

University of Sopron
Alexandre Lamfalussy Faculty of Economics

**THE NATIONAL COMPETITIVENESS AND ITS
SUBNATIONAL ASPECTS IN VISEGRAD GROUP
COUNTRIES**

Theses of the PhD Dissertation

Balázs Nagy

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Doctoral School: István Széchenyi Management and Organisation Sciences

Head of the Doctoral School: Prof. Dr. Éva Kiss DSc

Programme: International Economics Programme

Head of the Programme: Prof. Dr. Attila Fábián PhD

Scientific supervisor: Prof. Dr. Judit Balázs CSc

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1. GOALS AND HYPOTHESES

Reasons for the choice of the subject

The concept of the competitiveness has developed significantly for the last 20-30 years. In the beginning it was solely used for products and enterprises but from the 1990s it has appeared on macroeconomic level, researchers started to examine competitiveness of nations, which generated serious debates in scientific area. These debates are originated from the notion that competitiveness is basically not macroeconomic concept, therefore using productivity as suggested terminology instead. However, experts on competitiveness often confirm that competitiveness is a more complex concept than productivity. The latter one, for example, does not take into consideration how productivity is reached: what resources and costs were implied, while competitiveness is exploring whether productivity can be regarded sustainable from social, economic and environmental aspects referring to the facts that no country can remain competitive if insisting on short-term growth meanwhile development on middle- and long-terms is slowed down or obstructed.

The Author is presenting the possible interpretation framework of competitiveness (also currently being shaped), the applied measurement methods and the types of indicators. Based on the above factors he attempts to make a national competitiveness model built on regional competitiveness, furthermore, those macroeconomic variables are taken into account which have effects on competitiveness, although, they are not restricted to subnational level. Thus, financial stability is an analysed issue since interest payments of a state budget can be regarded an important indicator. This is not directly a competitiveness indicator, though, high interest payments can distract significant sources e.g. from the educational system, which is supposed to support competitiveness or health system ensuring welfare as an important factor of competitiveness.

At an earlier stage of the research, the Author focussed on three countries of the Carpathian Basin: Hungary, Romania and Slovakia were compared on different levels of competitiveness added by an analysis of the potential measurement methods. The results referring to particular areas presented remarkable geographical differences, disparities, which were taken seriously into account when writing the present dissertation. In sum, it generated the motivation to continue the research and to make a more complex analysis.

Compared to the former research, the number of examined countries and regions have been expanded, the Author decided to analyse all the Visegrad Group countries (Czech Republic, Poland, Hungary and Slovakia). The reason for selecting these four East-Central European countries was the Author's consideration, according to which it is possible to compare only countries possessing similar social, economic and cultural characteristics. V4 countries have relatively homogeneous structures, their cooperation dates back to centuries and in addition, they have witnessed similar historical events and changes.

The structure of the dissertation

The dissertation starts with an overview of the relevant literature (*Chapter 1*), the focus is on presenting the conceptual triangle of growth, competitiveness and development. Out of the triangle, competitiveness is examined in details on micro-, meso- and macro-levels. The next step in dealing with the relevant literature is listing the measurement methods, which is done based on the most recognised competitiveness analyses (*Chapter 2*). The dissertation does not include in detail analysis of the selected countries with respect to competitiveness indexes and ranks (e.g. WEF, IMD), instead, after presenting the strengths and weaknesses of measurement methodologies, a new competitiveness model, a new set of indicators and new measurement methodology are being elaborated. The new competitiveness model is analysing the Visegrad Group countries and their regions by means of statistical methods (Principal Component Analysis and Cluster Analysis), furthermore, a number of indicators are presented related to 17 goals of sustainable development, what enables to make comparisons between the V4 countries in terms of sustainability. Next, the findings are compared to some (formerly shown) competitiveness or social progress indicator and indicator set (*Chapter 3*). Finally, the Author draws the conclusions based on the results of the research (*Chapter 4*).

The research question, goals and hypotheses

Q: How competitive are Hungary and the Hungarian NUTS 2 regions compared to Visegrad Group countries and to their regions?

G1: Complex presentation of competitiveness concept, with a special emphasis on interpretation of national and subnational competitiveness and describing measurement methodology.

G2: Working out an individual competitiveness model and an indicator set based specifically on the Visegrad Group countries.

G3: Subnational and national level empiric analysis using multivariate statistical methods.

H1: Capital regions (Közép-Magyarország, Praha, Bratislavský kraj, Mazowieckie) achieve the best positions (1st-4th in the rank) respecting all factors of regional competitiveness.

H2: The Prague and Bratislava (Praha, Bratislavský kraj) regions cover purely the capitals themselves, therefore these regions surpass the Polish and Hungarian capital regions in every category of regional competitiveness model.

H3: The final regional rank based on composite indicators which are formulated using the Principal Component Analysis and the unweighted normalization does not differ in any factor.

H4: Research & Development is an important factor of competitiveness. Hungary mainly proves to be weak in competitiveness due to low results in R&D.

H5: Among Visegrad Group countries Czech Republic has the best position in the competitiveness ranks of international organisations. National competitiveness is affected by financial stability of a country, consequently, Czech Republic surpasses the other three countries in this area as well.

2. THE CONTENT AND METHODOLOGY OF THE RESEARCH

The dissertation can be divided into two bigger parts. The first one is a secondary research presenting the most important relevant theories and views based on growth, competitiveness

and development concepts, furthermore, it gives a detailed description of interpretations of competitiveness, added by its measurement and methodology models. Since the dissertation is applying aspects of regional science, the research included the review and approach of this discipline.

The empiric research in the dissertation is examining the competitiveness of the Visegrad Group countries based on an own, quantitative model. As relevant literature sources underline, competitiveness cannot be characterized by a single indicator. In addition, there may emerge reliability issues related to aggregate, composite indicators. For this reason, the Author is applying a recognized regional model: the Lengyel-competitiveness model in the present dissertation. In order to make it applicable to international usage and reliability it has slightly been modified, the altered version is shown below:

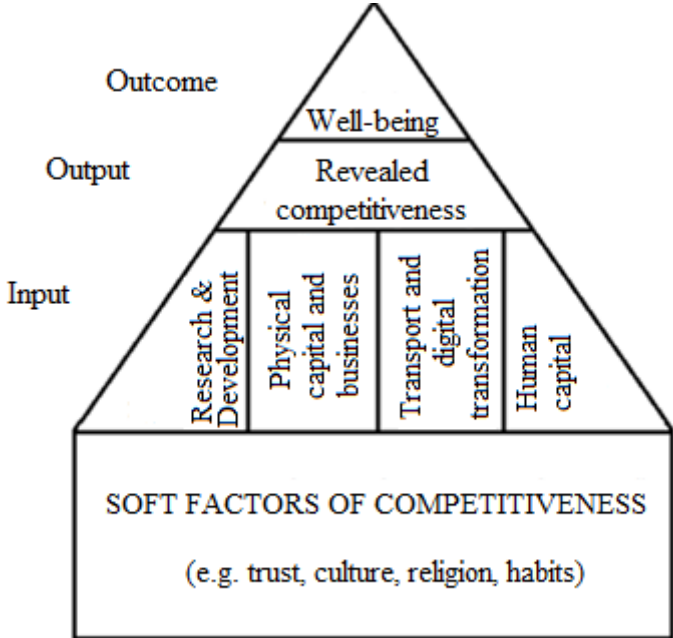


Fig. 1. Regional competitiveness model applied in the dissertation

Source: Author’s construction

The above figure shows input-output-outcome approach of competitiveness, furthermore, it implies that soft factors of competitiveness have to be taken into consideration to give an overall analysis. The dissertation does not include analysis of the mentioned factors, however, the Author considers important to expand the elaborated competitiveness model by qualitative data in a further research.

The data used in the dissertation were taken from Eurostat and OECD databases. To develop the new competitiveness model, the Author examined 35 NUTS 2 level regions of Visegrad Group countries applying 87 potential indicators, out of which, 32 were adapted into the final version of new competitiveness model. The Candidate gave a detailed description and comparison of Principal Component Analysis, including its methodological alternatives to work out composite indicators. The regional differences are presented by cluster analysis. Statistical analyses were executed using SPSS 22.0 software package.

The Candidate worked out his national competitiveness model based on regional data, the new model is called *competitiveness garden* by him. This model includes an expanded framework: the scope of formerly presented subnational analysis was broadened into a national and international context taken both the regional differences and macroeconomic (financial) stability into account. The significance of the change lies in the fact that regional differences of the examined Visegrad Group countries prove to hinder competitiveness in the long run, e.g. due to weakening of social capital.

In the dissertation the Author is comparing the received results to those of other, international reports, moreover, by means of the selected indicators of Sustainable Development Goals is presenting the development itself, which is considered to be the main goal of competitiveness.

In sum, the used methodology enabled the Author to analyse the measurable competitiveness differences within the Visegrad Group countries on several levels (regional and national), meanwhile the discrepancies related to sustainable development were clarified for the reader.

3. THE RESULTS OF THE RESEARCH

New and novel scientific results

1. The Author summarised the theoretical background, some more recognized models and measurement methods of competitiveness. It is stated, that this term has already been interpreted many times and in different ways, nevertheless, there has not appeared a definition on meso- and macro levels yet, which is accepted equally in scientific life. It is essential in respect of success of all the researches carried out in the topic how the term of competitiveness is defined by the researcher.

2. The Candidate made a regional analysis adapting the Lengyel-competitiveness pyramid on NUTS 2 regions of Visegrad Group countries. Using six factors and Cluster Analysis, four separate groups have been identified, representing the regions from the most competitive to the least competitive one. The four clusters can be characterized as follows:

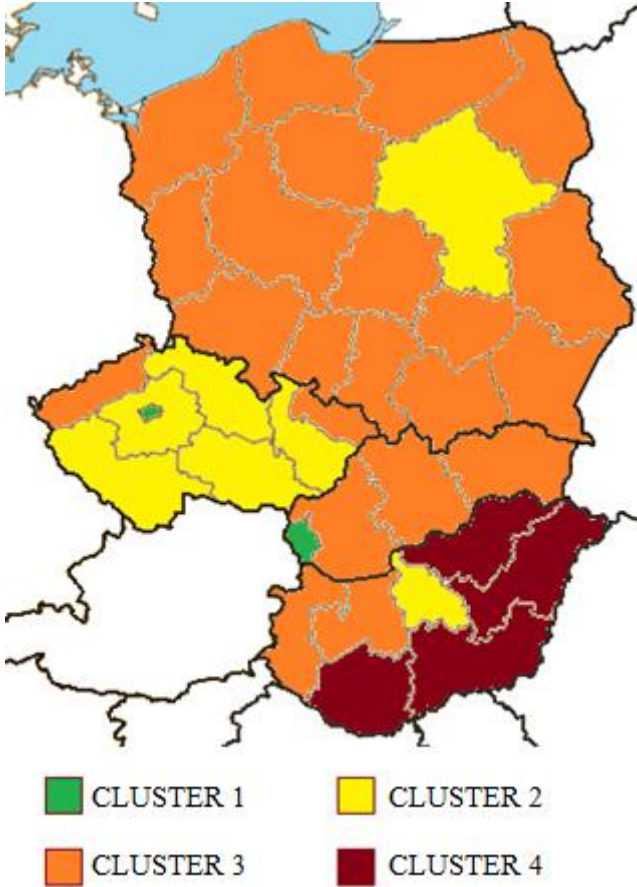


Fig. 2. Classification of regions based on cluster-analysis

Source: Author’s construction

Cluster 1: The most competitive regions belong to this group, however, due to the splitting, this cluster contains those regions where the region covers purely the capital itself.

Cluster 2: Beside the Hungarian and Polish capital regions only Czech non-capital regions are contained. Regions in this group reached results above the average, however, they are far behind the regions belonging to Cluster 1.

Cluster 3: Most regions belong to this group. Regarding cluster centres it is visible that these regions performed below the average in every respect. This cluster contains regions from every Visegrad Group country, practically all the Slovakian and Polish non-capital regions are meant to be classified in this group.

Cluster 4: This cluster contains the least competitive regions including four Hungarian regions as well. It must be remarked, that these regions have weaker results than regions in Cluster 3 mainly in Well-Being and Human Capital factors, while there are significantly smaller differences in Research & Development and in Transport and digital transformation factors.

3. Based on the regional competitiveness model a national level analysis was completed as well. The applied methodology seriously took into consideration the regional differences since these factors can generate such social tension that may have effects on national competitiveness. As a solution, a recognized method from Ács-Szerb methodology, Penalizing For Bottleneck (PFB) – which originally measured firm competitiveness – was adapted 'to penalize regional differences'. This new methodological approach allowed to define and measure competitiveness in a more complex way.
4. The validity of national level analysis is affected by financial stability which influences and enhances competitiveness. This factor was taken into account, therefore, the research resulted in an expanded competitiveness model starting from regional data, then analysing the national competitiveness with a special stress on the regional differences and finally providing composite indicators received from the most important indicators of financial stability. The new model is called *the garden of competitiveness*.
5. It can be regarded an important result that the dissertation presents the Visegrad Group countries with a special attention to the Sustainable Development Goals (SDG). This approach contributed to the favourable ranking of Czech Republic and weak position of Hungary based on the 17 sustainability categories.

Theses of the dissertation

Table 1. Testing of the hypotheses in the dissertation

Hypothesis	Result of the research
H1: Capital regions (Közép-Magyarország, Praha, Bratislavský kraj, Mazowieckie) achieve the best positions (1st-4th in the rank) respecting all factors of regional competitiveness.	The hypothesis was rejected. <i>(The four capital regions achieved the best positions only in Revealed competitiveness and Research & Development factors.)</i>
H2: The Prague and Bratislava (Praha, Bratislavský kraj) regions cover purely the capitals themselves, therefore these regions surpass the Polish and Hungarian capital regions in every category of regional competitiveness model.	The hypothesis was accepted. <i>(Prague and Bratislava were the most successful in every category.)</i>
H3: The final regional rank based on composite indicators which are formulated using the Principal Component Analysis and the unweighted normalization does not differ in any factor.	The hypothesis was rejected. <i>(4 positions is the biggest difference.)</i>
H4: Research & Development is an important factor of competitiveness. Hungary mainly proves to be weak in competitiveness due to low results in R&D.	The hypothesis was rejected. <i>(Hungary became 2nd place in R&D, nevertheless the country falls behind significantly in input factors, in Human capital area.)</i>
H5: Among Visegrad Group countries Czech Republic has the best position in the competitiveness ranks of international organisations. National competitiveness is affected by financial stability of a country, consequently, Czech Republic surpasses the other three countries in this area as well.	The hypothesis was accepted. <i>(Out of the 28 countries of the EU, Czech Republic became the 5th, Slovakia the 13th, Poland the 16th and Hungary the 17th place based on the new model.)</i>

Source: Author's construction

T1: Respecting the competitiveness factors, not exclusively the capital regions finished in the best places, in fact, some non-capital (especially Czech) regions managed to overtake the Hungarian and Polish capital regions. Furthermore, there are some factors where Hungarian and Polish capital regions achieved really bad results. Thus, e.g. Mazovia became the 24th place in Transport and digital transformation factor, the 8th place in Physical capital and businesses factor, while Central Hungary became the 20th place in Well-being factor and the 11th place in Human capital factor.

T2: Slovakian and Czech capital regions are significantly more competitive than the Hungarian and Polish ones, however, the former ones contain purely Prague and Bratislava¹. **The considerable advantage in competitiveness can be attributed to this factor of regional splitting,** therefore, it is recommended to take this distortion factor into consideration in further researches in the future. According to the Commission Regulation (EU) 2016/2066 amending the annexes to Regulation (EC) 1059/2003 of the European Parliament and Council on the establishment of a common classification of territorial units for statistics (NUTS) from January 1, 2018 Budapest (HU11) and Pest county (HU12) constitute separate NUTS 2 level regions, furthermore, Poland appears to have a diminished capital region (Warszawski stołeczny – PL91). This modification is expected to have influence on further regional (NUTS 2 level) competitiveness researches and findings, in addition, the comparison of capital regions will give more reliable results.

T3: Rankings based on composite indicators received by the Principal Component Analysis and the normalization do not comply in the regional model examined in the dissertation², consequently, it is essential to choose the appropriate method when carrying this kind of small-scale analysis. For this purpose, the Principal Component Analysis used in the current dissertation can be suitable, which reduced the number of initial variables with an acceptable information loss level.

T4: Weak competitiveness of Hungary cannot be attributed to low Research & Development activity, moreover, our country overtakes Slovakia and Poland at the count of

¹ Bratislava region (Bratislavský kraj) consists of the capital and 3 other districts (Okres Malacky, Okres Senec, Okres Pezinok).

² The biggest difference (4 positions) found in Human capital factor.

contracted factor scores. The analysis in the dissertation proves that **Hungary's biggest backlog can be discovered in the indicators related to Human capital.**

T5: The outstanding success in competitiveness of Czech Republic is supported by the financial stability of the country. In this aspect Czech Republic has also the best position among Visegrad Group countries. In spite of the improving macroeconomic environment, based on the new model, Hungary takes the last place out of the four countries.

4. CONCLUSIONS, SUGGESTIONS

After studying the scientific literature, it became obvious that there is no generally accepted definition for competitiveness yet. The 'standard notion of competitiveness' used in this dissertation can be regarded as a good starting point, nevertheless, many researchers and international organisations call the attention to some other important factors which can influence competitiveness. In the current dissertation the Author also attempted to establish an interpretation synthesizing experience gathered during the process of studying the scientific literature. According to his opinion, competitiveness is a multidisciplinary concept where social and economic factors play the vital roles, however other disciplines cannot be ignored either (e.g. technology, medicine), which can provide system-level analysis with additional information.

For this reason, the Candidate meant competitiveness in the dissertation as *capacity* to guarantee high employment rate and productivity for middle-term, as well as, to contribute to social progress, sustainable development and well-being for long-term. The other half of the compound, *competition*, raises several interpretation questions. Firstly, because this competition can be regarded as a non-zero-sum game, that is, countries and regions can win not only by defeating, eliminating the others, rather by using the synergetic effects they manage to enter a common economic and social development path. This statement is more relevant for subnational competitiveness, since a zero-sum game would increase the regional differences hindering development of particular regions. This conclusion defines the basic difference between firm and regional competitiveness, as in the former case companies aim to increase market share and profit rate, which is often reached by weakening their competitors. Secondly, the 'competition' refers to a comparative concept in the interpretation of the Author, therefore, his macro-level competitiveness analysis can be carried out primarily in comparison of several countries. The conclusion is, that however, it can seem favourable if a country has improving

economic and social indicators, in reality, it lags behind if other countries can develop faster in the progress competition.

Competitiveness is a complex concept characterized by the formerly mentioned multidisciplinary feature, at the same time, this complex phenomenon cannot be described by a single, contracted, composite indicator. Instead, analyses relating to individual competitiveness areas (factors in the dissertation) prove to be significantly more informative, since they focus on identifying beneficial and disadvantageous factors on competitiveness. This approach has been applied in the dissertation as well, when presenting the regional differences between the Visegrad Group countries and their NUTS 2 level regions.

The above considerations were taken into account in developing a new competitiveness model with a special emphasis on significance of regional differences in national competitiveness. In the process of modelling, the Candidate attempted to keep it simple, comprehensible, yet suitable for demonstrating the role of the state in changes of regional competitiveness, moreover, the importance of external effects and regional resilience was underlined. It is essential for an economy not only to be able to resist negative exterior effects but to make a good use of possibilities (e.g. digitalization) arriving from outside.

In the research of national competitiveness, the dominant position of Czech Republic was identified, since this country achieved remarkable results according to factors based on regional data of competitiveness. In addition, the Czech result was the best according to Financial stability factor on national level as well. The analysis of financial stability of a country is necessary, on the one hand, because stability contributes to flexibility and resilience, on the other hand, it enables progress in competitiveness. A relatively high national debt of a country, involving the interests (mainly in case of external debt) may deprive those investments of sources which would be vital in terms of maintaining or increasing competitiveness. Slovakia achieved the best result in Transport and digitalization area respecting the factor scores within the Visegrad Group countries. The complex competitiveness status of our northern neighbouring country is closely similar to that of Poland, these two countries became the second and third place according to specific factors. Hungary turns to be the least competitive in the group based on the national data, its drawback is mainly due to the weak results in Human capital and Well-being factor. In further researches in the future it would be worth analysing the changes of the demonstrated present competitiveness status, involving the occurred rearrangements among countries and regions. Furthermore, those specific political decisions

are supposed to be analysed which made Czech Republic the most competitive country in the region.

Since the most factors of national competitiveness are based on regional data, the competitiveness status reflected in the national results anticipates the regional results. The analysis of regional competitiveness factors primarily outlined the territorial differences. In the respect of national economy, it is essential to prevent appearing significant regional differences because they can lead to social problems having effect on development of the countries.

Based on the factor scores, the Author categorized the regions into four clusters (from the most competitive to the least one). The Czech regions undoubtedly excel in the analysed group which result naturally corresponds with the national competitiveness findings. The least competitive regions within the Visegrad Group countries can be found in Hungary. In case of the four regions affected (Northern Hungary, Northern Great Plain, Southern Great Plain, Southern Transdanubia) it would be advisable to examine what kind of arrangements should be done in order to increase competitiveness. Besides, it has to be considered whether centralized or decentralized decisions are required. Regarding the last issue - according to the Author - those statements of Rechnitzer written a decade ago are still valid, which confirm the necessity of decentralization. In addition, the Candidate considers indispensable the decentralized sources, since each region is unique: different development phases, various structures and diverse competitiveness (as the dissertation confirms) can feature them. In conclusion, the Candidate considers the analysis of national competitiveness an important issue, however there is no doubt that complex picture can only be received by additional subnational (regional) research with special regard to territorial differences.

5. PUBLICATIONS RELATED TO THE TOPIC OF DISSERTATION

Csath, M. – Györpál, T. – Nagy, B. – Taksás, B. (2016): Kormányzati képességek a gazdaságfejlesztésben: pénzügyi stabilitás, gazdasági innováció, versenyképesség. In: Kaiser, T. (ed.): *A Jó Állam mérhetősége II.* Dialóg Campus Kiadó, Budapest. pp. 75-96.

Csath, M. – Györpál, T. – Nagy, B. – Taksás, B. (2016): Speciális jelentés az állami versenyképességet javító, vállalkozóbarátabb üzleti környezet kialakításának lehetőségeiről. *Államtudományi Műhelytanulmányok.* (33). pp. 1-28.

Nagy, B. (2016): A Visegrádi Négyek és Románia versenyképességének kulcsterületei. In: Duray, M. – Kulcsár, L. – Szász, J. (ed.): *Együttműködési lehetőségek a Kárpátok térségében. (Kárpát-haza napló; 7).* Nemzetstratégiai Kutatóintézet, Nyugat-magyarországi Egyetem, Budapest, Sopron.

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Nagy, B. (2015): Regionális versenyképesség a Kárpát-medence országaiban különös tekintettel a humán tőkére. In: Keresztes, G. (ed.): *Tavaszi Szél 2015 konferenciakötet (2. kötet).* EKF Líceum Kiadó, Doktoranduszok Országos Szövetsége, Budapest.

Nagy, B. (2014): Competitiveness and Technological Readiness of Hungary in the Light of Foreign Direct Investment. *Gazdaság és Társadalom.* (4). pp. 19-31.

Csath, M. - Alföldy-Boruss, M. – Györpál, T. – Nagy, B. – Taksás, B. (2014): Pénzügyi stabilitás és gazdasági versenyképesség. In: Kaiser, T. – Kis, N. (ed.): A Jó Állam mérhetősége. Nemzeti Közzolgálati Egyetem, Budapest. pp. 89-140.

Full and current publication list can be found in Magyar Tudományos Művek Tára
(Hungarian National Scientific Bibliography):

<https://vm.mtmt.hu//search/slist.php?lang=0&AuthorID=10038195>.