

Attila Chikán

Measuring the competitiveness of companies

A competitiveness index and its application

Competitiveness is one of the most frequently used terms in economics today. Among the most significant changes seen in global economy in the past decade is the sharpening of competition (Ohmae, 1995), which poses increasingly tougher requirements for the participants of the economy (Chikán–Czakó, 2002). Meeting these requirements and coping with competition are requisite to survival at all levels of the economy. Everyone is likely to agree on this general statement; this agreement, however, would soon be over if a precise definition of competitiveness and, in particular, the degree or the measurement of it were addressed.

In this study, I will first outline a concept of competitiveness under which we have carried out research since 1995, and which the activity of the Institute of Competitiveness Research relies on. Then, I will articulate and interpret the main subject of this paper, namely the “Company Competitiveness Index” (hereinafter referred to as CCI), touching on the mathematical and statistical analyses that were used as the basis of finalising this index. Using CCI, we have conducted analyses on the extensive company database owned by the Institute of Research on Competitiveness, and I will also present any conclusions that can be drawn. Finally, I will put forward further potentials for the utilisation of this index.

THE CONCEPT AND LEVELS OF COMPETITIVENESS

The concept of competitiveness is the subject of extensive debates in the literature of both economics and business. In this article, I do not aim at a detailed analysis of this subject (Chikán–Czakó, 2006), I only address it as much as necessary to elaborate on the index.

In the international literature, four levels of economic competitiveness are generally distinguished: national, sectoral, company and product levels. Naturally, this is not without any debate: some attribute high importance to the competitiveness of regions, and, in addition to that, in two senses. Some of the experts mention the competitiveness of the USA, the EU, China, Japan (or South East Asia) in terms of macro-regions (Buckley, 1998; Mirza, 1998), while others focus on analysing the competitiveness of smaller geographical regions (North Italy, the English Midlands, etc.) (see the IMD reports or Porter, 1998). Another group denies the point of referring to competitiveness at any level above companies, stating that the forum for competition is the market, where the participants are companies with their products (Krugman, 1994). These debates are not detailed any further in this article; we only address company competitiveness. A particular-

ity of this circumstance is that the notion and measurement of company competitiveness are rather neglected subjects in the literature, compared to other levels of competitiveness. (Let me note here that I myself do not agree with the arguments of Krugman, hence I believe that there is a point in speaking of competitiveness at the national, regional or sectoral levels.)

We have not encountered a definition of company competitiveness that would comply with our research objectives in the literature, but found a great deal of important and useful additions. *Ádám Török* is right in his study focussing on a macro level competitiveness stating “*economics and international economics take hardly any or no notice of this notion, while management studies take it very seriously, and address it abundantly*” (Török, 2002). Unfortunately, this does not change the fact that the definition and measurement of company-level competitiveness cannot be considered a resolved problem. A good review of multiple concepts is provided by *McFetridge* (1995), and a study by *Kumar and Chadee* (2002) bears references also relying on the resource-based theory. *Hoványi's* (1999) fairly interesting structural model is thought provoking, but we did not find it operationalisable (applicable) in the theoretical framework of our own research. The otherwise instructive empirical analysis published by *Molina et al.* (2004) does not substantially address the definition of competitiveness, while handling external factors going along *Porter*, and, although it provides a number of references to internal factors, these factors are not systematised. *Klein* (2002) criticises on the incomplete definition of competitive edge and its realization, and the mistaking of the latter one for strategy; in fact, however, he also fails to offer a definition, although his description of rivalry and strategy implementation is indisputably interesting. For this reason, I provided my own definition back at the time when we started our research into competitiveness (*Chikán*, 1995),

which I slightly elaborated on and distilled for the current research phases, also relying on the opinions of fellow researchers. This reads “*company competitiveness is an ability of the company to provide, on a permanent basis and in compliance with the standards of social responsibility, products and services that consumers are more willing to pay for compared to rivals' products, under conditions that ensure profit for the company. A condition to this competitiveness is for the company to be able to detect and adapt to changes in the environment and within the company by way of meeting competitive market criteria permanently more favourable than those of rivals.*” (*Chikán–Czakó*, 2005)

I have no intention to give a detailed analysis of this definition here, I only remark that the construal of the word 'competitiveness' suggests an ability of the company to participate in competition in the hope of success. This refinement is very important from the aspect of distinguishing between systems of terminology and measurement related to competitiveness and performance. [The two notions are sometimes handled as identical, for example, *Arora and Gambardella* (1997) often simply assume in an implicit way that better performance is a concomitant of higher competitiveness as stated by *Andersen et al*, 2006]. The definition provided by me relies on the resource-based company theory most widely used today in business theories [*Wernerfelt* (1984) is considered to be the fundamental work on this theory, but the much more widely known conception of *Hamel and Prahalad* (1994) on the substantial abilities of the company also belongs here], which states that the company's success depends on its own resources, which can hardly be copied, if at all. These resources mean potential success, but realization is only possible using an appropriately selected and implemented strategy. This requires the company to re-produce qualities and resources that ensure competitive edge on

a continuous basis, proactively adapting to (i.e. predicting and preparing for) any changes in the environment. A prerequisite to competitiveness is a permanent upkeep of an ability to change (proactive adaptiveness) in addition to operability these together may lead to a performance recognised by the environment. [Kornai (1971) distinguishes between operability and the ability to change as two distinct stages of adaptation: primary adaptation is aimed at upkeeping the mere existence of the organisation, while secondary adaptation is used to ensure that certain expectations are met in the process.]

The above theoretical basics were accompanied by my belief in that the company's fundamental objective is to meet consumer demands, while making profits (Chikán, 2003), and, consequently, the company pursues a process of dual value creation: it has to create consumer value and ownership value in the same process. I believe this principle is fundamental to measuring company performance, and I also rely on it when developing the index.

SETTING UP THE COMPANY COMPETITIVENESS INDEX (CCI)

I set up the index following the definition of competitiveness specified here and organised in the logical order of operability/ability to change/performance. On elaborating on the final version, in addition to theoretical considerations, an important role was assigned to the mathematical and statistical analyses seeking answers to whether the index developed is actually suitable for measuring, and which of the logically possible versions exhibits the best measuring characteristics.

University lecturer Kovács Erzsébet assisted me in performing and evaluating calculations, for which I hereby express my appreciation to her.

The index was set up to be realistically quantifiable, and to be made utilisable for both scientific research and practical use. The international literature was of no practical help in creating a company index. At the same time, multiple indices are available, as everyone knows [the most widely known ones are the indices of the World Economic Forum (www.weforum.org) and the IMD (<http://www01.imd.ch/wcc>); for an assessment, see Czakó (2004)], which measure the competitiveness of a national economy. The logic underlying this index was used on developing our own index. These national economic indices, similarly to our research carried out so far, mainly fell back on opinion poll questionnaires. In theory, quantification of the CCI can be performed based on both itemised company details and opinions. This version of the index presented in this paper relies on the latter one – this facilitated the use of abundant databases of questionnaire surveys mentioned in the introduction on analysing and developing a final format to it.

Founded on the information presented so far, the basic structure of the index was set up as shown in *Figure 1*.

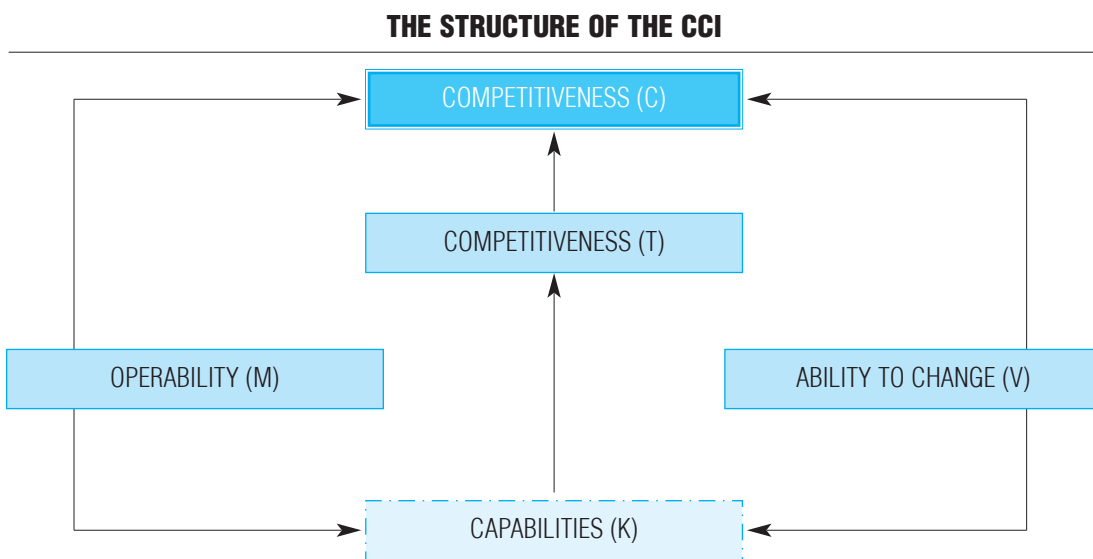
In this figure, C (an abbreviation of 'competitiveness') denotes the CCI calculated. M, V and T are the variables (or groups of variables) measured, a summary impact of which is measured by the index, and K is an interim working variable.

Expressed in a formula, those stated above result in

$$C = (M + V)T$$

being used to measure competitiveness. Contents-wise, it means that *the measure of competitiveness is a portion of operability and ability to change combined, as recognised by the market.*

This formula complies with the criteria set by the theory of resource-based companies, inasmuch as variables M and V are capable of expressing the substantial abilities. Using the



appropriate performance measures, this model can also be construed in the conceptual system of dual value creation.

M, V and T are all compositions of variable groups; multiple index numbers generated from opinions evaluating company activity were used to measure these, as you will see below. It is also important to mention as early as at this point that originally multiple versions of this index were considered, and the form described here has been developed through a number of analytic steps. The data from a company survey conducted by the Institute for Research on Competitiveness were used to select and finalise index numbers, the method of which will be explained in the next chapter.

THE QUESTIONNAIRE SURVEY AND THE MEASURING OF INDICATORS

The Competitiveness Research Centre operating alongside of the Institute for Corporate Economics at Corvinus University, Budapest, conducted a survey of company competitiveness, using practically identical questionnaires in April and May 2004. First in 1996, 1300 man-

agers of 325 companies, then in 1999, 1264 managers of 316 companies, and, finally, this time 1204 managers of 301 companies participated in the survey. A summary of earlier surveys and a programme for the research conducted between 2004 and 2006 are provided in Chikán-Czakó (2005). [For a detailed description of the last survey's database and the representativeness of the sample, see Lesi (2005).] This extensive survey founded on management opinions provided a very versatile database; consequently, we had a high degree of freedom to select from eligible information.

After a number of considerations, we arrived at the conclusion that the index was to be reasonably built around a certain block of questions of the “CEO” questionnaire. (For each company, separate questionnaires were completed by the No. 1 leader, mostly the Chief Executive Officer, and the heads of production, business and finance, or, in certain cases, their representatives.) This group of questions sought answers to the following major question: “What standard did your company reach in the following areas describing company activity in the past 2 to 3 years, compared to your strongest rival?” The question was fol-

lowed by a list of 42 fields to be evaluated on a five-point scale, where 1 denoted an assessment of “much weaker”, 3 “basically equal”, and 5 “much better”. The data from these scales were relied on when calculating variables M and V; this is where I selected the final 22 variables from as a result of a line of thought to be described below.

We used the variables from another group of questions directly following the previous one. The question read: “Please evaluate the performance of your company or (in case of multiple sectors involved) your key business line compared to the sectoral average (in domestic comparison) using the following criteria”. 1 in the five-point scale was taken to mean: “deep under the average sectoral standard”, 2 “slight-

ly lagging behind the average sectoral standard”, 3 “similar to the average sectoral standard”, 4 “slightly exceeding the average sectoral standard”, and 5 “representing the sectoral lead”. Here seven questions were asked in the questionnaire, of which we used two to make up the index.

I reached out for the literature of operations management to measure operability, which maintains and uses a number of indices that, in theory, could be used here. Relying on our earlier research (Chikán-Demeter, 2005), I chose the group of variables I considered the most complete, for which the first definition was provided by Miller et al, (1992). This definition stated that the operating efficiency of a company can be described using parameters measuring

Table 1

CALCULATING OPERABILITY

| | |
|---|--------------------------------------|
| <p>Cost/price (m¹) Cost effectiveness (a) Competitive prices (f)</p> | $m_1 = \frac{a + f}{2}$ |
| <p>Quality (m²) Product quality (d) Manufacturing standard (m) Standard of raw materials (aa)</p> | $m_2 = \frac{d + m + aa}{3}$ |
| <p>Time (m³) Delivery deadline (k) Punctuality of delivery (g)</p> | $m_3 = \frac{k + g}{2}$ |
| <p>Flexibility (m⁴) Flexible response to consumer requirements (l) Flexibility of the production system (i) Flexibility of the logistical system (j)</p> | $m_4 = \frac{l + i + j}{3}$ |
| <p>Service (m⁵) Product choice (e) Standard of consumer service (t) Organisation of distribution channels (p) Ethical behaviour (γ)</p> | $m_5 = \frac{e + t + p + \gamma}{4}$ |

cost/price, quality, time, flexibility and the standard if service. Accordingly, elements shown in *Table 1* were used to calculate M, relying on the questions posed in our questionnaire. (Next to each factor, the letter code used for the subsections of question V16 of the questionnaire was displayed for identification. This bears no further significance.)

Based on the table:

$$M = \frac{1}{5} \sum m_i$$

i.e. the average of sub-indices were used for measuring operability in a comprehensive way.

Similar logic was applied to calculate the index for the ability to change. Relying on the literature for adaptiveness, three main groups of factors have been defined:

- market relations: prediction of and adaptation to consumer demands,
- availability of the resource considered to be the primary resource, human resources and
- organisational responsiveness.

The variables shown in *Table 2* have been used to measure these (references are made again to certain points of the questionnaire).

As a result, the index for the ability to change is

$$V = \frac{1}{3} \sum_{i=1}^3 V_i$$

All these reveal that all partial data of M and V were measured on a five-point scale, and the two indices were produced as an average of these. Accordingly, the values of both M and V were between 1 and 5 for all companies.

We used the logic of dual value creation to measure company performance. The two variables used are the proportions of return on sales (t_1) and market share (t_2) compared to the sectoral average the former denoting profitability, the latter consumer orientation. Both indices compare company performance to the relevant sectoral average, i.e. indicate how much more the market recognises it compared to that of other companies (how much more willing the market is to pay for the products offered by the company – is measured by profitability, and, how much more the market prefers to buy these compared to the products of others is measured by market share).

Table 2

CALCULATING THE INDEX OF THE ABILITY TO CHANGE

| | |
|---|-------------------------------|
| <p>Market relations (v1) Consumer relations as close as possible (nn) Ability to predict market changes (w) Use of innovative sales incentive methods (ee)</p> | $v_1 = \frac{nn + w + ee}{3}$ |
| <p>Human skills (v2) Qualification of employees (dd) High-standard, knowledgeable management (ff)</p> | $v_2 = \frac{dd + ff}{2}$ |
| <p>Organisational responsiveness (v3) Up-to-date nature of decision making/operating methods (qq) Technological standard (c) Level of R+D expenditures (hh)</p> | $v_3 = \frac{qq + c + hh}{3}$ |

Consequently, the formula is

$$T^* = \frac{t_1 + t_2}{2}$$

This suggests that the value of T^* is also between 1 and 5. In order for T to be able to fill in the role intended for it in the CCI on compiling the formula (i.e. adjusting the standard of basic abilities expressed in M and V and compared to rivals, to an extent recognised by the market), the value of T was normalized to be within the range (0,1); this was used in calculations to represent T .

QUANTITATIVE ANALYSIS

In order to develop a final index version, and interpret the results correctly, extensive mathematical and statistical analyses were carried out. First, we examined what relations to assume among variables M , V and T in order to decide on the final form of the index. In addition to the chosen index described here, we have also examined the following versions:

- $C = \frac{MT + V}{2}$, on the one hand,
- $C = (\alpha M + \beta V)\gamma T$, on the other hand,
- $C = \alpha M\gamma T + \beta V(1-\gamma)T$ and, finally,.

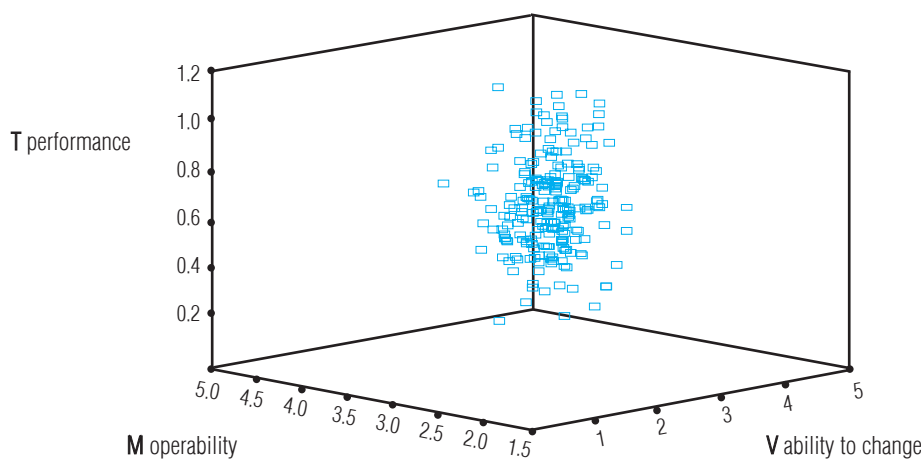
301 questionnaires of the survey conducted in 2004 were used for the investigation; however, we could only rely on data from 207 companies due to some basic data missing or mistaken. Calculating a rank correlation, we revealed that the versions described above practically resulted in identical rank orders among the companies used as a sample, considering a wide scale of parameters, and; at the same time, the interpretation of results can be, in theory, less substantiated and more intricate than for the formula $C = (M+V)T$.

Analyses also revealed that M and V played a basically equal role in determining a rank order of companies, which justifies presenting specific figures not only on the grounds of theoretical economic considerations, but also for statistical reasons. Over the full sample, the linear correlation coefficient of C with the values of M , V and T was 0.57, 0.66 and 0.91, respectively; these refer to a highly significant relation. [As the correlation coefficient of M and V on T are practically equal, we found it reasonable to apply the latter of the two formulas, $C = (MT+V)$ and $C = (M+V)T$. The explanatory power of M and V are practically equal, and that of T is slightly higher.]

In order to discover relations among M , V and T , a factor analysis was conducted relying on an

Figure 2

POSITION OF COMPANIES IN THE SPACE OF M, V AND T



analysis of the key component, and this supported the significance of the three variables in determining the rank order of competitiveness. The factor analysis yielded a relation of $F=0.45M+0.47V+0.32V$. *Figure 2* shows a distribution of dots representing companies in the space of the three variables. It is easy to see that these dots neatly cluster around an imaginary axis. This means that the data justify the production of a factor and a one-dimensional rank order.

The congruence of the factor and the index C (CCI) is monotonic and consistent, with a correlation of 0.864, and a rank correlation of 0.867. This represents very good congruence from this point of view, the question whether it is more acceptable to apply the original index C or factor F to rank companies mostly depends on whether the relation of factor T to M and V is, in economic terms, more additive or multiplicative in nature. As explained on introducing the index, T measures how much the market recognises the company abilities expressed in M and V. This justifies assuming a multiplicative effect. In addition, it is remarkable that the factor model is only able to preserve 62% of the original contents of the three indices, which also serves as an argument in favour of the index C. The factor analysis also revealed that the paired correlation coefficients of m_i and v_i and the communalities obtained through factor analysis are nearly equal in size, which gave rise to the conclusion that all bear considerable significance on producing the CCI.

The results summarised here have reassuringly supported the assumption that the index $C=(M+V)T$ ultimately chosen is statistically suitable to measure and rank companies for company competitiveness.

USING CCI TO RANK COMPANIES

The primary aim of creating this index is to be able to use it for evaluating and analysing the competitiveness of companies. In order to dis-

cover the intrinsic possibilities, we ranked 217 companies that supplied all the necessary data, based on the available company data, and we also evaluated the rank order. In addition to observing the rules of questionnaire surveys, certainly, no data can be published on individual companies, but I suppose some interesting conclusions may still be drawn.

For the evaluation, we used the system of company attributes set up on processing the questionnaire survey (Wimmer, Á-Csesznák, A. 2005). The questionnaire contains hundreds of data for each company, of which ten were selected as the most important ones in terms of research conducted in previous years and for the purposes of the current research phase. This means that each company is characterised using a ten-component vector, based on the value of each selected variable shown in the questionnaire. The ten selected variables with the possible values are shown in the appendix.

Table 3 shows the parameter values of companies ranking as the first and last ten.

Characteristics of the ten most and least competitive companies

The figures marked in bold in the table represent the most typical values (mode) in the first and last ten items. Commas denote missing values. This reveals that a “typical” company in the most competitive group holds the following attributes:

- is a large corporation
- is of foreign majority ownership
- belongs to the processing industry
- its activity diversification is not distinctive
- mainly produces for the domestic market
- has neutral expectations of accession to the EU
- exhibits proactive behaviour, attempts to influence changes
- grades its own performance to the sector leaders
- sets a moderate market growth as an objective
- operates on a concentrated market.

Table 3

CHARACTERISTICS OF THE TEN MOST AND LEAST COMPETITIVE COMPANIES

| Rank | Company code | B ₁ | B ₂ | B ₃ | B ₄ | B ₅ | B ₆ | B ₇ | B ₈ | B ₉ | B ₁₀ |
|------|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| 1 | 97 | 3 | 3 | 3 | 1 | 3 | 1 | 4 | 3 | 2 | 2 |
| 2 | 301 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 3 | 2 | 1 |
| 3 | 209 | 3 | 3 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 2 |
| 4 | 28 | 3 | 1 | 4 | 3 | , | 1 | 4 | 3 | 1 | 3 |
| 5 | 88 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 3 | 2 | 1 |
| 6 | 228 | 3 | 1 | 2 | 2 | 1 | 2 | 4 | 3 | 2 | 1 |
| 7 | 193 | 2 | 1 | 1 | 2 | 1 | , | 3 | 3 | 3 | 2 |
| 8 | 31 | 3 | 3 | 3 | 1 | 1 | 2 | 4 | 3 | 2 | 1 |
| 9 | 291 | 3 | 3 | 4 | 3 | , | 2 | 4 | 3 | 2 | 1 |
| 10 | 253 | 3 | 3 | 3 | 1 | 1 | 2 | 4 | 3 | 2 | 2 |
| 201 | 245 | 3 | 1 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 1 |
| 202 | 210 | 3 | 1 | 3 | 3 | 3 | 2 | 3 | 1 | 2 | 1 |
| 203 | 194 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 |
| 204 | 156 | 1 | 1 | 4 | 2 | 1 | 1 | 3 | 1 | 2 | 2 |
| 205 | 23 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 1 | 2 | 2 |
| 206 | 25 | 3 | 1 | 3 | 3 | 2 | 3 | 1 | 1 | 2 | 2 |
| 207 | 1 | 2 | 1 | 3 | 1 | 3 | , | 3 | 3 | 3 | 3 |
| 208 | 8 | 2 | , | 4 | 1 | 1 | 3 | 3 | 2 | 2 | 1 |
| 209 | 13 | 2 | 1 | 2 | 1 | 1 | , | 3 | 3 | 1 | 1 |
| 210 | 14 | 2 | 2 | 4 | 2 | 1 | , | 2 | , | 2 | , |

As opposed to this, a company “typically” belonging to the worst group in terms of competitiveness exhibits significantly different attributes:

- may belong to any size group
- the state is the majority owner
- sectoral classification is not distinctive
- may belong to any group in terms of diversification of activity
- mainly produces for the domestic market
- expects difficulties on accession to the EU
- tries to exhibit adaptive behaviour (preparing for changes)
- grades itself as a lagger in terms of performance
- aims at a moderate market growth
- operates on a concentrated market.

It is to be seen that the difference between the two groups primarily lies in the owner, the attitude to accession to the EU, preparation for changes, and company performance. It is interest-

ing that three factors – export orientation, market objectives and market concentration –, the most typical value of both groups are identical.

For a more thorough analysis, the results of another test were used for help. The 217 companies in the population (more precisely, the first 210) were classified in groups of 30 to see the tendencies shown on generating a rank order.

Each group was examined for

- the most frequent types of companies (types were determined using the ten criteria specified earlier)
- the extent of difference between the distribution of companies in sub-samples and in the entire population, from various aspects.

According to *Table 4*, the most competitive companies are typically large corporations, with foreign majority ownership. Sectoral distribution and export orientation does not play important roles in setting up the group. They are companies diversified to a medium extent,

Table 4

THE MODE OF KEY VARIABLES IN DIFFERENT COMPETITIVENESS GROUPS*

| Attribute | Group | | | | | | |
|--------------------------------|-------|-------|-------|--------|---------|---------|---------|
| | 1-30 | 31-60 | 61-90 | 91-120 | 121-150 | 151-180 | 181-210 |
| Size | 3 | 2 | 3 | 2 | 1/2 | 2/3 | 2/3 |
| Owner | 3 | 2/3 | 3 | 2 | - | 2 | 1 |
| Sector 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Diversification | 2 | 2 | 2 | - | 2 | 2 | 2 |
| Export orientation | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Expectations concerning the EU | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| Attitude to changes | 3 | 3 | 3 | 2 | 2 | 2 | 1 |
| Performance | - | 3 | 2 | - | - | 1 | - |
| Market objectives | - | - | - | 2 | 2 | 2 | 1/2 |
| Concentration | 1 | 2 | 1 | 1 | 1 | 3 | 2 |

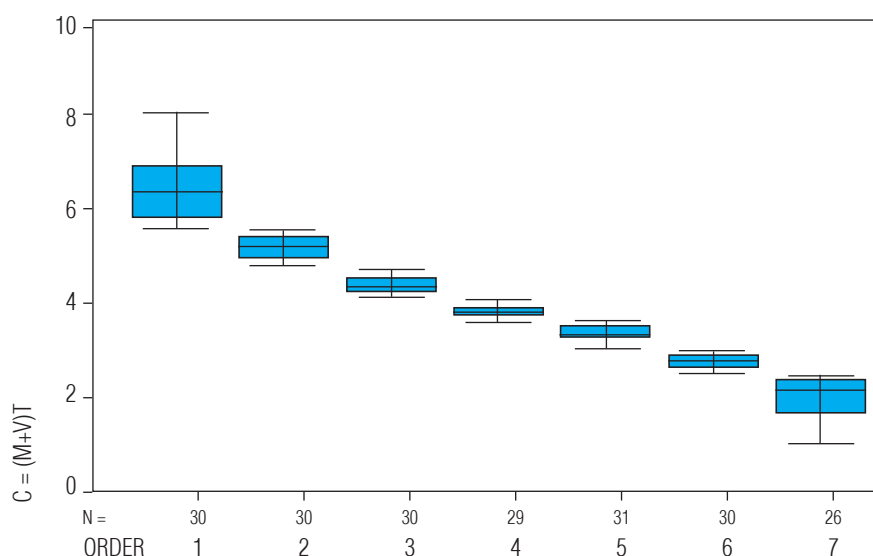
* No mode is calculated in some groups; in such cases, a dash is displayed in the table (1/2 or 2/3 means two modes).

which have optimistic expectations concerning the accession to the EU. They prepare for changes in advance, and consider their own performance significantly better than the sectoral average. They typically operate on a concentrated market, and aim at a moderate market growth. The companies of weakest competitiveness are mostly among medium-sized companies, and the state has majority owner-

ship in them. No typical sectoral orientation is observed. They are diversified to a medium extent, and mainly produce for the domestic market. They expect difficulties in coping with the EU, and they believe they are slow to follow changes. Their performance is weak in their judgement, and they operate in a moderately concentrated market, with various market objectives.

Figure 3

A COMPARISON OF COMPETITIVENESS GROUPS



Naturally, their competitiveness index decreases monotonically, but variances in the first and last group are greater than in the five groups in between.

In *Figure 3*, the extension of vertical lines indicates the maximum and minimum values in each cluster, and the rectangle shows the range where 50% of the data are, while the horizontal line inside each rectangle represents the median.

A cluster analysis of the 217 companies was carried out in the space of the ten key variables, with the companies grouped in 9, 7 and 5 clusters, respectively. For comparison, the solution with 7 clusters is presented here. Variances significant in terms of all variables were found between clusters, which confirms that these variables may lead to revealing substantial differences between companies. Regarding the seven clusters, we examined the influence of ten key variables on clustering. The seven clusters were independent of the level of diversification alone, all the other nine aspects showed close or semi-close association with clustering. The average CCIs of companies grouped in the seven clusters show significant differences. These results indicate that the variables considered actually play a decisive role in determining the ranking of competitiveness.

At the same time, no definite relation could be

revealed between the clusters set up and the composition of groups of 30 generated based on the rank order of competitiveness. (Independence between the two classifications can only be rejected at a significance level of 6.6%, which is considered a borderline case.)

Table 5 also shows that the overlap between the groups determined based on the rank order of competitiveness and the clusters set up based on 10 criteria is insufficient for the two groupings to be handled as identical. This suggests that each criterion covers important differences, but not even a combination of 10 criteria determines ranking. The criteria include nominal ones, where the terms better or worse are not applicable. Clustering companies together is only determined by similar values; similarity means no hierarchical sorting, clusters cannot be ranked, and, therefore, cannot truly be compared to a rank order.

A SUMMARY OF USING THE INDEX

As shown by the analyses presented here, the CCI stands the test of both economic theories and statistical analyses, and is suitable to measure company competitiveness. I certainly do not assert that this is the only or even the best

Table 5

SHARED ELEMENTS OF CLUSTERS AND GROUPS FORMED BY RANKING IN TERMS OF COMPETITIVENESS

| Clusters | Groups generated using CCI | | | | | | | Total |
|----------|----------------------------|----|----|----|----|----|----|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 1 | 6 | 4 | 4 | 4 | 6 | 8 | 3 | 35 |
| 2 | 5 | 2 | 4 | 4 | 3 | 4 | | 22 |
| 3 | 6 | 4 | 4 | 3 | 3 | | 1 | 21 |
| 4 | 1 | 3 | | 2 | 2 | 4 | 7 | 19 |
| 5 | | | | | | 2 | 2 | 4 |
| 6 | 1 | 4 | 5 | 2 | | 1 | 2 | 15 |
| 7 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 11 |
| Total | 20 | 18 | 19 | 17 | 17 | 20 | 16 | 127 |

method available; it is certainly the first of such attempts in the international literature, and, according to analyses performed so far, has yielded substantial results.

As proved many times on measuring the proceeding and results of complicated processes, an index that is intuitively clear and simple in structure proved to be the most utilisable. It can be used to conclude substantial findings for the entire population and certain subsets of companies. Our plans include using the CCI to enrich findings for other investigations carried out under our research programme, and analyse impacts of competitiveness.

In addition to tasks of comprehensive analy-

sis, the CCI, to our judgement, is also suitable for performing benchmarking type assessments of company operation. The opinions required for the CCI can be obtained from a senior company manager in a short time in the form of a closed interview. The CCI and any partial indices calculated from these can be compared to the data of the whole sample or certain sub-samples (for example, companies that belong to the same sector or set identical objectives). In addition to helping the company in positioning itself among similar companies in terms of competitiveness, it also explains the reasons leading to reaching the particular level.

LITERATURE

- ANDERSEN, N.–HENRIKSEN, B.–AARSETH, W. (2006): Holistic Performance Measurement: an integrated framework, *International Journal of Productivity and Performance Management*, Vol. 55. No. 1. pp. 61–78.
- ARORA, A. GAMBARDILLA, A. (1997): Domestic Markets and International Competitiveness: Generic and Product-specific Competencies in the Engineering Sector, *Strategic Management Journal*, Vol. 18. pp. 53–74
- BUCKLEY, P.J. (1998): A perspective on the emerging world economy: protectionism, regionalization and competitiveness, In: *Mirza, H (1998b)*, pp. 12–21
- CHIKÁN, A. (1995): A versenyképesség fogalmáról, Kézirat, “Versenyben a világgal” kutatási program [On the notion of competitiveness, Manuscript, research programme “In competition with the world”], *BKE Vállalatgazdaságtan Tanszék [department of Corporate Economics of BKE], Budapest*
- CHIKÁN, A.–CZAKÓ, E. (2002): Kis nemzetgazdaságok versenyképessége a globális gazdaságban a magyar példa [Competitiveness of small national economies in global economy – the Hungarian example], In: Chikán, A. Czakó, E.-Paprika, Z. (szerk., editor): *Vállalati versenyképesség a globalizálódó magyar gazdaságban [Company competitiveness in the globalising Hungarian economy]*, *Akadémiai Kiadó, Budapest*
- CHIKÁN, A. (2003): A kettős értékteremtés és a vállalat alapvető célja [Dual value creation and the core objective of the company], *Vezetéstudomány No. 5. pp. 10–13.*
- CHIKÁN, A.–CZAKÓ, E. (2005): Kutatási tervtanulmány, *Versenyben a világgal, 2004–2006, Gazdasági versenyképességünk vállalati nézőpontból* című kutatás, 1. sz. műhelytanulmány [Draft research plan, In competition with the world, 2004–2006, Workshop study No. 1 for the research entitled ‘Our economic competitiveness from a company aspect’] *Budapesti Corvinus Egyetem, Vállalatgazdaságtan Intézet, Versenyképesség Kutató Központ, Budapest [Centre for Research on Competitiveness, Institute for Corporate Economics Corvinus University, Budapest]*
- CHIKÁN, A.–CZAKÓ, E. (2006): A versenyképesség szintjei: fogalmak és értelmezések, *Versenyképességi Kutatások műhelytanulmány-sorozat [Levels of competitiveness: concepts and interpretations, A series of workshop studies for Competitiveness Research]*, *Versenyképesség Kutató Központ [Centre for Research on Competitiveness], Budapest*
- CHIKÁN, A.–DEMETER, K. (2006): Company characteristics, operations competitiveness and overall performance, *Submitted to the International Journal of Quantitative and Operations Management*
- CHO, D.–S. MOON, H.-C. (2000): From Adam Smith to Michael Porter, Evolution of Competitiveness Theory, *World Scientific, Singapore, etc.*

- CZAKÓ, E. (2004): Miért versenyképes a versenyképesség? A versenyképességi listák újdonságai [Why is competitiveness competitive?, Novelities of competitiveness lists], In: Czakó, E. Dobos, I. Kőbéglyi, A. (2004)
- HOVÁNYI, G. (1999): A vállalati versenyképesség makrogazdasági és globális háttere [Macro-economical and global background to company competitiveness], *Közgazdasági Szemle, XLVI. évf., november, [pp] 1013–1030. oldal*
- IMD Versenyképességi elemzések [IMD analyses of competitiveness], <http://www01.imd.ch/wcc>
- KORNAI, J. (1971): Anti-equilibrium, *Közgazdasági és Jogi Könyvkiadó, Budapest*
- KRUGMAN, P. (1994): Competitiveness: A dangerous obsession, *Foreign Affairs* 732, pp. 28–44
- KUMAR, R.–CHADEE, D. (2002): International Competitiveness of Asian Firms: An Analytical Framework, *ERD Working Paper No. 4., Asian Development Bank, Manila*
- LESI, M. (2005): A 2004-es versenyképesség kutatás vállalati mintájának alapjellemzői és reprezentativitása, Versenyben a világgal 2004–2006 Gazdasági versenyképességünk vállalati nézőpontból című kutatás, 2. számú műhelytanulmány [The core attributes and representativeness of the company sample in the 2004 research into competitiveness, Workshop study No. 2 for the research entitled 'Our economic competitiveness from a company aspect', In competition with the world, 2004–2006], *Budapesti Corvinus Egyetem, Vállalatgazdaságtan Intézet, Versenyképesség Kutató Központ, Budapest [Centre for Research on Competitiveness, Institute for Corporate Economics Corvinus University, Budapest]*
- McFETRIDGE, D. G. (1995): Competitiveness: Concepts and Measures, *Occasional Paper No. 5. Industry Canada, Ottawa*
- MILLER, J. G.–DE MEYER, A.–NAKANE, J. (1992): Benchmarking Global Manufacturing, *Business One, Irwin Homewood, Illinois*
- MIRZA, H. (1998a): Globalization and regionalization: an introduction, In: *Mirza, H. (1998b), pp. 3–11*
- MIRZA, H. (ed. 1998b): Global Competitive Strategies in the New World Economy, *Edward Elgar, Cheltenham, U.K.*
- MOLINA, M. A. BARRIOS DEL PINO, I. RODRIGUEZ, A. C. (2004): Industry, Management Capabilities and Firms' Competitiveness: An Empirical Contribution *Managerial and Decision Economics* 25. pp. 65–281
- OHMAE, K. (Editor, 1995): The Evolving Global Economy, Making Sense of the New World Order, *Harvard Business Review Book, Cambridge, Mass*
- PRAHALAD, C. V.–HAMEL, G. (1991): The Core Competence of the Corporation. *Harvard Business Review*, 66 (May June)
- TÖRÖK, Á. (2002): Mit mérünk mivel? A versenyképesség értelmezéséről és mérési problémáiról, IFM-tanulmányok [What to use to measure what? On the construal and measuring problems of competitiveness, IFM studies], *Integrációs és Fejlesztéspolitikai Munkacsoport, Nemzeti Fejlesztési Hivatal, Budapest [Work Group for Integration and Development Policy, National Development Office, Budapest]*
- WERNERFELT, B. (1984): A Resource-Based View of the Firm. *Strategic Management Journal* 5, 171–180
- WIMMER, Á.–CSESZNÁK, A. (2005): Vállalati jellemzők és összefüggéseik az EU-csatlakozás idején, A "Versenyben a világgal 2004–2006" kutatási programban részt vevő vállalatok jellemzése, Versenyben a világgal 2004–2006 Gazdasági versenyképességünk vállalati nézőpontból című kutatás, 3. számú műhelytanulmány [Company attributes and relations on accession to the EU, a characterisation of companies participating in the programme 'In competition with the world, 2004–2006', Workshop study No. 3 for the research entitled In competition with the world, 2004–2006, Our economic competitiveness from a company aspect], *Budapesti Corvinus Egyetem, Vállalatgazdaságtan Intézet, Versenyképesség Kutató Központ, Budapest [Centre for Research on Competitiveness, Institute for Corporate Economics Corvinus University, Budapest]*
- World Economic Forum versenyképességi jelentések, [Competitiveness reports for the World Economic Forum], www.weforum.org

APPENDIX NO 1

V16.

a) What standard did your company reach in the following areas describing company activity in the past 2 to 3 years, compared to your strongest rival?

| | much weaker | | basically identical | | much better |
|--|--------------------|---|----------------------------|---|--------------------|
| a) Cost effectiveness | 1 | 2 | 3 | 4 | 5 |
| c) Technological standard | 1 | 2 | 3 | 4 | 5 |
| d) Product quality | 1 | 2 | 3 | 4 | 5 |
| e) Width of product range | 1 | 2 | 3 | 4 | 5 |
| f) Competitive prices | 1 | 2 | 3 | 4 | 5 |
| g) Punctuality of delivery | 1 | 2 | 3 | 4 | 5 |
| i) Flexibility of the production system | 1 | 2 | 3 | 4 | 5 |
| j) Efficiency of the logistical system | 1 | 2 | 3 | 4 | 5 |
| k) Shortness of delivery deadlines | 1 | 2 | 3 | 4 | 5 |
| l) Flexible response to changing consumer requirements | 1 | 2 | 3 | 4 | 5 |
| m) Manufacturing standard | 1 | 2 | 3 | 4 | 5 |
| p) Organisation of distribution channels | 1 | 2 | 3 | 4 | 5 |
| t) Standard of consumer services | 1 | 2 | 3 | 4 | 5 |
| w) Ability to predict market changes | 1 | 2 | 3 | 4 | 5 |
| y) Ethical behaviour | 1 | 2 | 3 | 4 | 5 |
| aa) Introduction of raw materials of appropriate quality | 1 | 2 | 3 | 4 | 5 |
| dd) Qualification of employees | 1 | 2 | 3 | 4 | 5 |
| ee) Application of innovative sales incentive methods | 1 | 2 | 3 | 4 | 5 |
| ff) High-standard, knowledgeable management | 1 | 2 | 3 | 4 | 5 |
| gg) Modernisation of decision making / operating methods | 1 | 2 | 3 | 4 | 5 |
| hh) Level of R+D expenditures | 1 | 2 | 3 | 4 | 5 |
| nn) Consumer relations as close as possible | 1 | 2 | 3 | 4 | 5 |

V17.

Please evaluate the performance of your company or (in case of multiple sectors involved) your key business line compared to the sectoral average (in domestic comparison) using the following criteria:

- 1 – deep under the average sectoral standard
- 2 – slightly lagging behind the average sectoral standard
- 3 – similar to the average sectoral standard
- 4 – slightly exceeding the average sectoral standard
- 5 – representing the sectoral lead

| | | | | | |
|--|---|---|---|---|---|
| a) Return on sales | 1 | 2 | 3 | 4 | 5 |
| c) Market share (based on sales revenue) | 1 | 2 | 3 | 4 | 5 |

APPENDIX NO 2

| Variable name | Variable code | Valuable values |
|--|---------------|---|
| 1. Company size | B1 | 1 – Small company, 2 – Medium-sized company 3 – Large corporation |
| 2. Type of owners | B2 | 1 – Majority ownership of the state 2 – Domestic majority (non-state) ownership 3 – Foreign majority ownership |
| 3. Core activity | B3 | 1 – Agriculture and food processing industry 2 – Extractive and construction industries, power supply 3 – Processing industry 4 – Commerce and services |
| 4. Diversification of activity | B4 | 1 – Company operating in a single business line 2 – Diversified company 3 – Highly diversified company |
| 5. Export orientation | B5 | 1 – Mainly for the domestic market 2 – Medium level of export activity 3 – Export is overwhelming |
| 6. Expectations concerning the accession to the EU | B6 | 1 – Optimistic 2 – Neutral 3 – Expecting difficulties |
| 7. Attitude to changes | B7 | 1 – Hard to follow changes 2 – Late to respond to changes 3 – Preparing for changes 4 – Influencing changes |
| 8. Company performance | B8 | 1 – Laggards 2 – Average performers 3 – Leaders |
| 9. Market objectives | B9 | 1 – The objective is to retain market positions 2 – The objective is to achieve a moderate growth 3 – The objective is to achieve aggressive growth |
| 10. Market concentration | B10 | 1 – Concentrated market 2 – Moderately concentrated market 3 – Shared market |