

SNOWFLAKE MODEL OF REGIONAL COMPETITIVENESS - EVIDENCE FROM SERBIA¹²

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Abstract

The competitiveness of the region is ability to be productive and maintain a high standard of living. In this paper, we have created Snowflake model of regional competitiveness considering not only economic and social factors, but also infrastructure, innovations, geo-natural variables, institutional factors, culture and tourism. This model can be applied in any country or group of countries. The model shows the competitiveness of the region in three ways: 1) quantitatively - by the index of regional competitiveness, 2) ranking the region compared to other regions and 3) it possesses visual characteristic - represents snowflake of competitiveness. As part of our analysis, we measured the regions of Serbia. The reason is that Serbia has the largest regional differences in Europe, which was an additional motive to test the model.

KEYWORDS: regional competitiveness, Snowflake model, index of regional competitiveness, factors of regional competitiveness, indicators of regional competitiveness, regional drivers

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Introduction

While the Adam Smith presented a Theory of Absolute advantage in his book *An Inquiry into the Nature and Causes of The Wealth of Nations* (1776) which explains the benefits of international trade and represents one of the earliest theories of the concept of competitiveness, it passed almost 200 years when appeared papers in the scientific literature that analyze regional competitiveness. Regional competitiveness becomes an object of scientific literature since the 1990s, primarily connected with the names of Michael Porter (1990) and Paul Krugman (1991a, 1991b, 1994).

Scientific confrontation of these two authors and their opposite opinions have influenced on the evolving ideas of regional competitiveness. Since then, many authors have analyzed this issue (Cho 1994; Rugman et al. 1998; European Commission 1999; Dunning et al. 1998; Huggins 2003; Martin 2004; Kitson et al. 2004; de Vet et al. 2004; Lengyel 2004; Cho – Moon 2000; Kitson et al. 2008; Snieška and Bruneckienė 2009). But, after more than two decades, two key issues are still discussed: “*What is regional competitiveness? How to measure regional competitiveness?*” Issues are not simple. Moreover, it turned out that there is no unanimity on this issues.

Each author has its own definition which is similar in nature, but represents different methodologies or viewing angle of competitiveness. Addition to this, the definitions of this concept are also differing according to the level of measurement of competitiveness. The level at which the competition is defined is the most important aspect of this concept (Annoni, Kozovska 2010; Kitson et al. 2004). Therefore, competitiveness is defined on the macro level (OECD 1992, European Commission 2003; Schwab, Porter 2007), micro level (IMD 2000, 2004; Krugman 1996; Powell 2001; Martin et al. 2006), and from *The Sixth Periodic Report* (European Commission 1999) appears most definitions of competitiveness at the regional level (European Commission 2003; Huggins 2003; Gardiner et al. 2004; Kitson et al. 2004; Bristow, 2005; Meyer, Stamer 2008; Annoni, Kozovska 2010; Vukovic, Wei 2010; Vukovic et al. 2012).

In this paper we define the competitiveness of the region as ability to be productive and maintain a high standard of living. If we even say that there is a relative consensus about the definition of regional competitiveness, the differences in the opinions of the authors are resulted from the differences in creating a model of regional competitiveness, on one side and/or different selections of factors or drivers of competitiveness, on the other side. Regardless of whether observed regional output as the final result of the measurement of competitiveness (Martin, 2005) or competitiveness is expressed as productivity (Krugman, 1994), almost all models of regional competitiveness are based on the measurement of certain factors.

However, no matter what kind of form has a model of regional competitiveness, studies have shown the following: a) competitiveness cannot be based on measuring only the economic and social factors, it has to be approached with multifactorial measuring (Lengyel, 2003; Kitson et al., 2004; de Vet et al., 2004; Huggins, 2005; Snieška, Bruneckienė, 2009) and b) the creation of a composite index provides the most accurate measurement (Freudenberg, 2003; Wignaraja et al., 2004; IMD, 2004; Giovannini et al., 2005; Saisana et al., 2005; Huggins, 2005; Snieška, Bruneckienė, 2009). Due to the variety of factors, the process of measuring of regional competitiveness is complex and the term competitiveness becomes a difficult and confusing (Snieška, Bruneckienė 2009).

The purpose of this paper is to create a model of regional competitiveness which will include, analyze and measure a number of different of factors, which can determine the competitiveness of certain regions.

The Model

Snowflake model assumes that each region builds its competitive position on the basis of factors which have a competitive advantage. Compared to the most of the models, which are based on economic and social factors, this model includes both formal and informal institutions, infrastructure, innovation, and geographic location. Each of these factors depends on the specific groups of indicators, which may be visually presented in the form of crystals of snowflakes. Snowflakes model comprises the following stages:

1. In the first phase the main factors of regional competitiveness are determined. The model refers only to those factors that have a regional influence. The factors that are characteristic for the national level are not included in the model. For example, macro-economic factors do not affect the inter-regional competition at NUTS 2 or NUTS 3 level. However, when it comes to the region at the level NUTS 1 (which can be applied even to the whole country), then it can take into account national factors. The model is based on eight factors: the economic factor, the social factor, infrastructure, innovations, the human factor, geo-natural factor, informal institutions and the property rights protection, culture and tourism. The model estimates the ability of the region to use the factors of competitiveness in order to build its competitive position among other regions. The number of factors affects the complexity of the model, based on which it provides a measurement of all aspects of regional competitiveness. In this way, the problem of measurements of only economic or social factors is overcome. However, a limitation of this model is exactly the natural structure of the snowflake which has eight points. The model could not have seven or nine factors, because there wouldn't have a form of snowflake. Therefore, the informal institutions and the protection of property rights are presented in framework of the same factor. However, due to their nature and the connections this restriction is not large. The same is true for the factor of culture and tourism.
2. The second stage refers to the determination of indicators that influence the factors of regional competitiveness and their values. At this stage the key decision is made: *Which indicators determining factors of regional competitiveness?* All factors of the model are identical for all regions of different countries, but selection of some of indicators for these factors is often not possible. Due to historical and socio-political differences as well as differences in the organization and the priorities of the statistical services of different countries, some indicators are not measured or can be measured by indicators which are similar to those from Snowflake model. Bearing this in mind, the selection of indicators is a complex and difficult task since it requires the selection of substitutes (if there is no data for a particular indicator). If unrepresentative indicators are selected for a specific factor, its measurement may provide misleading information about the competitiveness of the region. This phase represents the qualitative part of development of the model, because it includes a selection of 78 indicators and sub-indicators. Specifically, factors of the regional competitiveness are showed by forty-eight indicators where some of these indicators are disaggregated at thirty sub-indicators (Table 1). In this way, the accuracy of measurement of individual indicators has increased. In contrast to many other models of regional competitiveness that measure only indicators (without their decomposition), the previous feature makes Snowflake model very rare (sub-indicator model). The purpose of measurement sub-indicators is the fact of quality of presentation of specific variables.

Table 1: Factors, indicators and sub-indicators of Snowflake model of regional competitiveness

Factors	Indicators and sub-indicators		
<p>The economic factor</p> <p>(Refers to the economic strength of the region. This factor includes the manufacturing, investment and financial performance of the region, as well as the ability of the region to employ citizens and provide adequate wages)</p>	GDP		
	Financial performance	<i>The number of companies with net profit</i>	
		<i>The number of companies with a net loss</i>	
	Entrepreneurship	<i>Number of companies</i>	
		<i>Number of entrepreneurs</i>	
		<i>Insolvency of companies exceed 180 days</i>	
		<i>The spread of clusters</i>	
	Employment	<i>The number of employees</i>	
		<i>The number of employees in the economy</i>	
	The average net wage		
Investments in capital	<i>Investments in capital assets</i>		
	<i>Capital</i>		
<p>The social factor</p> <p>(This factor right shows the ability of the region to provide social and health care to its citizens, as well as living space. The social factor also includes the negative impact of corruption, which reduces the quality of life in the region)</p>	Number of flats and houses		
	The value of residential building		
	Corruption	<i>The prevalence of corruption</i>	
		<i>Average bribe in RSD(Republic Serbia Dinar)</i>	
	Investments in health and social care		
	Budget expenditure in health and social care		
	The number of medical personnel	<i>The number of doctors and dentists</i>	
		<i>The number of pharmacists</i>	
	<p>The infrastructure factor</p> <p>(The quality of infrastructure affects not only the quality of life of citizens, but also on the adoption of many investment decisions. This factor includes the most vital parts of infrastructure, measuring the quality of roads, railways, air transport and electric power infrastructure)</p>	Length of the roads	
		Investments in infrastructure	<i>Investments in fuels</i>
<i>Investment in transportation and storing</i>			
<i>Investment in informations and communications</i>			
A modern road surface			
The quality of railways			
Connectivity of air transport with foreign countries			
The quality of electricity network			
The total number of research papers			
Research & Development		<i>The number of organizations engaged in R & D</i>	
	<i>Number of employees in R & D</i>		
	<i>Expenditures for R & D</i>		
Investment in innovations			
The number of registered patents			
Published research papers			
The use of modern technology			
<p>The human factor</p> <p>(The quality of human capital depends largely on the age structure of the population and the quality of education. Those regions that have the highest percentage of the working-age population and highly educated people are able to achieve higher productivity and gain a competitive advantage over other regions)</p>	The population of working age (15-64)		
	Highly-educated population		
	Budgetary expenditures in education		
	Investments in education		
	Quality of education in schools		
	The quality of studies at universities		
<p>The geo-natural factor</p> <p>(The utilization of this factor depends from the size of the territory, climate benefits, the availability of natural resources and its position)</p>	Land area (km ²)		
	The forest area (km ²)		
	The agricultural land (km ²)		
	Geo-climatic advantages	<i>Advantages of the geographic location</i>	
		<i>Climate benignity</i>	
	Waste	<i>Hazardous waste</i>	
		<i>Total discharged wastewater</i>	
	Water supply	<i>Total water supply</i>	
		<i>Investments in water supply and waste management</i>	
	Informal institutions and the property rights protection factor	Confidence	<i>Confidence in politicians</i>
<i>Confidence in business institutions</i>			

(Informal institutions are „soft“ factors which in most cases can not be measured quantitatively. In some regions this could be a key factor in their development. Protection of property rights is very important for all business entities in the investment decision-making)	The quality of government services	
	The safety of property rights	
	The share of the gray economy in business activities	
	Judicial independence	
	The attractiveness of the business environment	
The culture and tourism factor (The touristic potential of the region can have a great influence on its competitiveness. The tertiary sector in many regions is the basis of their economic activity. Culture does not have a major impact on the economic position of the region, but affects the satisfaction of many people residing in that territory)	The number of cinemas	
	The number of theaters	
	The number of libraries	
	Issued publications	
	Expenditures for the arts and recreation	
	Tourism	<i>The number of tourists</i>
		<i>Total tourist overnight stays</i>

1. Indicators and sub-indicators of regional competitiveness are measured in the third phase. They are different in their nature and structure, which is the reason why their measurement requires the use of different units of measure. On the one hand, the complexity of the measurement of indicators is an advantage of this model, since it encompasses a large number of different indicators that affect the competitiveness of the region. On the other hand, violates the principle of simplicity and creates more possibilities for incorrect estimates or calculations, which can be expressed as the limitation of the Model.
2. In the fourth phase, composite index of regional competitiveness is created and calculated. The index measures 8 factors, constituting of 78 indicators and sub-indicators (Figure 1). All measured factors and their indicators can be ranked. The sum of the values of all factors creates the index of regional competitiveness. Each factor has six of indicators, which in the aggregate provide the value of measured factor. For more precise measurements, certain indicators are decomposed into sub-indicators. The numbers of sub-indicators are not the same for all indicators. Some of indicators and sub-indicators are shown as negative value (the share of the gray economy in business activities and the number of companies with a net loss), because increase in their value reduces regional competitiveness. The expression of regional competitiveness can be represented as:

Index of regional competitiveness = The economic factor + The social factor + The infrastructure factor + The factor of innovations + The human factor + The geo-natural factor + Informal institutions and the property rights protection factor + The culture and tourism factor

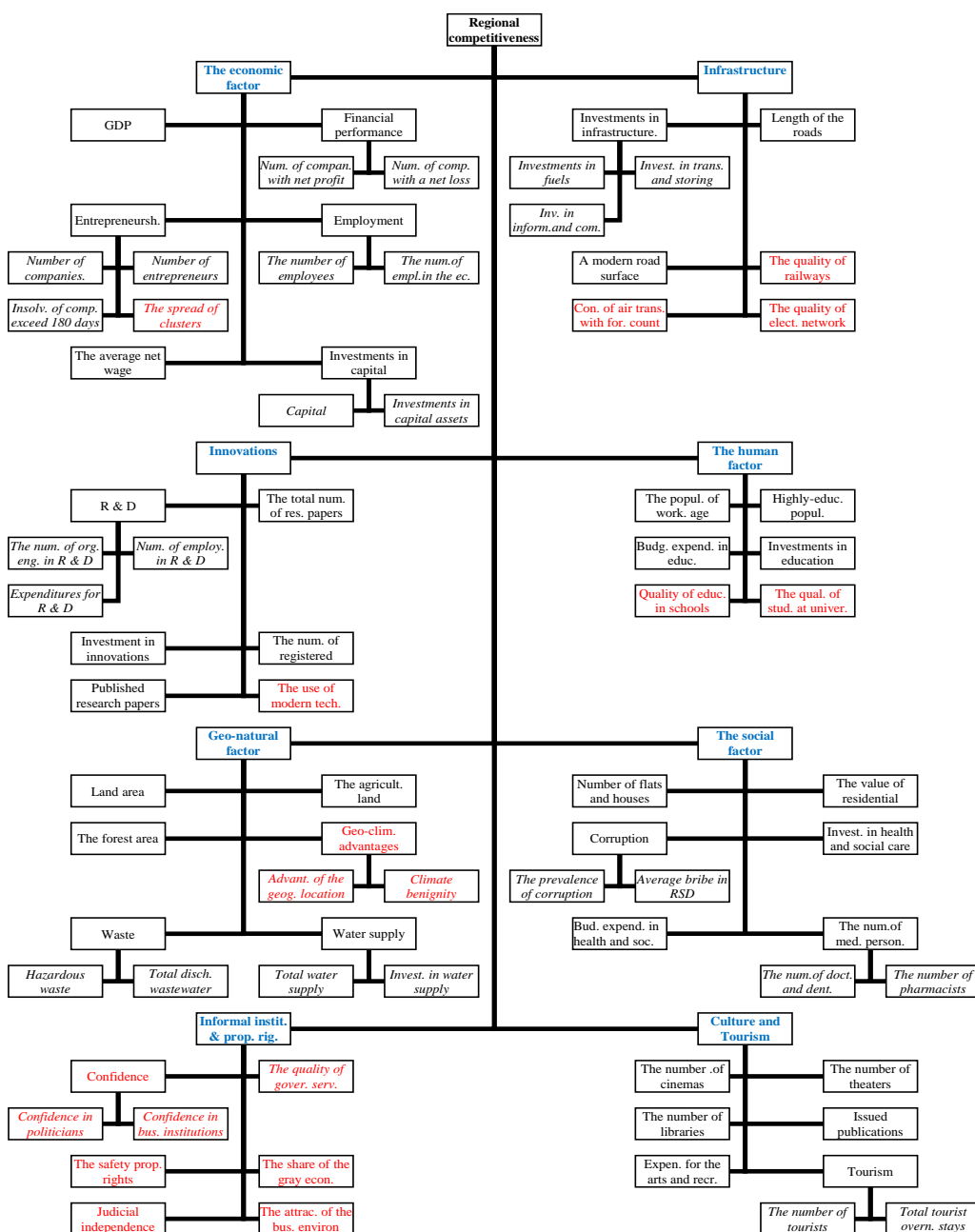


Figure 1: Factors and indicators of Snowflake model of regional competitiveness

Notes: Index of regional competitiveness is marked in bold letter, the factors are highlighted in blue, sub-indicators in italic letter and indicators and sub-indicators which are measured by survey are highlighted in red.

Sub index of regional competitiveness can be expressed as:

$$X_i = [(x_i/X) \div (p_i/P)] \times 100$$

Where X_i is the index value for a particular region, x_i is the value of indicator in the region, X is the value of indicator for the country, p_i is population in particular region and P is total population in the country.

The obtained values of sub index of certain indicators appreciate the differences in the population of each region. In this manner, the differences are easily expressed in the region in relation to the level of the territory, as well as the differences between the obtained values of the various regions. The purpose of this sub-index is to show the strength of each region. However, the sub index has the biggest disadvantage because aggregates "apples and oranges". Since sub index favoring those indicators which have the highest standard deviation and decreases the significance of those indicators which have a lower standard deviation, it is necessary to divide the term with standard deviations of each indicator. In addition, all indicators have the same significance and cannot express the qualitative side of the measured sub index. Index can be expressed as (Huovari et al. 2001):

$$\text{Sub index} \div \delta = X_i \div \delta = [(x_i/X) \div (p_i/P)] \times 100 \div \delta$$

Wherein δ represents the standard deviation of X_i indicator. To avoid the problem of overestimates of index or even its underestimates, the index is necessary to multiply by 100 (even 1000), or in some cases divide it with the same amount, in order to obtain the value with same number of decimal. Another disadvantage of standardized index that Model solves is equalization of factor's strength in regional competitiveness. It would be wrong to equate the strength of indicators GDP and the number of theaters or employment and the number of pharmacists in a region. The method is very complex, since it gives the author possibility to estimate value of the index. On the other side, provides the most correct measurement of indicators, because avoids a trap of "same importance" of factors. It is important to note that the countries and regions are distinguished by their natural and social characteristics so values of the same indicators do not have the same importance.

In the last phase, index of regional competitiveness is analyzed.

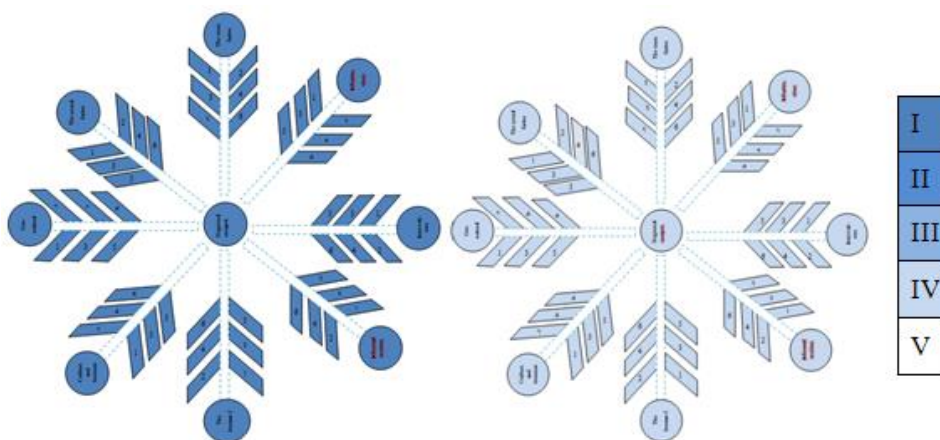


Figure 2: The strongest and the weakest structure of snowflakes competitiveness and the rank of competitiveness.

Model graphically shows the structure of snowflakes competitiveness (Figure 2). The darkest shade of blue, indicates that the competitiveness of factors or their indicators is the largest, with a value of rank I. The brightest shade of blue, indicates that the competitiveness of factors or their indicators is smallest, with a value of rank IV. White fields of the Model (with a value of rank V), indicates that there are no data for the factors and their respective indicators. In some countries this assumption is unavoidable. For example, the data for the region of Kosovo and Metohija have a value of rank V, because they are unavailable or there is no possibility of appropriate assessment. The range of blue shades can be larger depending on how many regions certain country is divided. For example, if the country has 20 regions, then the Model shall have 20 shades of blue. The same thing applies to number of ranks.

Continental regions of Serbia: Background

Serbia covers an area of 88 502 km², with population of 7.186.862 citizens. The Law on Regional Development (2009) defines regions in Serbia as statistically functional territorial entities that are set up for the needs of planning and implementing the policy of regional development in conformity with the nomenclature of statistical territorial units at level 2. The Law on Regional Development has defined 5 statistical territorial units which correspond to NUTS level 2. Those are: 1) Region of Vojvodina, 2) Belgrade Region; 3) Šumadija and Western Serbia Region; 4) Southern and Eastern Serbia Region; 5) Kosovo and Metohija Region (Figure 3). For the purposes of this research, competitiveness is measured at this territorial level.



Figure 3: Regions in Serbia Source: <http://pretraga2.apr.gov.rs/APRMapePodsticaja/>

Notes: By the United Nations Resolution 1244, Kosovo has a special status within the Federal Republic of Yugoslavia of which Serbia is the successor.

Results

After the calculation of index values of all indicators, we have calculated the factors of regional competitiveness which are based on certain indicators (see Fig. 1). In this calculation, there are also negative indicators that reduce the value of the represented factor, such as: waste, corruption and the share of the gray economy. Index of regional competitiveness is determined by the sum of all factors of regional competitiveness. Results of indexes and factors of regional competitiveness are presented in Table 2.

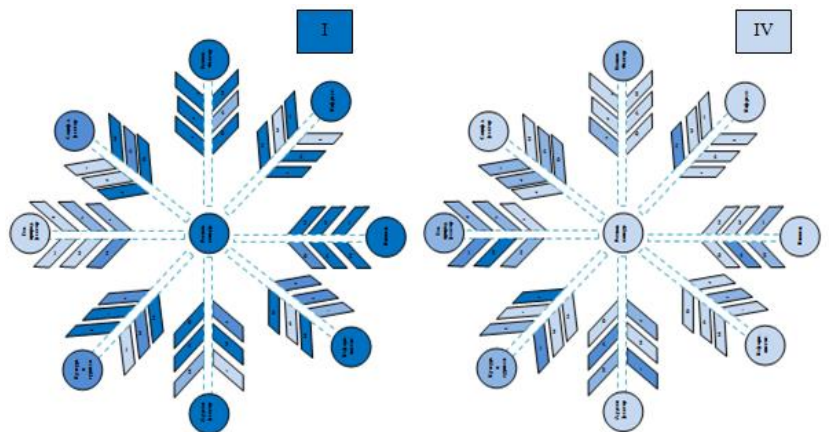
Table 2: Results of measurement of factors of regional competitiveness, the value of the index of regional competitiveness in Serbia and their ranks.

Regions / Index of regional competitiveness / (rank)	The economic factor	Infrastructure	The human factor	Innovations	Geo-natural factor	The social factor	Culture and Tourism	Informal institutions and the property rights protection
Belgrade Region - 10,59 (I)	2,1274 (I)	1,74832 (I)	1,6485 (I)	2,0272 (I)	0,2595 (IV)	0,30633 (II)	1,1633 (II)	1,3053 (I)
Southern and Eastern Serbia Region - 7,14 (IV)	1,349 (IV)	0,920678 (IV)	1,3482 (IV)	0,2848 (IV)	1,0891 (III)	0,24459 (IV)	0,892 (III)	0,9625 (IV)
Šumadija and Western Serbia Region - 9,71 (II)	1,3975 (III)	1,219044 (II)	1,4343 (III)	0,3277 (III)	1,8818 (I)	0,30167 (III)	2,0553 (I)	1,1369 (III)
Region of Vojvodina - 9,33 (III)	1,4945 (II)	1,028668 (III)	1,6411 (II)	1,5091 (II)	1,3324 (II)	0,37119 (I)	0,6588 (IV)	1,2951 (II)
Kosovo and Metohija Region - n/a (V)	n/a (V)	n/a (V)	n/a (V)	n/a (V)	n/a (V)	n/a (V)	n/a (V)	n/a (V)

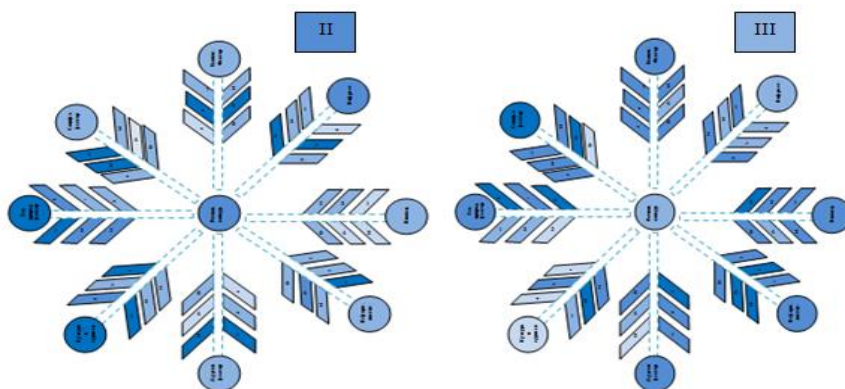
Source: Authors calculations

Notes: (I), (II), (III), (IV), (V) are ranks of regional competitiveness

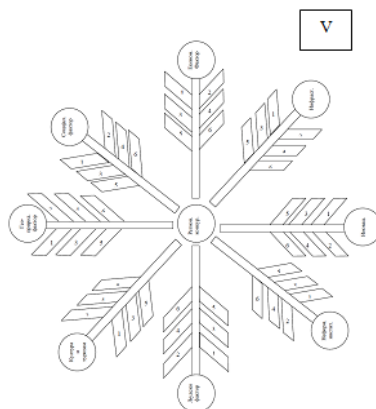
Belgrade is the most competitive region in the majority of factors: the economic factor, infrastructure, the human factor, innovations, informal institutions and the property rights protection (rank I for all factors), while at least competitive in geo-natural factor (rank IV). Southern and Eastern Serbia Region has the lowest value in almost all factors, where the lowest-ranking are: the economic factor, infrastructure, the human factor, innovations, informal institutions and the property rights protection and the social factor (Figure 4a). Šumadija and Western Serbia Region is the most competitive in the geo-natural factor and culture and tourism, while in other factors are middle positioned. Region of Vojvodina is the most competitive in the social factor and at least competitive in a factor of culture and tourism, while for the other factors are middle ranked (Figure 4b).



(a) Belgrade Region and Southern and Eastern Serbia Region



(b) Šumadija and Western Serbia Region and Region of Vojvodina

*Figure 4: Snowflakes of competitiveness**(c) Kosovo and Metohija Region*

Belgrade Region has an Index value 10.59 and shows that it is far more competitive than Southern and Eastern Serbia Region with the Index value 7.14. In percentage terms, Belgrade Region is more competitive than Southern and Eastern Serbia for 67.42%. Compared to the region Šumadija and Western Serbia Region and Region of Vojvodina, Belgrade is competitive for 8.31 and 11.89%, respectively, when comparing the percentage differences in Index value. Therefore Belgrade Region has ranked I.

Differences between regional competitiveness Šumadija and Western Serbia and Vojvodina are very small. Šumadija and Western Serbia Region are more competitive compared to Region of Vojvodina for 3.91%, when comparing the percentage differences in Index value. With this in mind, Šumadija and Western Serbia Region have rank II and Region of Vojvodina has rank III. These regions are more competitive compared to Southern and Eastern Serbia Region, which have rank IV. Competitiveness of Kosovo and Metohija Region was not possible to measure, because there are no available data for most indicators. By the United Nations Resolution 1244, Kosovo has a special status within the Federal Republic of Yugoslavia of which Serbia is the the successor. In this analysis, it could be logically concluded that this region is at least competitive with respect to all regions. Because of these facts, Kosovo and Metohija Region has the rank V and is not marked by shades of blue (Figure 4c).

Conclusion

Larger number of different factors comprehensively presents our definition that the competitiveness of the region is ability to be productive and maintain a high standard of living. The same standard of living and productivity depend not only on economic performance, or the number of schools, universities and hospitals in a region. Likewise, the institutional support is also important, as well as quality infrastructure, science and technology development and other variables that affect the quality of life in a region. The number of variables that affect the productivity and standard of living is certainly higher, but it is impossible to include all. On the other hand, some authors measure only economic and social factors or even just GDP as a proxy for human well-being (Armington, Acs 2002; Royuela, García 2013), factors of entrepreneurship (Storey, 1994; Kirchoff et al., 2002; Lee et al. 2004), human capital factors (Thompson, 1965; Lucas 1988), territorial capital (Camagni, Capello 2013) or space and quality (Jansson – Waxell 2011). Others measure certain economic and social variables termed as creative industries and the creative class (Florida 2002; Chapain and Comunian 2010; Chapain et al. 2013; Dzudzek – Lindner 2013) which became popular in the literature in the last ten years. There are much more examples. This just proves our statement at the beginning of this paper that that most authors can agree on the definition of regional competitiveness, but differences arise in various methodologies or different views of competitiveness.

How is possible comprehensively express the issue of regional competitiveness? Only by measuring a large number of factors and their indicators. We believe that only on this way can fully explore this issue. More specifically, there are a number of indicators that are impossible to obtain with quantitative methods, but whose presence is important in creating an index of regional competitiveness. This primarily implies psychological indicators whose data can be collected only by interview with experts (government experts, representatives of companies that have regional significance, the scientific community). Bearing this in mind, we have measured 78 indicators which are grouped into eight factors of Snowflake model of

regional competitiveness. Taking advantage of a large number of indicators, which are included in eight factors of competitiveness, we succeeded to overcome the problem of a measurement of only economic and social factors. Also, Snowflake model can be applied in any country. It allows measurement of similar indicators if the same indicator does not exist in regions where regional competitiveness is measured. This characteristic of the model gives an advantage because it can be applied in the countries (regions) which does not have the same statistics. On the other hand this characteristic is also its limitation, since errors may occur in the selection of a substitute indicator.

Snowflake model has a several important features: 1) It can be used as a tool of socio-economic analysis of regional competitiveness, because it determines the strengths and the weaknesses on the regional level. 2) In making strategic decisions, it can be used as a tool for strategic planning, keeping in mind the importance of increasing regional competitiveness for a particular country. 3) It informs about the degree of regional competitiveness and quality of life, business conditions, the efficiency of government in the region, etc. Finally, if we say that this model is not unique because it measures a large number of factors and their indicators (in recent years have appeared analyzes that included a number of factors and indicators), then, it is particular because it has a characteristic of graphic (the visual) impression.

References

- [1] Annoni, P., Kozovska, K. (2010). EU Regional Competitiveness Index 2010. European Commission, Joint Research Centre, Institute for the Protection and Security of the Citizen, Luxembourg. DOI 10.2788/88040
- [2] Armington, C., Acs, Z. (2002). The determinants of regional variation in new firm formation, *Regional Studies* 36: 33–45.
- [3] Bristow, G. (2005). Everyone's a 'winner': problematising the discourse of regional competitiveness. *Journal of Economic Geography*, 5: 285-304. DOI: 10.1093/jeg/lbh063
- [4] Camagni, R., Capello, R. (2013). Regional Competitiveness and Territorial Capital: A Conceptual Approach and Empirical Evidence from the European Union, *Regional Studies* 47 (9): 1383–1402.
- [5] Chapain, C. Clifton, N., Comunian, R. (2013). Understanding Creative Regions: Bridging the Gap between Global Discourses and Regional and National Contexts, *Regional Studies* 47(2): 131–134.
- [6] Chapain, C., Comunian, R. (2010). Enabling and inhibiting the creative economy: the role of the local and regional dimensions in England, *Regional Studies* 44(6), 717–734.
- [7] Cho, D. S. (1994). The nine factor model. Reprinted in Cho, D. S, Moon, C. H. From Adam Smith to Michael Porter. *Evolution of Competitiveness Theory. Asia-Pacific Business Series*, 2005 (2): 135–160.
- [8] Cho, D. S., Moon, H. C. (2000). From Adam Smith to Michael Porter: Evolution of Competitiveness Theory. Korea: *Asia-Pacific Business Series*. DOI: 10.1142/9789814401661_0003
- [9] Coase, R. (1937). The Nature of the Firm, *Economica*, 4: 386-405.
- [10] De Vet, JM. Baker, P. Dalgleish, K. Pollock, R., Healy, A. (2004). The competitiveness of places and spaces: A Position Paper, Rotterdam , Leeds, Birmingham, Brussels.

- [11] Dunning, J. H. Bannerman, E., Lundan, S. M. (1998). *Competitiveness and Industrial Policy in Northern Ireland*, Monograph 5, March. Belfast: Northern Ireland Research Council.
- [12] Dzudzek, I., Lindner, P. (2013). *Performing the Creative-Economy Script: Contradicting Urban Rationalities at Work*, *Regional Studies* 2013: 1-16. DOI: 10.1080/00343404.2013.847272
- [13] European Commission (1999). *Sixth Periodic Report on the Social and Economic Situation of Regions in the EU*. Brusel.
- [14] Europin Commision (2003). Ronald L. Martin (edt). *A Study on the Factors of Regional Competitiveness*. Draft final report for The European Commission Directorate-General Regional Policy. Bruselas: Cambridge Econometrics. Ecorys-NEI.
- [15] Freudenberg, M. (2003). *Composite Indicators of Country Performance: A Critical Assessment*. STI working paper, 2003/16: 2–34. DOI: 10.1787/405566708255
- [16] Florida, R. (2002). *The Rise of the Creative Class and How It's Transforming Work, Leisure, Community and Everyday Life*. Basic Books, New York, NY.
- [17] Gardiner, G. Martin, R., Tyler, P. (2004). *Competitiveness, productivity and economic growth across the European regions*, *Regional Studies* 38(9): 1045-1068. DOI: 10.1080/0034340042000292638
- [18] Giovannini, E. Nardo, M. Saisana, M. Saltelli, A. Tarantola, S., Hoffman, A. (2005). *Handbook on Constructing Composite Indicators: Methodology and User Guide*. OECD Statistics Working Paper, STD/DOC OECD publishing. DOI : 10.1787/18152031
- [19] Huovari, J. Kangasharju, A., Alanen, A. (2001). *Constructing an index for regional competitiveness*. Pellervo Economic Research Institute Working Papers, Helsinki, No. 44. DOI: 10.1007/978-3-540-24823-1_7
- [20] Huggins, R. (2003). *Creating a UK Competitiveness Index: Regional and Local Benchmarking*, *Regional Studies*, 37: 89-96. DOI: 10.1080/0034340022000033420
- [21] Imd (2000) *The World Competitiveness Yearbook 2000*, Lausanne.
- [22] Imd (2004) *The World Competitiveness Yearbook 2004*, Lausanne.
- [23] Jansson, J. and Waxell, A. (2011). *Quality and regional competitiveness*, *Environment and Planning*, 43: 2237 –2252.
- [24] Kirchhoff, B. Armington, C. Hasan, I., Newbert, S. (2002). *The influence of R&D expenditures on new firm formation and economic growth* (available at: http://www.njit.edu/old/News/Releases/finalreport_10-02-02.pdf).
- [25] Kitson, M. Martin, R., Tyler, P. (2004) *Regional Competitiveness: An Elusive yet Key Concept?*, *Regional Studies*, 38(9): 991–999. DOI: 10.1080/0034340042000320816
- [26] Kitson, M. Martin, R., Tyler, P. (2008). *The Regional Competitiveness Debate*, Programme on regional innovation, The Cambrigde MIT Institute.
- [27] Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*.
- [28] Krugman, P. (1979). *Increasing Returns, Monopolistic Competition and International Trade*, *Journal of International Economics*, 9(4): 469-479.
- [29] Krugman, P. (1991a). *Increasing Returns and Economic Geography*. *Journal of Political Economy*, 99(3), 483-489.
- [30] Krugman, P. (1991b). *Geography and Trade*, Cambridge, MJT Press: 9–13.

- [31] Krugman, P. (1994). Competitiveness: A Dangerous Obsession. *Foreign Affairs*, 73(2): 28-44.
- [32] Krugman, P. (1996). Making sense of the competitiveness debate. *Oxford Review of Economic Policy*, 12 (3): 17-25. DOI: 10.1093/oxrep/12.3.17
- [33] Lee, S. Florida, R., Acs, Z. (2004). Creativity and Entrepreneurship: A Regional Analysis of New Firm Formation, *Regional Studies*, 38(8): 879–891. DOI: 10.1080/0034340042000280910
- [34] Lengyel, I. (2004). The pyramid model: enhancing regional competitiveness in Hungary. *Acta Oeconomica*, 54 (3): 323–342. DOI: 10.1556/AOecon.54.2004.3.3
- [35] Lucas, R. (1988). On the mechanics of economic development, *Journal of Monetary Economics* 22: 3–42.
- [36] Marshall, A. (1890). *Principles of Economics*, MacMillan, London.
- [37] Martin, R. (2005). *A Study on the Factors of Regional Competitiveness*, A draft final report for the European Commission Directorate-General Regional Policy, European Commission.
- [38] Martin, R. Kitson, M., Tyler, P. (2006). *Regional Competitiveness*. London: Routledge. DOI: 10.1177/00420980070440110905
- [39] Meyer-Stamer, J. (2008). Systematic Competitiveness and Local Economic Development. In Shamin Bodhanya (ed.) *Large Scale Systemic Change: Theories, Modelling and Practices*.
- [40] Myrdal, G. (1957). *Economic Theory and Underdeveloped Regions*, Duckworth, London.
- [41] Oecd (1992). *Programme on technology and the Economy*. (available at: <http://www.oecd.org/dataoecd/3/48/1918259.pdf>)
- [42] Ohlin, B. (1967). *Interregional and International Trade*. Harvard Economic Studies, 39. Cambridge, MA: Harvard University Press.
- [43] Porter, M. (1990). *The competitive advantage of nations*. London: MacMillan Press.
- [44] Powell, T. C. (2001) *Competitive Advantage: Logical and Philosophical Considerations*, *Strategic Management Journal*, 22 (9): 875-888. DOI: 10.1002/smj.173
- [45] Ricardo, D. (1817). *On the Principles of Political Economy and Taxation*.
- [46] Official Gazette of Rs (2009). *Regulation on Nomenclature of Statistical Territorial Units*, No 109/2009 and 46/2010.
- [47] Republic development bureau (2009). *Report on the Development of Serbia for 2008*, Belgrade.
- [48] Royuela, V., García, G. A. (2013). Economic and Social Convergence in Colombia, *Regional Studies* 2013:1-21. DOI: 10.1080/00343404.2012.762086 <http://dx.doi.org/10.1080/00343404.2012.762086>
- [49] Rostow, W. W. (1960). *The Stages of Economic Growth*, Cambridge University Press.
- [50] Rugman, A. M. Moon, H. C., Verbeke, A. (1998). The Generalized Double Diamond Model. Reprinted in Cho, D. S, Moon, C. H. *From Adam Smith to Michael Porter. Evolution of Competitiveness Theory*. Asia-Pacific Business Series, 2005 (2): 111–133.
- [51] Rybczynski, T. M. (1955). Factor Endowment and Relative Commodity Prices. *Economica*, 22 (88): 336–341.
- [52] Saisana, M. Tarantola, S. Schulze, N. Cherchye, L. Moesen, W., Van Puyenbroeck, T. (2005). *Knowledge Economy Indicators. State-of-the- Art Report on Composite Indicators for the Knowledge-based Economy*. Workpackage 5.

- [53] Serbian business registers agency (2014) The Regional Development Measures and Incentives Register, (available at: <http://pretraga2.apr.gov.rs/APRMapePodsticaja/>) update: june 2014.
- [54] Schwab, K., Porter, M. E. (2007). The Global Competitiveness Report 2007-2008. World Economic Forum. Geneva, Switzerland.
- [55] Schumpeter, J. (1911). Theorie der wirtschaftlichen Entwicklung: eine Untersuchung über Unternehmergeinn, Kapital, Kredit, Zins und den Konjunkturzyklus, Duncker & Humblot, Munich and Leipzig.
- [56] Smith, A. (1776). An Inquiry into the Nature and Causes of The Wealth of Nations.
- [57] Snieška, V., Bruneckienė, J. (2009). Measurement of Lithuanian Regions by Regional Competitiveness Index, Engineering economics, 1 (61).
- [58] Statistical Office of the Republic of Serbia (2010). Municipalities in Serbia, 2010. Belgrade.
- [59] Statistical Office of the Republic of Serbia (2011a). Statistical Yearbook of the Republic of Serbia, 2011. Belgrade.
- [60] Statistical Office of the Republic of Serbia (2011b). Scientific research activities in the Republic of Serbia, 2010. Belgrade.
- [61] Statistical Office of the Republic of Serbia (2011c). Municipalities and regions in the Republic of Serbia, 2011. Belgrade.
- [62] Statistical Office of the Republic of Serbia (2012a). Statistical Yearbook of the Republic of Serbia 2012. Belgrade.
- [63] Statistical Office of the Republic of Serbia (2012b). Statistics of waste and waste management in the Republic of Serbia, Belgrade.
- [64] Stolper, W., Samuelson, P. A. (1941). Protection and Real Wages. Review of Economic Studies, 9: 58-73.
- [65] Storey, D. (1994). Understanding the Small Business Sector. Routledge, New York.
- [66] Thompson, W. (1965). A Preface to Urban Economics. Johns Hopkins Press, Baltimore.
- [67] Vukovic D. (2009). Low competitiveness of underdeveloped areas - the "bottleneck" of Serbia. Journal of Geographical institute „Jovan Cvijic Serbian academy of sciences and arts, 59 (2), 189-204. ISSN 0350-7599.
- [68] Vuković, D., Wei, L. (2010). Regional competitiveness: the case of western china. Journal of Geographical institute „Jovan Cvijic“ of Serbian academy of sciences and arts, 60 (1): 107-124. DOI: 911.2/3(51)
- [69] Vuković D., Jovanović A., Đukić. M. (2012). Defining competitiveness through the theories of new economic geography and regional economy. Journal of Geographical institute „Jovan Cvijic“ of Serbian academy of sciences and arts, 62 (3), 49-64. DOI: 10.2298/IJGI1203049V
- [70] Wignaraja, G. Lezama, M., Joiner, D. (2004). Small States in Transition: From Vulnerability to Competitiveness, Commonwealth Secretariat, United Kingdom. DOI: 10.1177/0047287510368139

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