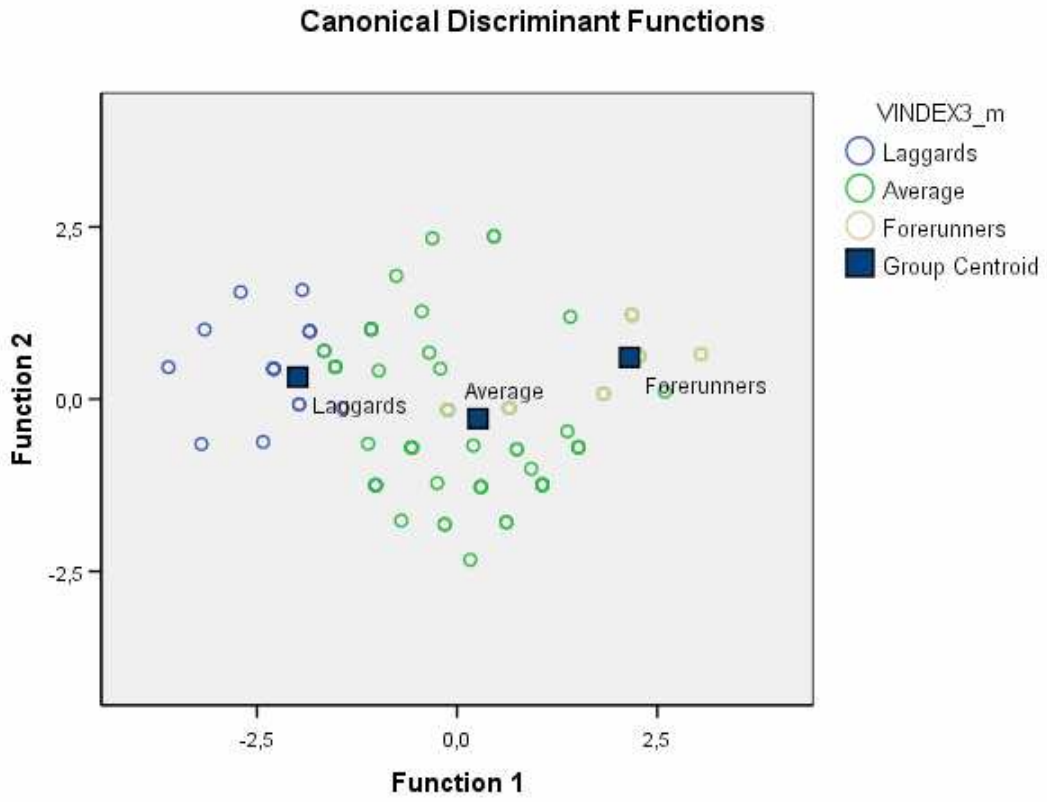
12 Discriminance analysis is a multivariate statistical method which helps in checking the relevance of the observations' classification [31 p329].

13 The difference between logistic regression and classic regression is that the former assumes only a few possible outcomes of the dependent variable.

14 „The advantage of the Stepwise method is that there is no variable involved in the model that has a "certain place". In case the explanatory power of a variable of the model drops and its t-value becomes insignificant after a new variable is involved, the "weakened" variable leaves the model." [32 p241.]

15 The general form of the discriminance function is: $D_j = d_{0j} + d_{1j}x_1 + d_{2j}x_2 + \ldots + d_{kj}x_k$, where j is the number of the given discriminance function, x_i is the observed variable, d_0 is an appropriately selected constant, and d_{ij} is the the constant of the i-th observed variable in the j-th discriminance function. The aim of the discriminance analysis is to create new variables that will cause the largest differences in the dependent variable between the defined groups [32]. Similarly to the factors in factor analysis, discriminance functions can be given specific interpretations, however our actual aim is to found an evidence for the existence of such a function and to learn whether it represents a significant relationship.

The Wilks' Lambda values are used to test the significance of the discriminant functions[16]. According to the figures, function 1 has an extraordinary importance since its Wilks's Lambda value is 0.318 which means that function 1 explains 68.2 percent of the whole information stored in the different variables. This is supported by the fact that function 1 explains 93 percent of the variance that is explained by the two functions and function 2 explains only the remaining 7 percent. The canonical correlation is 0.8 in case of function 1 and 0.343 in case of function 2. In summary, we conclude that the discriminant functions are significant and the effect of the second function is weak, while the first function explains the majority of the variance. Interestingly, the strongest correlation is between the first function and the presence of performance assessment system, and the relationship between the remaining three variables and the second function is strong enough. The groups and their centroids can be plotted in a two-dimension chart as shown in Chart *3*.



3. chart: The location of the competitiveness categories and their centroids in terms of the two discriminant functions

The chart provides a visual evidence for the result that the categories are sharply separated in terms of the first discriminant function (horizontal axis). The highest variability appears in the averagely competitive category while the centroid of the laggards' category is farther from the centroid of the averagely competitive category than that of the forerunners' category. It can be also learned that certain forerunners are quite close to the centroid of the averagely competitive category, and many averagely competitive companies could belong to the laggards' category. A positive result is that there is not any incorrect classification concerning the categories of the forerunners and laggards.

16 Lambda values closer to 0 represent stronger relationship.

Finally, we investigate that to what extent are we able to estimate the results of the classification on the basis of the discriminant function. The original probability that a given company belongs to one of the competitiveness categories is 1/3. On the basis of the evidence presented in table *3*., the question arises that how many organisations are classified in the relevant category and how many of them are classified in an incorrect way by using this methodology.

Competitiveness categories		Assumed classification			Total
		Laggards	Average	Forerunners	
No.	Laggards	21	3	0	24
	Average	10	40	9	59
	Forerunners	0	3	12	15
%	Laggards	87.5	12.5	0.0	100.0
	Average	16.9	64.4	16.9	100.0
	Forerunners	0.0	20.0	80.0	100.0

9. table: Results of the classification based on the discriminant analysis

The absolute numbers ("No.") show that 21 (87.5%) out of the 24 companies in the laggards' category belongs to the relevant category while 3 of them are classified into the averagely competitive category. The figures are much worse in the averagely competitive category, since the ratio of the correct classification results is only 64.4% and the remaining part is classified into the laggards' or forerunners' categories with a 50-50% ratio. 12 out of the 15 companies in the forerunners' category is classified correctly which is a 80% ratio and the remaining part is in the averagely competitive category. On the whole, 74.5% of the classifications were correct.
The main results of the discriminant analysis are as follows:

1. the three categories of the competitiveness index can be sharply separated in terms of the analysed variables by the first discriminant function,
2. almost three fourths of the observations were classified correctly concerning the given competitiveness categories on the basis of the analysed variables.

The discriminant analysis shed light on the fact that our competitiveness categories are satisfactorily separated in terms of the four selected variables. Now we analyse that how and to what extent do certain explanatory variables affect the companies in the laggards' and forerunners' categories relative to those in the averagely competitive categories.
In order to perform this task we use logistic regression[17] and this practice, in this case, is not limited by significant multicollinearity or by the low number of observations[18].
We apply multivariate logistic regression[19] since the dependent variable (competitiveness index) has three categories, therefore we cannot assume normality and cannot use OLS regression. We assumed that the basis is the averagely competitive category, hence we have two separate regressions, one for the laggards' category and one for the forerunners' category.

17 The aim of the logistic regression is the same as that of the classic regression, i.e. the explanation of the dependent variable's behaviour with some independent variables [32 p204]. A specific feature of the logistic regression is that the dependent variable is discrete.
18 The minimum number of observations needed is 60.
19 The expression "multivariate" used by the literature may be misleading. Here multivariate refers to the number of the dependent variables' outcomes instead of the number of variables involved in the regression.

Parameters	Laggards (β)	Forerunners (β)	Laggards (exp(β))	Forerunners (exp(β))	t-value	Difference between the laggards and the forerunners' categories
Intercept	1.986* (1.208)	-6.092*** (1.644)	7.286	0.002	17.667	***
Attitude towards changes	-4.331*** (1.474)	1.099** (0.524)	0.013	3.001	-13.679	***
R& D	-10.421*** (3.903)	2.226*** (0.831)	0.000	9.263	-12.318	***
Characteristics of the target market	-2.032** (0.857)	2.494** (1.158)	0.131	12.110	-14.006	***
Performance assessment system	-5.891** (2.512)	0.708^{ns} (0.920)	0.003	2.030	-9.734	***

Standard errors are in parenthesis.
*** significant at 1% level, ** significant at 5% level, * significant at 10% level, ns non-significant

10. table: Summary of the logistic regression results

The first two columns of the above table show that three categories can be separated significantly in terms of competitiveness regarding the first three variables (attitude towards changes, R&D, characteristics of the target market), while there are only two categories (forerunners and not forerunners) concerning the variable performance assessment system. The signs are parallel with our presumptions since regression coefficients are negative for the category of laggards and positive for the category of forerunners.
Columns marked with exp(β) show that how many times will be the chance more when the explanatory variable grow with one unit [27 p225].
Those companies within the *laggards'* category that have higher values concerning the attitude towards changes (e.g. those who influence changes compared to those who predict changes and prepare in time) have 98.7 percent less chance to belong to the laggards' category than to the averagely competitive category. Those companies that perform R&D have 0 (or minor) chance to belong to the laggards' category instead of the averagely competitive category compared to those that do not perform R&D. In the laggards' category, the highest value is measured for the characteristics of the target market (0.131), i.e. in case a given company operates in an extending market, the chance is 0.131 times higher which means that it has 86.9 percent less chance to belong to the laggards' category instead of the averagely competitive category. Concerning the performance assessment system, the values are almost as extreme as in the case of R&D.
Regarding the classification in the *forerunners'* category, the most influential factor is the characteristics of the target market. In case a given company has an extending target market, it has 12.11 times more chance to belong to the forerunners' category instead of the averagely competitive category compared to a company with a less extending market. R&D activities have also a strong influence since those companies that perform R&D have more than 9 times more chance to belong to the forerunners' category than to the averagely competitive category. The influence of the attitude towards changes is significant but to a much lesser extent. Those companies that have better values concerning the attitude towards changes have 3 times more chance to belong to the forerunners' category instead of the averagely competitive category compared to those that have worse values.
In order to enhance the competitiveness of a given company, first of all, it should try to find

the appropriate target market. After it, the company should perform R&D activities and try to react to environmental changes in time. In case the company has enough capacity, it should introduce a performance assessment system.

5. Conclusion

In this study, we present an own alternative method of measuring regional micro-level competitiveness. The research used a sample of 99 observations from Baranya, Tolna and Somogy counties and analysed 6 variables (R&D, characteristics of the target market(s), attitude towards changes, marketing budget ratio, participation in a strategic alliance, fluctuation) from which a weighted additive model was set up in one stage. The index created with this methodology was continuous and normally distributed, and 3 categories were distinguished: forerunners, averagely competitive companies and laggards. To test the index, we used discriminant analysis, and analysed the different competitiveness categories with the help of multivariate logistic regression.

As a result of the discriminant analysis we found that the competitiveness index defines sharply separated categories in terms of the selected variables and 74.5 percent of the observations is classified correctly within the framework of the model.

On the basis of the multivariate logistic regression we showed that the characteristics of the target market is a critic factor in the cases of both extreme categories compared to the averagely competitive category. In addition, in the laggards' category, an important factor is the attitude towards changes while in the forerunners' category, the determining factor is R&D in respect of the classification.

The most significant result of our research is the creation of a competitiveness index which has both practical and scientific value added. From practical point of view, an analysis of the surveyed companies' competitiveness becomes possible and recommendations can be made concerning the directions of development. From scientific point of view, the creation of the index provides a possible methodology of measuring micro-level competitiveness which field – excepting Chikán's CCI – is not yet researched in the international and Hungarian literature.

We assign two directions for future research. First, the existing results can be improved through a survey conducted with a geographically extended scope. Second, it should be investigated whether the measurement of competitiveness can be aggregated in a single index or several individual indexes are needed, or possibly, a hierarchical structure of the indexes is relevant.

Acknowledgements

Zsuzsanna Pótó is grateful for the Complex South Transdanubian Regional Competitiveness Research (ROP-3.3.1-2004-10-0006/33) and Környezetünkért Közalapítvány stuff and the research participants. Gábor Márkus is grateful for the financial support of the OTKA Research Foundation, theme number NK 29283. The whole paper is available upon request.

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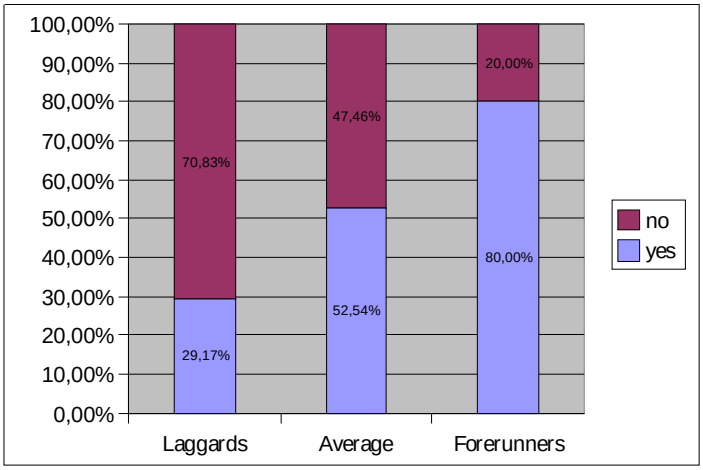
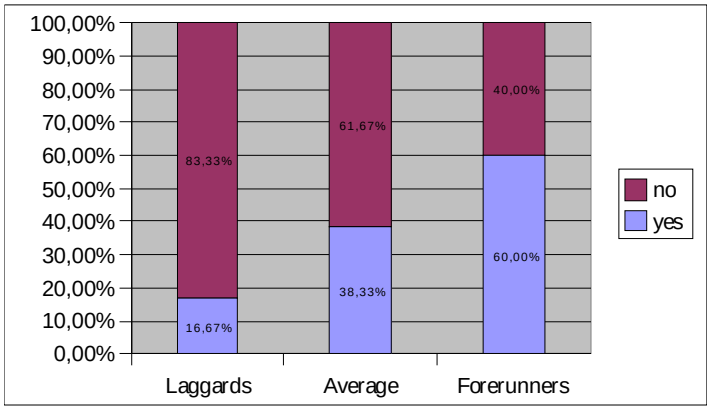
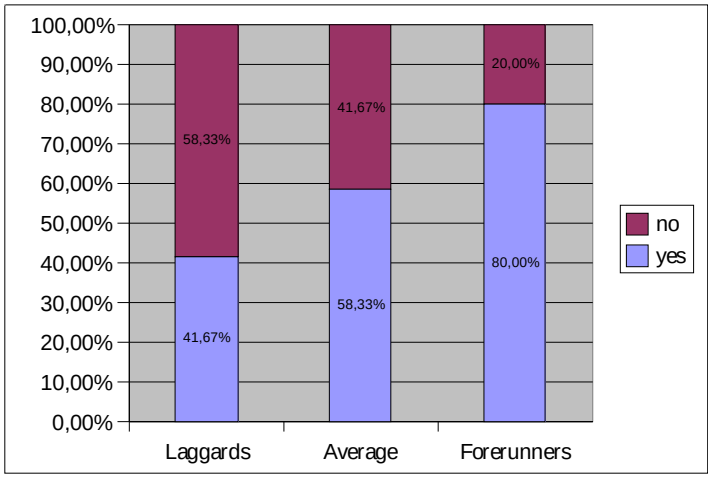
Appendix



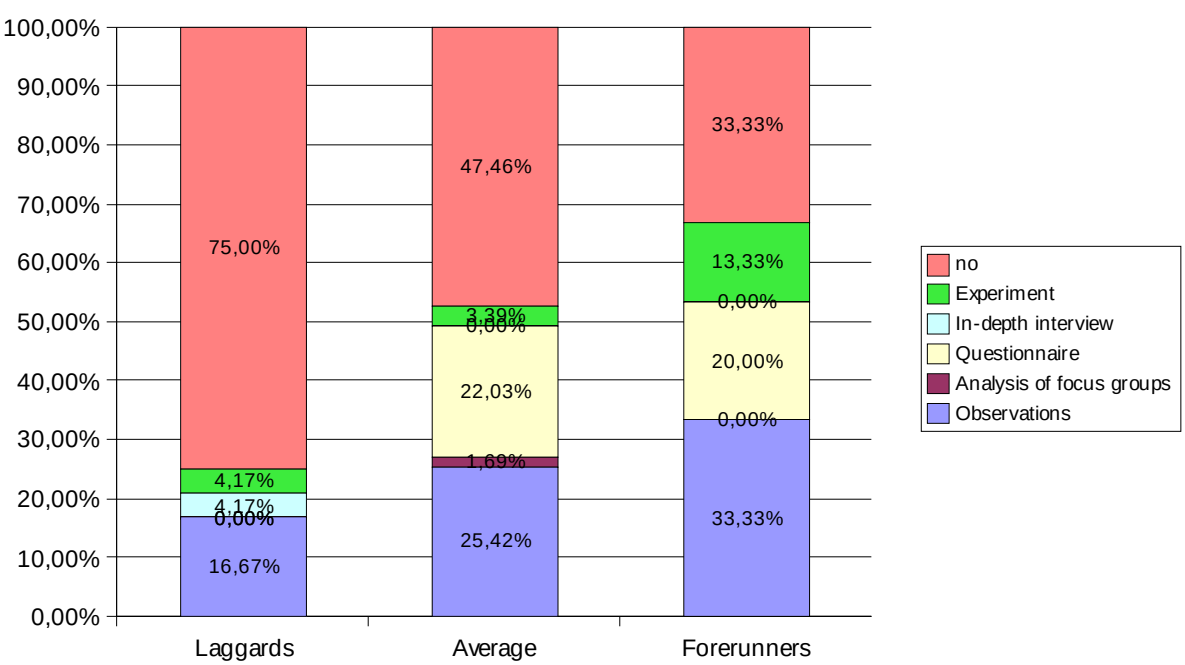
Does your organisation have any performance assessment system?



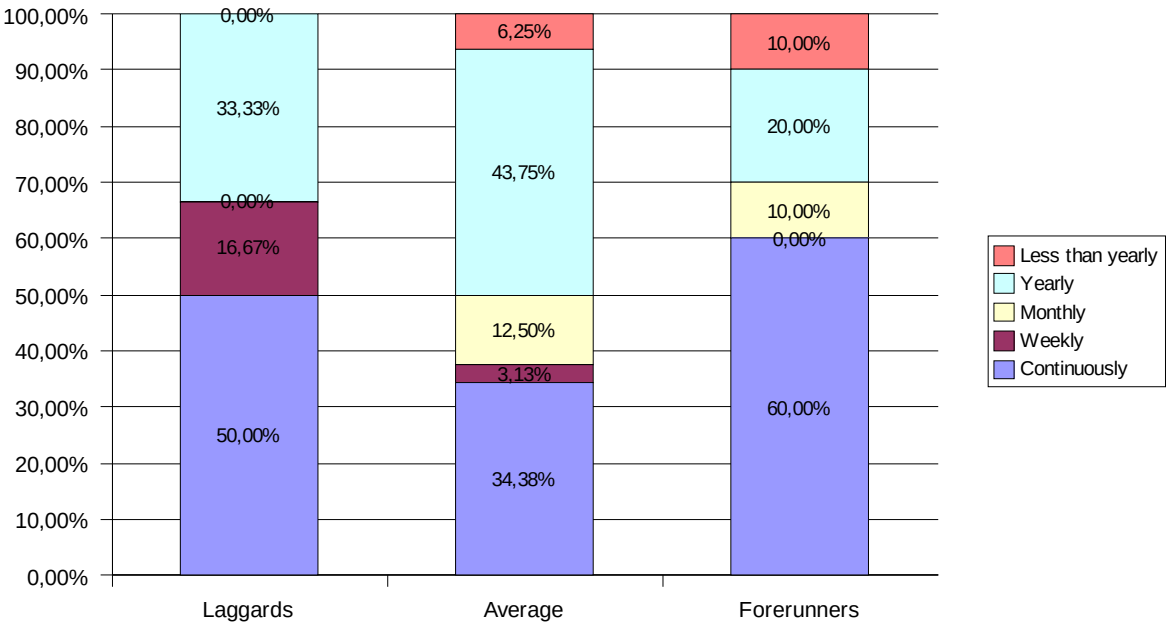
Does your organisation have an own or purchased accounting or controlling system?



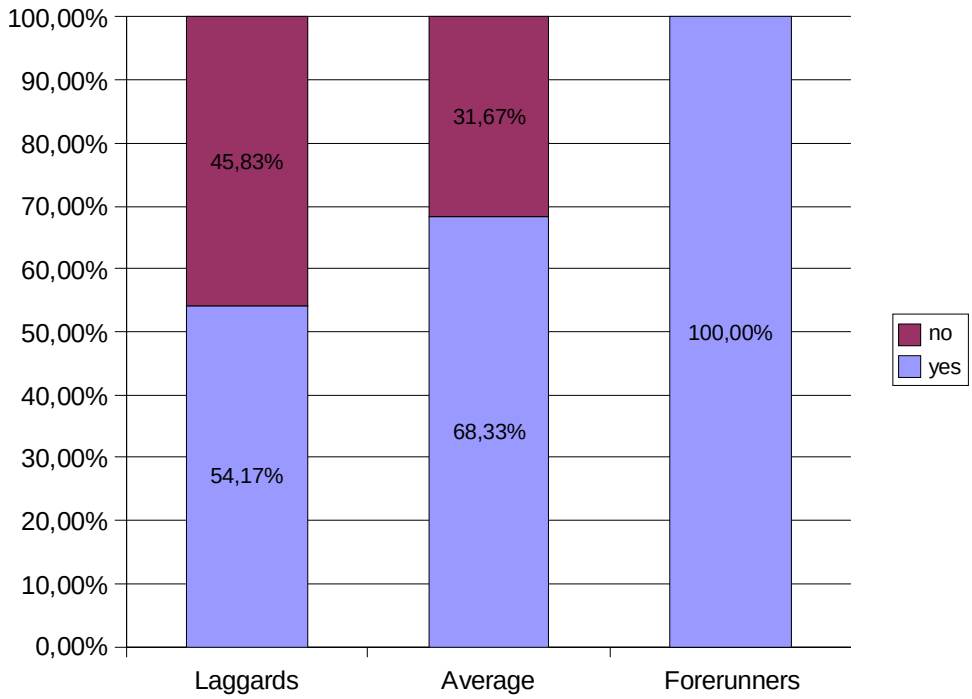
Does your organisation conduct internal controlling, audit or other controlling activities?



Does/Did your organisation conduct marketing research, if yes, what kind?



How often does your organisation conduct marketing research?



Does your organisation have an established brand image (logo, slogan etc.)?