Inzinerine Ekonomika-Engineering Economics, **2014, 25(5), 513–521**

The Factors and Other Characteristics Influencing Competitiveness of Enterprises in Countries in the Post-Transition Phase of the Economy

Lenka Komarkova[1], Petr Pirozek[2], Pavel Pudil[3]

[1,3]*University of Economics in Prague*
Jarosovska 1117, CZ-37701, Jindrichuv Hradec, Czech Republic
E-mail. komarkol@fm.vse.cz, pudil@fm.vse.cz

[2]*Masaryk University*
Lipova 41a, CZ-60200, Brno, Czech Republic
E-mail. pirozek@econ.muni.cz

crossref http://dx.doi.org/10.5755/j01.ee.25.5.3136

The aim of the research was to discover the factors or influences associated with competitiveness of enterprises, particularly the factors influencing competitiveness from internal and external environments. The sample is gathered from the branches of manufacturing and construction industries in 2007 and for other sectors of the national economy in 2009. Acquired data reflect the personal views of managers from the monitored enterprises and are expressed in nine variables detailing the internal environment and eight variables detailing the external environment. In our study, the significant influence on competitiveness was found only for the two variables from the internal environment – the ability to flexibly adapt to their customers and the innovation activity of enterprises, though in different time periods. The first one was found to be influential in 2007, at the time of economic growth. The results reflect the fact that managers of enterprises from the first two groups (with higher and average Return on Assets) are homogenous in their opinions with regard to the influence over competitiveness in the capabilities to adapt flexibly to customers, while managers of financially inefficient enterprises held different opinion regarding this issue. On the contrary, in 2009 at the outbreak of the financial crisis, for financially efficient enterprises, innovation activities were found as decisive.

Keywords: *Competitiveness of Enterprises, Internal Environment, External Environment, Variables, Empirical Survey, Relevant Impacts on Competitiveness.*

Introduction

Competitiveness is currently a very topical issue connected with the events taking place not only in the business sector, but elsewhere as well. Competitiveness of enterprises in the Central European developing economies is an important aspect with influence on performance and development in each respective country (Snieska & Draksaite, 2007). In the economic past of Central Europe, mutual interactions between enterprises were lacking and therefore it was difficult to define competitiveness on the basis of business activities (Kessler, 2007; Cazurra & Annique, 2007). Nowadays the market economy is becoming fully functional in Central Europe and the Czech Republic, including integration into the EU internal market, and the importance of competitiveness has been growing continuously (Banyte & Salickaite, 2008). A closer territorial look on the competitiveness reveals that such issues are intensively discussed in all countries with developing market economies. Selected research projects are currently focused on the macroeconomic substance of competitiveness (Travkina & Tvaronavieiene, 2011); combine views on competitiveness from the macro- and mezzo-levels (Heckova & Chapcakova, 2011); or interpret competitiveness with respect to mutual cooperation between enterprises in a given field (Alvarez *et al.*, 2009). Furthermore, we can see the highest degree of interest in issues connected with competitiveness of enterprises in the dynamically developing Asian economies (Yang *et al.*, 2010; Liu *et al.*, 2004).

The competitiveness in the Central and Eastern European (CEE further on) states is associated with a range of similarities, in terms of the initial economic conditions and in the course of the transition of their economies. This was characterized by a loss of continuity in the market economy, high energy intensity of production, technological underdevelopment, the primary orientation of exports to COMECON markets, being cut off from the world markets and the deformed structure of prices and wages (Slany *et al.*, 2008; Rybakovas, 2009). Competitiveness issues in the countries of the CEE often cover, as previously mentioned, the basic macro-economic indicators and institutional aspects in the given country (Slany *et al.*, 2011; Matysek-Jedrych, 2012). Despite positive economic indicators, the Czech Republic has continued to face challenges in the competitiveness of enterprises. We believe that we can draw on the findings even from the other countries of the CEE, specifically the Baltic States, where a bigger interest in the issues of the competitiveness of enterprises can be found (measured by the number of research articles). Moreover, macroeconomic indicators suggest that the financial crisis had similar impacts on the Czech Republic as were found in the Baltic States.

Research often describes basic economic parameters and interprets competitiveness from viewpoints of inter-company or inter-disciplinary comparison (Banyte &

Salickaite, 2008). Research on competitiveness based on opinions of company managers, who should be main supporters of competitiveness, is rather rare (Trunecek, 2009). Relevant conclusions are still not available regarding the environment's influence on competitiveness (Stiles, 2001). Certain studies are based on strategic analysis of the business environment (Barney, 1991) and investigate the effects of external and internal environments in the context of long-term, methodologically designed strategic analysis of enterprises (Flanagan *et al.*, 2007; Balkyte & Tvaronavieiene, 2010).

In the course of looking for inspiration in issues dealing with the competitiveness of enterprises, we encountered several interesting approaches to evaluating and defining it. These were the results of research on competitiveness, which describe five successive and interrelated elements (Mickeviciene & Zitkus, 2011a). Further, there was research that represents the model of the structure of competitiveness, in which there are elements of the general environment, competitive environment, competitive potential, competitive advantage and competitive position (Stankiewicz, 2005), and was inspiring for its further elaboration. Last but not least, this model was further extended by two interrelated components: accordance and knowledge representing a reliable instrument for designing strategy to be competitive (Mickeviciene & Zitkus, 2011b). With regard to the EU single market, it was necessary to monitor the issue of competitiveness of enterprises, even from the international point of view, where it is possible to take advantage of the findings from the main factors identified: market shares distribution, market rate of growth and market profitableness (Snieska, 2008).

The notion of competitiveness is widely discussed in the Czech Republic today and is a core area of interest of many institutions whose theoretic and application work is focused on this area. To better understand the competitiveness of enterprises in the Czech Republic, it is possible to use a definition from abroad – the position of the enterprise in the market as well as its potential in the competitive struggle is traditionally described as competitiveness (Mickeviciene & Zitkus, 2011a).

In the Czech Republic, the basic notion of an enterprise's competitiveness may be understood in an absolute or relative sense. In the absolute sense, competitiveness is related to achieving economically positive results through economic performance; while in the relative sense it is understood as a position of the given enterprise with respect to the others (Trunecek, 2009). A number of authors have discussed performance as a measure for competitiveness (Siska, 2008) or (Spalek & Castek, 2010). Such papers relate competitiveness with performance, especially with the aid of quantitative data. Results concerning qualitative research on competitiveness, based on soft data, are not presented widely. Nonetheless, approaches can be found that are based on statistical methods (Sebo & Sebova, 2010) and connected with several competitiveness criteria.

Having in mind the above-mentioned definitions, we understand competitiveness in this contribution as an enterprise's ability to be successful in the economic competition with other enterprises; and the outcome of such competition is success/failure expressed by the enterprise's economic results and measured by financial indices (Blazek *et al.*, 2007). This contribution introduces the influence of selected variables on competitiveness. The variables are selected with respect to the strategic analysis of the environment and are based on the opinions of top managers. Within our research, the internal environment in enterprises was characterised by variables (questions) most frequently cited in the literature as presented by managers (Trienekens & Beulens, 2001). Classification of the external environment stems from the basic approach formulated by M. Porter (Porter, 1980) and connected with the stakeholder approach (BlaZek & Castek, 2009), in which the most significant interest groups related to an enterprise are represented (Donaldson & Preston, 1995).

The focus of our article reflects the issues of the competitiveness of enterprises stemming from the approach to research on competitiveness divided into individual levels – metaeconomic, macroeconomic, mesoeconomic and micro-economic (Zitkus & Mickeviciene, 2004) with an emphasis on the basic causes of external and internal influences from the entrepreneurial environment. The contributions of our research and the expansion of the findings mentioned above is the detection of the essential factors operating in the entrepreneurial environment and determining their potential impact on the competitiveness of enterprises. The results obtained can enable a better understanding of issues of competitiveness, not only in the Czech Republic, but also in other CEE countries, including the Baltic States.

To summarize, the aim of this contribution is twofold: 1) to find factors or at least causative effects on the competitiveness with respect to the external and internal environment; 2) to present possible approaches and the methodology designed for their identification (as briefly described in the following paragraph).

The methodology used to identify factors was based on intra-group homogeneity and group variability in the values of the ordinal variable (the intra-group homogeneity was assessed with the help of standardised ordinal dispersion and intra-group variability was tested by means of chi-squared test of homogeneity conditional distribution. On the basis of the identified factors, managers can better respond to the requirement related to increasing the competitiveness of the enterprise.

Both the external and internal environment are characterized by selected variables which according to current knowledge play an important role in business activities. The significance of this role and the impact on competitiveness has not yet been sufficiently analysed in enterprises where the transformation of economy was carried out. Our research therefore aims to contribute new results and to fill in at least partly the gap in this area.

We suppose that competitive enterprises excel in financial indices – that is why we equate an enterprise's competitiveness with its financial performance (Fahy, 2002). On the basis of this assumption we test a hypothesis stating that there is a statistically significant difference between enterprises with good financial performance on the one hand and those with bad financial performance (representing lower competitiveness) on the other hand, with respect to selected variables watched by each enterprise's top management.

The Centre for Research of Competitiveness in the Czech Republic, attached to the Masaryk University in Brno, carried out an extensive survey in the years 2007 and 2009, covering enterprises in all sectors of the national economy in the Czech Republic. The survey was based on the results of questionnaires asking managers' opinions about the potential factors of their enterprise's competitiveness; and also characteristics of their enterprise in another section of the questionnaire (Blazek *et al.*, 2007). In this contribution we focus on the first section of the questionnaire, for both internal and external factors of competitiveness. For each factor, the respondent evaluated the following aspects in the questionnaire:

- the factor's value (in comparison with competitors);
- impact of the factor's value on the given enterprise's competitiveness.

Although the managers' replies cannot be viewed as objective measurements of the respective values but only as subjective opinions about them, a suitable statistical analysis applied to the set of all such replies may help us objectively represent the obtained results. As already mentioned above, we divided the enterprises into three performance groups by their financial indices (and consequently, competitiveness). The statistical analysis was then focused on testing the replies' similarity/dissimilarity between the enterprise groups for both aspects of each factor (the value in comparison with competitors, and the impact of the variable on competitiveness). The substance of the statistical test is described in more detail in the section *Establishing relevant impacts on competitiveness of enterprises.*

The respondents replied to nine questions aimed at valuation of potential internal factors of competitiveness: *innovation activity; ability to flexibly adapt to customers; production quality; labour costs; other costs; workers' qualifications; customer care; access to financial resources; business brand*. Eight more questions were related to potential external factors of competitiveness: *competitors' fight; bargaining power of customers; bargaining power of suppliers; interest in employment; corruption; support by national authorities; support by local authorities; development in the marketplace*[1]. For each potential factor, its value in comparison with competitors was established on a scale from 1 to 5, where 1 stands for a significantly lower and 5 for a significantly higher evaluation level – i.e., the former stands for a lower and the latter for a higher level of the enterprise's competitiveness.

The evaluation of the respective characteristic we have just described, concerning its value in a given enterprise in comparison with its competitors, may be interpreted (especially if the value is either 1 or 5) as a potential factor of competitiveness as seen subjectively by the evaluating manager. Managers' opinions are made objective in further processing with the aid of a suitable statistical test, described in the section *Methodology*.

In another question each respondent measured the possible impact on competitiveness, on a similar scale of 1 to 5, with 1 standing for a strongly negative and 5 for a strongly positive impact on competitiveness. The formulation in that question was inspired by an effort to get source information for statistical verification – at least to a lower degree – of a relationship between the given characteristic and competitiveness. Using a suitable statistical test we verify the hypothesis whether the characteristic has an impact on competitiveness, even if the given characteristic may not be a factor of competitiveness in the managers' opinion (that is, not in one manager's opinion, but with respect to statistical analysis of all respondents' replies).

Apart from *development in the marketplace* (present only in 2007), all questions were identical for both empirical surveys carried out in the years 2007 and 2009. The form of the survey was a unified questionnaire with a set of 240 questions presented in an interview. Predominantly, the interviewed respondent was the director of the enterprise, or its owner in the director's position.

Methodology

The empirical survey was evaluated and the variables relevant for competitiveness were established at two stages. In the first stage, enterprises were evaluated with respect to their financial indices and, with the aid of cluster analysis methods, classified into clusters according to their financial performance. At the second stage, the similarity of respondents' replies was measured within each cluster and for each question in the questionnaire. Each such question was related to either the internal or external environment, and its relevant impact on competitiveness was established.

Classification of Enterprises According to their Economic Success

In the empirical survey of 2007, enterprises were divided into three basic groups – so-called clusters – A, B, and C according to their success. The financial parameters of the enterprises were identified by methods of cluster analysis (Rezankova *et al.*, 2009), using ROA (Return on Assets) indices in the last five years, 2002 to 2006. For each enterprise, ten financial indices characterising financial performance (that is, five ROA indices and five asset-growth indices for each enterprise) were calculated from accounting data. Three clusters were identified with the aid of these indices. Cluster A contains enterprises with high profitability and growth; Cluster B is mainly characterised by average to slightly below-the-average profit and growth; and Cluster C contains enterprises that reported no profit and decreased their assets (Siska, 2008). We can view these clusters as characterised by financial performance or abstract competitiveness according to the financial parameters they achieved:

Cluster A – a group of highly competitive enterprises with good financial performance (hereinafter A-enterprises);

Cluster B – a group of enterprises with average competitiveness and average financial performance (hereinafter B-enterprises);

Cluster C – a group of enterprises with low competitiveness and worse financial performance (hereinafter C-enterprises).

The methodology was somewhat adjusted in 2009 (Blazek *et al.*, 2009) in establishing the enterprises' financial

[1] *This variable was only used for manufacturing and construction industries in the 2007 survey.*

performance and their division into clusters; but the classification of enterprises was similar to that used in 2007.

Establishing Relevant Impacts on Competitiveness of Enterprises

The goal of the analysis is to identify identical characteristics in the investigated group of enterprises, corresponding to the classification based on the achieved financial performance (or the derived competitiveness). In other words, each cluster (A, B or C) will be characterised by similarity of replies to a given question in the questionnaire, where the question is connected with a given type of environment and is different from other clusters. Hence the answer is a value of the respective ordinal variable typical for the given cluster of enterprises. For example, if we identify a variable whose value is typical in the good financial performance cluster and is different in the cluster of enterprises with bad financial performance, we can assume such a variable to be a potential factor of competitiveness. For this reason, the qualitative characteristics of the variables were established with the aid of the values qualitatively identified within the framework of partial evaluation of impacts on the given cluster. At that moment we had to choose a method of solution suitable for the above-mentioned similarity or dissimilarity between individual clusters of enterprises.

In order to define and describe basic characteristics of the clusters, statistical analysis of data was carried out with respect to similarity of respondents' replies within each cluster. This statistical analysis was carried out in the free statistical computing environment R, version 2,12,0 (R Development Core Team, 2010). In all 17 instances, ordinal variables with five-degree evaluation scales were considered. For each of them (with possible values 1, 2, 3, 4, and 5) a table of absolute and relative frequencies was built with respect to the classification of the enterprise in one of the above-mentioned clusters. Apart from that step, values of the following descriptive statistics were established:

- mode – the most frequent reply (with the addition of the modal category frequency);
- normalised ordinal variance (n. dorvar) – the measure of dissimilarity between respondents

$$n.\text{dorvar} = \frac{4}{K-1}\sum_{i=1}^{K-1} F_i(1-F_i) \in \langle 0;1 \rangle \qquad (1)$$

where K stands for the number of categories (in our case there is K = 5) and F_i is the cumulative relative frequency of the i-th category (Rezankova, 2007).

The variability index, *n.*dorvar, takes on its minimum (equal to 0) if the variable's values are exactly identical for all respondents, and takes on its maximum (equal to 1) if one-half of respondents assigned the lowest and one-half the highest level to that variable. In other words, the lower the variability index, the higher the homogeneity of the replies (i.e., similarity) for respondents within the given group of enterprises. Based on the range of possible values for the normalised ordinal variance, its centre, i.e., the value of 0,5, was taken as the limit for assessment of the replies. The results are accepted as similar if n. dorvar ≤ 0,5 and dissimilar if n. dorvar > 0,5. Such values are used for interpretation of homogeneity within a cluster, i.e., similarity of replies within each cluster of enterprises. In order to enable identification of differences between similarity values in clusters, a test verifying inter-cluster homogeneity was applied to establish relevance of its interpretation for competitiveness. Dissimilarity of replies between clusters of enterprises was evaluated with the aid of the χ^2-test of homogeneity for conditional distributions (the χ^2-test of independence)[2]. After completion of that test we were able to move on to evaluating impacts of the corresponding variables on competitiveness.

Results

The first stage of the empirical survey took place for a sample of 432 of enterprises active in the Czech Republic. They were taken from manufacturing and construction industries – classes D and F according to the classification of economic activities (NACE Rev 2). The parent population contained 2,817 enterprises complying with requirements on quota variables with respect to territorial and size (above 50 employees) aspects and the legal form of enterprise (Blazek *et al.*, 2007). It means that 15,33 % of enterprises out of the parent population participated in the survey; having in mind the proportions of the quota variables, the sample can be considered sufficiently representative.

The second stage of the survey, implemented in 2009, was carried out in a similar way. In comparison with the 2007 survey, the lower limit for the number of employees was reduced to 10 to improve representation of small enterprises in the sample. The parent population contained 2,098 enterprises. Regarding representativeness, the sample size was chosen as 288 enterprises – approx. 13 % of the parent population. However, requirements for completeness of accounting-record data (and the related inclusion in correct clusters) as well as comprehensively filled-out questionnaires, the sample processed for purposes of this contribution included 247 enterprises. Enterprises from industries not included in the 2007 survey were added in 2009. Industries A, B, C, E, G, H, I, K, L, M, N, and O (according to NACE Rev 2) were subject to the survey. The most numerous in the sample were enterprises in section G[3] with more than 42 %, followed by section K[4] with 24 %. The remaining sections' [5] proportions in the sample were up to 10 % (see (Blazek *et al.*, 2009) for more details). Enterprises were in each survey classified into groups according to their economic success, expressed via financial indices. Table 1 shows division of the enterprises into clusters according to their economic success in the survey stages.

---

[2] The test is described in more detail, e.g., in (Andel, 2007). Due to the small values of expected frequencies the test level – the so-called p-value – was determined using Monte Carlo simulations (with a 100,000 runs). The decisions were made on a significance level of α = 5 %. The p-values indicating a statistically significant result (with a provable dissimilarity between the considered three types of enterprises) on the given significance level are marked with asterisk.

[3] Merchandise; repairs of motor vehicles and products for personal use and predominantly for households

[4] Activities in real-estate sales and lease; business activities

[5] Industries B (fishery and fish breeding) and C (extraction of minerals) are not represented at all

Table 1

Absolute (relative) frequencies for groups of enterprises in the 2007 and 2009 surveys

Enterprise clusters	A	B	C	Total
2007 survey	205 (47, 5 %)	185 (42,8 %)	42 (9,7 %)	432
2009 survey	121 (49,0 %)	80 (32,4 %)	46 (18,6 %)	247

For the enterprise clusters and variables their intra-cluster homogeneity (similarity) was quantified with the aid of normalised ordinal variance (n. dorvar), and inter-cluster dissimilarity was identified on the relevant level (p-value) of the homogeneity test. Both the intra-cluster similarity and inter-cluster dissimilarity confirmed relevance only for a small number of selected variables.

The results of the 2007 survey (Tables 2 and 3) show that the corresponding evaluation of intra-cluster similarity and inter-cluster dissimilarity for the competitiveness factors were achieved for two variables.

Table 2

Internal variables in the 2007 survey

Internal Variables 2007	Cluster	Competitiveness factor			Impact on competitiveness		
		mode	n.dorvar	p-value	mode	n.dorvar	p-value
innovation activity	A	3	0,549	**0,020**	4	0,548	**0,047**
	B	3	0,555		4	0,590	
	C	3	0,632		3	0,622	
ability to flexibly adapt to customers	A	4	0,414	0,062	4	0,452	**0,041**
	B	4	0,447		4	0,413	
	C	4	0,566		4	0,627	
production quality	A	3	0,421	0,202	4	0,467	0,091
	B	3	0,393		4	0,438	
	C	3	0,415		4	0,469	
labour costs	A	3	0,494	0,861	3	0,479	0,301
	B	3	0,512		3	0,496	
	C	3	0,495		4	0,578	
other costs	A	3	0,436	0,349	3	0,457	**0,008**
	B	3	0,377		3	0,441	
	C	3	0,369		3	0,450	
workers' qualification	A	3	0,368	**0,050**	4	0,424	0,755
	B	3	0,421		3	0,416	
	C	3	0,380		3	0,458	
customer care	A	4	0,454	0,436	4	0,475	0,440
	B	3	0,517		4	0,504	
	C	3	0,456		3	0,478	
access to financial resources	A	3	0,576	**0,048**	3	0,542	0,413
	B	3	0,609		3	0,555	
	C	x	0,568		3	0,578	
business brand	A	4	0,543	0,875	4	0,532	0,982
	B	4	0,542		4	0,506	
	C	3	0,534		4	0,515	

Table note: x – the mode is not unambiguously determined, values 3 and 4 have the same frequencies

Namely, workers' qualification for internal and bargaining power of suppliers for external environment were identified. From that identification we can deduce that these variables may, in enterprise top managers' opinions, be understood as potential factors of competitiveness. Impacts on competitiveness were evaluated in a similar way. However, the two above-mentioned variables were not confirmed as having an impact on competitiveness. Two other variables were identified as those having statistically significant influence on competitiveness from the internal environment's viewpoint: ability to flexibly adapt to customers and other costs.

Table 3

External variables in the 2007 survey

External Variables 2007	Cluster	Competitiveness factor			Impact on competitiveness		
		mode	n.dorvar	p-value	mode	n.dorvar	p-value
competitors' fight	A	4	0,426	0,391	4	0,641	0,180
	B	4	0,418		4	0,682	
	C	5	0,376		2	0,752	
bargaining power of customers	A	4	0,426	0,841	2	0,606	0,598
	B	4	0,402		2	0,617	
	C	4	0,418		2	0,541	
bargaining power of suppliers	A	3	0,414	**0,023**	3	0,542	0,484
	B	3	0,400		3	0,535	
	C	3	0,359		3	0,464	
interest in employment	A	3	0,345	0,171	3	0,473	0,095
	B	3	0,415		3	0,510	
	C	3	0,382		2	0,526	
corruption	A	2	0,664	0,173	3	0,488	0,796
	B	1	0,620		3	0,457	
	C	1	0,581		3	0,419	
support by national authorities	A	1	0,459	0,053	3	0,490	0,717
	B	1	0,429		3	0,499	
	C	1	0,401		3	0,514	
support by local authorities	A	1	0,553	0,054	3	0,474	0,317
	B	1	0,545		3	0,417	
	C	1	0,571		3	0,521	
development in the marketplace	A	4	0,424	0,091	4	0,516	**0,017**
	B	4	0,400		4	0,520	
	C	4	0,394		4	0,577	

Table 4

Internal variables in the 2009 survey

Internal Variables 2009	Cluster	Competitiveness factor			Impact on competitiveness		
		mode	n.dorvar	p-value	mode	n.dorvar	p-value
innovation activity	A	x	0,524	0,106	4	0,469	**0,008**
	B	3	0,464		3	0,467	
	C	4	0,548		4	0,622	
ability to flexibly adapt to customers	A	4	0,430	0,093	4	0,443	0,651
	B	4	0,494		4	0,445	
	C	4	0,501		4	0,461	
production quality	A	4	0,448	0,070	4	0,451	**0,036**
	B	3	0,448		4	0,403	
	C	4	0,360		4	0,330	
labour costs	A	3	0,455	0,355	3	0,479	0,373
	B	3	0,559		3	0,481	
	C	3	0,389		3	0,310	
other costs	A	3	0,496	0,188	3	0,463	0,446
	B	3	0,432		3	0,422	
	C	3	0,451		3	0,424	
workers' qualification	A	3	0,432	0,365	4	0,407	0,084
	B	3	0,370		3	0,451	
	C	3	0,456		3	0,464	
customer care	A	4	0,439	0,583	4	0,487	0,460
	B	4	0,446		4	0,447	
	C	3	0,484		3	0,540	
access to financial resources	A	3	0,534	0,445	3	0,505	0,069
	B	3	0,547		3	0,539	
	C	3	0,458		3	0,389	
business brand	A	4	0,535	0,082	4	0,494	0,156
	B	4	0,516		4	0,451	
	C	3	0,517		3	0,545	

Table note: x – the mode is not unambiguously determined, values 3 and 4 have the same frequencies

Table 5

External variables in the 2009 survey

External Variables 2009	Cluster	Competitiveness factor			Impact on competitiveness		
		mode	n.dorvar	p-value	mode	n.dorvar	p-value
competitors' fight	A	4	0,487	0,192	2	0,670	0,621
	B	5	0,648		4	0,710	
	C	5	0,498		2	0,664	
bargaining power of customers	A	4	0,468	0,463	2	0,536	0,135
	B	4	0,512		3	0,672	
	C	5	0,615		2	0,633	
bargaining power of suppliers	A	3	0,461	0,458	3	0,449	0,857
	B	3	0,467		3	0,424	
	C	3	0,513		3	0,375	
interest in employment	A	3	0,475	0,667	3	0,423	0,635
	B	3	0,435		4	0,427	
	C	3	0,398		3	0,437	
corruption	A	3	0,698	0,202	3	0,442	0,085
	B	1	0,676		3	0,438	
	C	1	0,616		3	0,552	
support by national authorities	A	1	0,478	0,360	3	0,466	0,492
	B	1	0,576		3	0,559	
	C	1	0,377		3	0,389	
support by local authorities	A	1	0,531	0,085	3	0,394	**0,018**
	B	1	0,692		3	0,527	
	C	1	0,657		3	0,419	
development in the marketplace	A	4	0,487	0,192	2	0,670	0,621
	B	5	0,648		4	0,710	
	C	5	0,498		2	0,664	

Unlike in 2007, the 2009 survey (Tables 4 and 5) did not indicate, in comparison with other competitors, any statistically significant difference between clusters concerning values of potential factors of competitiveness. The only similarity was found by evaluation of impacts on competitiveness, that is, a lower degree of relationship between a variable and competitiveness. Within the 2009 survey, the following variables were identified as having relevant impacts on competitiveness: *innovation activity* and *production quality* for the internal and *local support* for the external environment.

In both surveys, both potential factors and impacts achieved ordinal values of 3 and 4, as we can see in Tables 2 through 5. Let us recall that such values (3 and 4) mean "approximately the same" or "slightly higher" for competitiveness factors, while their meaning for impacts is "none" or "slightly positive".

Discussions

Surveys of Czech enterprise competitiveness were carried out in the years 2007 and 2009, i.e., the period of recessive economic growth in the Czech Republic and the beginning of the worldwide financial crisis which had a major negative impact on enterprises active in the Czech Republic. This fact has to be mentioned with respect to limited interpretation of the results.

The obtained results are based on the opinions of top managers and differ according to the sampled industries – manufacturing and construction (2007), and other industries (2009). The achieved results correspond to the pieces of knowledge gained at research projects on compete-tiveness not only for the Czech Republic but also for some other countries of Central and Eastern Europe in posttransformation stage of the economy (Stojcic *et al.*, 2013).

The 2007 survey proved statistical significance of certain selected variables as potential factors of competitiveness, and identified some other variables' impact on competitiveness. In 2009, only results evaluating impacts on competitiveness were significant, which may also have been caused by a prevailing prudence in evaluating competitiveness.

Managers agreed on two variables regarding comparison with relevant competitors in 2007: *worker qualifications* and *bargaining power of suppliers*. Regarding the values which these variables took on the ordinal scale (namely, 3, which is approximately the same as in comparison with competitors), neither of these two variables can be deemed a relevant factor of competitiveness: neither shows a significant dissimilarity from competitors that might indicate a lower/higher level of competitiveness. No minimum or maximum values were measured. The fact that no statistically significant impact of those variables on competitiveness has been established seems to be in line with that observation.

The variable *other costs* took a value of 3 on the ordinal scale, indicating no impact on competitiveness. In other words, respondents have agreed on *other costs* not having any influence on competitiveness. We have achieved a more interesting result for the *ability to flexibly adapt to customers*. It achieved a value of 4 on the ordinal scale (a slightly positive influence) and was significant only for Clusters A and B, i.e., enterprises with high and average competitiveness. Out of all possible factors of competitiveness in 2007, it is the only variable which has a significant relationship to competitiveness. Moreover, with regard to the findings already achieved from the Baltic States, it shows similar results in the area of competitiveness. Here the flexibility in relation to the business environment appears as one of the fundamental factors of competitiveness. Some models show the different degrees of flexibility in the sector examined; however, its general importance for achieving a competitive position of the enterprise on the market was confirmed (Savaneviciene, 2006).

The 2009 results clearly indicate a certain ambiguity in the evaluation of results – there is no agreement among respondents on potential factors of competitiveness in comparison with relevant competitors.

Their opinions only agree about the impacts on competitiveness, that is, a lower degree of relationship with competitiveness. In all clusters of enterprises the *production quality* is identified, with a value of 4 on the ordinal scale, corresponding to a slightly positive influence. However, with respect to a significant similarity concerning the importance of *quality*, the *production quality* cannot be deemed a relevant factor of competitiveness. In terms of a comparison with the Baltic States, the results of our research are reaffirmed, where ambiguous results were also found with regard to the quality of production in relation to the certification of ISO 9001 and ISO 14001 within the 10 new member states (Mikulis & Ruzevicius, 2009).

Neither may the *support by local authorities* be deemed a relevant factor of competitiveness. Similarity for that variable was only established in Clusters A and C. The variable's value (3 on the ordinal scale) says that this

variable has no impact on competitiveness, which is expressed by a significant similarity between Clusters A and C. The only difference in cluster evaluation occurs for *innovation activity*. In 2009, only Clusters A and B show values of 4 and 3 on the ordinal scale. In Cluster A the similarity takes on a value of 4 – a slightly positive influence on competitiveness. On the contrary, value of 3 significantly proved no impacts on competitiveness by *innovation activity* in Cluster B. Hence it is a statistically proven difference between Clusters A and B. From the viewpoint of searching factors of competitiveness in 2009, we can take the *innovation activity* for a variable that has a significant relationship with competitiveness. This is in accordance with the findings in the Baltic States. It was found that innovation is a significant determinant of company value (Berzkalne & Zelgalve, 2012). In addition, s during a recession in order to ensure the competitiveness of an enterprise was roughly modelled on the set of Lithuanian enterprises (Purlys, 2009). As a general rule, it is possible to mention the findings that, when comparing individual countries throughout the EU, CEE countries lag behind in terms of the number of patents (BerZinskiene & Rudyte, 2011), which is valid not only for Lithuania, but also for the Czech Republic.

Conclusions

Results of both surveys are based on a representative sample of enterprises from a prevailing majority of industries present in the Czech Republic. Due to the different industries being represented in each of the surveys and the methods of data collection (opinions of top managers), interpretation and generalization of conclusions are difficult if we want to identify potential factors of competitiveness based on the environment of a given enterprise. We also must admit that the results are affected by a low proportion of C-enterprises, i.e., enterprises with low competitiveness and worse financial performance, in the samples. That aspect is partly implied by low interest in participation in the survey, and partly by the beginning or continuing crisis.

On a larger scale, the statistically proven difference of the *ability to flexibly adapt to customers* and the *innovation activity* in the two survey periods may be viewed as interesting. In both instances the lower degree of relationship between the variable and competitiveness is concerned. The enterprises with high and average competitiveness (Clusters A and B) are identical with respect to the impacts on competitiveness by the *ability to flexibly adapt to customers*. However, it is lacking in enterprises with low competitiveness (Cluster C). From this fact we can deduce that enterprises pay attention to customers and the related flexibility, in the period of economic growth and imaginary economic stability. On the contrary, in the time of crisis attention of the most competitive enterprises (Cluster A) is focused on the *innovation activity*. For the less competitive enterprises (Cluster B) there is a significant similarity in the opinion that the *innovation activity* has no influence on competitiveness; and no significant similarity has been established in the group of non-competitive enterprises (Cluster C). The reasons for such phenomena cannot be validly explained on the basis of the results achieved and are subject to further research.

In the conclusion we may observe that, even though the particular sample that was at our disposal identified only a few variables as having an impact on competitiveness, the methodological value of the work is not diminished. The existence of available methodology could be an impetus for extending the processed data sample and continuing the research, even at an international scale. The Czech Republic is a relatively small economy; in a larger economy or with the data from more countries, the submitted methods could assist in extracting other factors of competitiveness from the data etc. Here, there are possibilities for international cooperation, in particular in small transition economies such as Lithuania, Latvia and Estonia, which may have features and starting conditions in common with the Czech Republic. When continuing our research, we plan to focus on identifying factors of competitiveness while respecting their multidimensional relations. To this end, we suppose that the methodology employed will be extended to include feature selection in statistical pattern recognition. It is the field not only providing suitable methods for our research task as illustrated by the preliminary results published in ECMLG 2012 (Pudil *et al.*, 2012) but also the field where the research team from our university has achieved internationally recognized results.

Acknowledgements

The paper was supported by the Grant Agency of the Czech Republic - project No. P403/12/1557.

References

Alvarez, I., Marin R., & Fonfria, A. (2009). The role of networking in the competitiveness of firms. *Technological Forecasting & Social Change*, 76, 410–421. http://dx.doi.org/10.1016/j.techfore.2008.10.002

Andel, J. (2007). Statistical Methods. Prague, Matfyzpress.

Balkyte, A., & Tvaronavieiene, M. (2010). Perception of competitiveness in the context of sustainable development: Facets of sustainable competitiveness. *Journal of Business Economics and Management*, 11(2), 341–365. http://dx.doi.org/ 10.3846/jbem.2010.17

Banyte, J., & Salickaite R (2008). Successful Diffusion and Adoption of Innovation as a Means to Increase Competitiveness of Enterprises. *Inzinerine Ekonomika-Engineering Economics*, 1(56), 48–56.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. http://dx.doi.org/10.1177/014920639101700108

Berzkalne, I., & Zelgalve E. (2012). Innovation and company value: evidence from the Baltic countries. Regional Formation and Development Studies, 3(11), 39–51.

Berzinskiene, D., & Rudyte, D. (2011). Assessment of innovativeness and competitiveness of Lithuania in the international context. Socialiniai tyrimai/Social Research, 3(24), 26–34.

Blazek, L. *et al.* (2007). Competitiveness of enterprises (Primary analysis of empirical survey results) 1st edition, Brno: Masaryk University.

Blazek, L. *et al.* (2009). Competitiveness of enterprises. Analysis of economic success factors. Second stage. 1st edition, Brno: Masaryk University.

Blazek, L. & Castek, O. (2009). Stakeholder approach and the corporate financial performance. *Narodohospodarsky obzor*, Brno, ESF MU Brno, vol. IX., no. 2

Cazurra, A. C. & Annique, U. C. (2007). Regional economic integration and R&D investment, *Research Policy*, vol. 36: 227–246. http://dx.doi.org/10.1016/j.respol.2006.11.003

Donaldson, T., & Preston, L. E. (1995). The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications. *The Academy of Management Review*, 20(1), 65–91.

Fahy, J. (2002). A resource-based analysis of sustainable competitive advantage in a global environment. *International Business Review*, 11(1), 57–77. http://dx.doi.org/10.1016/S0969-5931(01)00047-6

Flanagan, R., Lu, W., Shen, L., & Jewell, C. (2007). Competitiveness in construction: a critical review of research. *Construction Management and Economics*, 25(9), 989–1000. http://dx.doi.org/10.1080/01446190701258039

HeCkova, J., & Chapcakova, A. (2011). Competitiveness of the Branch Structure of Slovak Manufacturing Industry in 1998–2008. *Ekonomicky Casopis/Journal of Economics*, 59(1), 59–78.

Kessler, A. (2007). Success factors for new businesses in Austria and the Czech Republic. *Entrepreneurship & Regional Development*, 19, 381–403. http://dx.doi.org/10.1080/08985620701439959

Liu, P. L., Chen, W. Ch., & Tsai, Ch. H. (2004). An empirical study on the correlation between knowledge management capability and competitiveness in Taiwan's industries. *Technovation*, 24, 971–977. http://dx.doi.org/10.1016/S0166-4972(03)00061-0

Matysek-Jedrych, A. (2012). Competitiveness and crisis – the case of the Baltic States economies. Poznan University of Economics Review, 12(2), 49–73.

Mickeviciene, M., & Zitkus, L. (2011a). Competitive ability as an instrument for ex-ante evaluation of enterprise's competitiveness. *Inzinerine Ekonomika-Engineering Economics*, 4(22), 423–433.

Mickeviciene, M., & Zitkus, L. (2011b). Problem of assessing enterprise's possibilities to compete and its possible solution. Verslas: teorija ir praktika [Business: Theory and Practice], 12(4), 332–340.

Mikulis, J., & Ruzevicius, J. (2009). Management systems and competitiveness of a country – Lithuanian context. Current Issues of Business and Law, 3.

Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors. New York/Collier Macmillan: Free Press.

Pudil, P., Blazek, L., Somol, P., Pokorna, J., & Pirozek, P. (2012). "Searching Factors of Corporate Competitiveness Using Statistical Pattern Recognition Techniques", *Proceedings of 8th European Conference on Management Leadership and Governanc*e *(ECMLG) 2012*, Paphos, Cyprus.

Purlys, C. (2009). The model of modern innovation influence to competitiveness at recession. European Integration studies, No 3 str. 201–217.

R Development Core Team (2010). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Available from internet http://www.R-project.org.

Rybakovas, E. (2009). Competitiveness of Lithuanian manufacturing industry. Economics & Management: 14.

Rezankova, H. (2007). Analysis of data from questionnaire surveys. Prague, Professional Publishing.

Rezankova, H., Husek, D., & Snasel, V. (2009). Cluster analysis of data. Prague, Professional Publishing.

Savaneviciene, A. (2006). Flexibility in Lithuania enterprises: comparative analysis of garment, food and it enterprises. *Inzinerine Ekonomika-Engineering Economics*(5), 92–98.

Slany, A. et al. (2008). Konkurenceschopnost ekonomiky (komparace zemi 10CE). 1. vyd. Brno: Masarykova univerzita. (in Czech).

Slany, A. et al. (2011). Konkurenceschopnost, růstova vykonnost a stabilita Ceske ekonomiky. 1. vyd. Brno: Masarykova univerzita. (in Czech).

Snieska, V. (2008) Research into international competitiveness in 2000–2008. *Inzinerine Ekonomika-Engineering Economics*(4), 29–41.

Snieska, V., & Draksaite, A. (2007). The Role of Knowledge Process Outsourcing in Creating National Competitiveness in Global Economy. *Inzinerine Ekonomika-Engineering Economics*(3), 35–41.

Stankiewicz, M. J. (2005). Konkurencyjnosc przedsiebiorstwa: budowanie konkurencyjnoeci przedsiebiorstwa w warunkach globalizacji. Dom organizatora, Torun.

Stiles, P. (2001). The Impact of the Board on strategy: an empirical examination. *Journal of Management Studies*, 38(5), 627–650. http://dx.doi.org/10.1111/1467-6486.00252

Stojcic, N., Hashi, I., & Telhaj, S. (2013). Restructuring and Competitiveness Empirical Evidence on Firm Behavior in New EU Member States and Candidate Countries, *Eastern European Economics*, 51(4), 84–107. http://dx.doi.org/10.2753/EEE0012-8775510404

Sebo, J., & Sebova, M. (2010). Measuring competitiveness with the aid of multi-criterial evaluation, *Journal of Competitiveness*, 1/2010, 33–40.

Siska, L. (2008). Analysis of financial performance of respondents in an empirical survey, Brno: Masaryk University, Working Paper No. 10/2008.

Spalek, J., & Castek, O. (2010). Contribution of self-learning methods for statistical pattern recognition when identifying Czech enterprises' competitiveness factors. *Ekonomicky Casopis*, 58(9), 922–937.

Travkina, I., & Tvaronavieiene, M. (2011). Export Competitiveness and Domestic, Productivity Facets: Case of Lithuania. *Journal of Business Economics and Management*, 12(1), 49–68. http://dx.doi.org/10.3846/16111699.2011.555360

Trienekens, J. H., & Beulens, A. J. (2001). Views on inter-enterprise relationships. *Production Planning & Control*, 12(5), 466–477. http://dx.doi.org/10.1080/09537280110042693

Trunecek, J. (2009). On competitiveness of Czech enterprises in the turbulent environment. *Politicka Ekonomie*, 57(4), 435–450.

Yang, Ch. L., Pinglin, S., Chan, Y., & Sheu, Ch. (2010). Mediated effect of environmental management on manufacturing competitiveness: An empirical study, Int. J. Production Economics, 123, 210–220. http://dx.doi.org/10.1016/j.ijpe. 2009.08.017

Zitkus, L., & Mickeviciene, M. (2004). Integration and competitiveness development in lithuania's enterprises. *Inzinerine Ekonomika-Engineering Economics*(1), 52–56.

The article has been reviewed.

Received in December, 2012; accepted in December, 2014.