MAPPING OF REGIONAL CLUSTERS IN SERBIA

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Abstract

Ever since Michael E Porter's seminal 2003 article "The Economic Performance of Regions" on the link between clusters, economic development and innovation, many others have emulated and expanded on his analysis using cluster maps and associated statistical techniques. One of the most developed cluster-mapping methodologies is a 3-star analysis of regional clusters, developed by the European Cluster Observatory and universally applied across the countries of the European Union. There are no cluster-mapping analyses of countries in the Western Balkans, however, mostly due to a lack of reliable statistical data at sub-national tiers of government. This paper describes a pioneering attempt to apply the cluster-mapping methodology of the European Cluster Observatory to conditions in the Republic of Serbia and to derive conclusions that would be useful and dependable for academics and policy makers. The research shows three key findings: firstly, 11 cluster categories, largely in the services sector, concentrate in the major cities of Belgrade, Novi Sad and, to some extent, Niš; secondly, a number of cluster categories (13 in total) are insignificant, with low levels of employment and/or a small number of registered companies; and thirdly, the remaining 14 categories are distributed across Serbia.

Keywords: Cluster Mapping, Agglomerations, Regions, Serbia

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INTRODUCTION

The geographic and urban agglomeration of enterprises has attracted the attention of economists for more than a century. The first empirical research was conducted by Alfred Marshall, who used the term *industrial districts* to describe the advantages generated by locating businesses in the same geographical areas (Marshall, 1890).

In the literature, the term *industrial district* is used interchangeably with the term *business clusters*, or simply *clusters*, widely promoted by Michael E Porter, probably the most prominent scholar in this field. At the same time, the term *industrial districts* has continued to be used by a group of (mainly Italian) scholars, led by Giacomo Becattini, one of Italy's most influential and world-renowned social scientists (Paniccia, 2006). This paper will use the term *cluster*. It is important to note that clusters and industrial districts differ from the concept of *urban agglomeration*, which includes companies from various fields located in the same urban area because they are performing similar or interconnected activities (Boja 2011).

Clusters have become a subject of intense research and economic analysis, starting with the study conducted by Michael E. Porter (Porter, 1990) in his book, *The Competitive Advantage of Nations*. Porter defines clusters as *a geographic concentration of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions in particular fields that compete but also cooperate* (Porter 1998, p.197). Sölvell et al (2008) rephrased Porter's definition of clusters as referring to *groups of companies and institutions co-located in a specific geographic region and linked by interdependences in providing a related group of products and/or services*.

Because of the proximity between them - both in terms of geography and of activities - cluster constituents enjoy the economic benefits of several types of positive location-specific externalities, such as access to specialised human resources and suppliers, knowledge spill-over, pressure for higher performance in head-to-head competition, and learning from the close interaction with specialised customers and suppliers (Marshall, 1890; Krugman, 1991; Ketels, 2004; Sölvell et al, 2008).

In the seminal article *The Economic Performance of Regions*, Porter designed a cluster mapping methodology based on examining patterns of employment across geography in different types of industries across the SIC system of classification (Porter 2003). That article has inspired many others to emulate and expand cluster analysis in the area of advancing statistical studies and the creation of so-called cluster maps.

The first analyses in Europe that applied Porter's methodology in cluster mapping was one carried out in Sweden in 2003 (Linqvist et al, 2003; Ketels, 2004). This analysis paved the way for Swedish economists from the Centre for Strategy and Competitiveness at the Stockholm School of Economics to establish the European Cluster Observatory, which designed a methodology and conducted similar analyses across other EU countries (Sölvell et al, 2008; EC DG Enterprise and Industry, 2007).

Cluster-mapping analyses in the countries of the Western Balkans are lacking, however, mostly due to inadequate statistical data at sub-national level. The purpose of this paper is to provide an empirical analysis of concentration patterns of employment and enterprises at different territorial levels within the Republic of Serbia, and as such it represents the first cluster-mapping analysis of any of the countries of the Western Balkans. The analysis employed the cluster-mapping methodology that was developed by the European Cluster Observatory, modifying it to suit the conditions particular to the Republic of Serbia.

Geographic focus in this paper interchangeably refers to the level of administrative districts and to the local (city and municipal) level.

CLUSTER-MAPPING METHODOLOGY

In the article *The Economic Performance of Regions* it is examined three differing types of industries that constitute a regional economy (Porter 2003). The first type of industry in regional economies is *local industries*, where employment is evenly distributed across all regions (employment is roughly proportional to regional population). A second type of industry is *resource dependent industries*, where employment is located primarily where the needed natural resources are found. The third type of industries in regional economies is *traded industries*, which are not resource dependent. These industries locate in a particular region based not on resources but on broader competitive considerations, and employment concentration varies markedly by region.

Within this article Porter utilised the distribution of employment by industry to separate industries within three differing groups, utilising three measures of the variation of industry employment across geography to separate industries: (i) the share of national employment for all states with LQ ≥ 1; (ii) the mean location quotient (LQ) for the top five states ranked by LQ; and (iii) the employment GINI coefficient. After examining the pattern of employment across geography in many industries, cut-offs were established for each variable: employment in states with LQ ≥ 1 of ≥ 50% of total employment; mean LQ of the top five states ≥ 2; and employment GINI of 0.3 (Porter, 2003).

Table 1: The Thirty-eight Cluster Categories of the European Cluster Observatory

Cluster Category	Cluster Category	Cluster Category
Aerospace	Entertainment	Medical Devices
Agricultural Products	Financial Services	Metal Manufacturing
Analytical Instruments	Fishing and Fishing Products	Oil and Gas Products and Services
Apparel	Footwear	Plastics
Automotive	Forest Products	Power Generation and Transmission
Biopharmaceuticals	Furniture	Processed Food
Building Fixtures, Equipment and Service	Heavy Machinery	Production Technology
Business Services	Heavy Construction Services	Publishing and Printing
Construction Materials	Hospitality and Tourism	Sporting, Recreational and Children's Goods
Chemical Products	Information Technology	Textiles
Communications Equipment	Jewellery and Precious Metals	Tobacco
Distribution Services	Leather Products	Transportation and Logistics
Education and Knowledge Creation	Lighting and Electrical Equipment	

Source: Sölvell et al, 2008, p.108

The European Cluster Observatory developed a methodology is based on the above described Porter's approach. The Observatory measures the concentration of employment within 38 cluster categories (presented in the table 1). Cluster categories are specific groups of industries that tend to locate in the same places (EC DG Enterprise and Industry, 2007, p.7). The categories are built by combining one or several 4-digit industries, independent of which 3-digit industry they belong to. The Observatory methodology focuses on mapping so-

called regional clusters, where regions are equal to the NUTS 2 regions of the European Union. A *regional cluster* is defined as the phenomenon in which *employment in a given region in a particular cluster category meets cut-off criteria in terms of share of cluster sector employment, share of regional employment, and specialisation* (EC DG Enterprise and Industry, 2007, p.10).

Regional cluster concentrations by the Observatory methodology are measured in three dimensions (Sölvell et al, 2008): (i) size - absolute number of employees (>10,000 jobs is the standard benchmark for a regional cluster), (ii) degree of specialisation (regional sector employment is at least two times expected levels) and degree of regional market labour dominance (>3 per cent of total employment in a particular sector). Each of these three measures of cluster size, specialisation and labour market dominance are accredited with a *star*. The largest and most specialised clusters receive three stars.

The approach to the mapping of clusters in the Republic of Serbia was based on the conceptual framework of the methodology developed by the European Cluster Observatory, involving the analysis of agglomeration within these 38 sectors. However, in order to meet the needs and conditions of the Republic of Serbia, it was necessary to modify the methodology yet the applied changes limited possibility for compare the findings with other countries. Therefore, the applied methodology rather serves the needs of inter-regional comparison within Serbia than the comparison between Serbian and other EU regions.

As noted above, the European Cluster Observatory only uses employment data to evaluate the strength of regional clusters. Serbia is a transitional economy which still has a significant number of non-privatised large socially-owned enterprises, from which many employees have been laid off but are nevertheless registered as employed. Moreover, in some sectors (e.g. automotive, biopharmaceuticals, heavy machinery, jewellery and precious metals, oil and gas products and services, etc), a single company accounts for the entire employment in a sector in an observed geographical area (especially at district level) and therefore cannot be considered as clusters since they are incompatible with the accepted definition. Furthermore, employment statistics per sector are generally inaccurate since there is no reliable system of employment data collection.

As a compromise, in addition to employment data, the analysis of Serbia included data on enterprises (company demographics), with each cluster graded in the same manner and with the same implications as apply to employment data. Rationale for including company data was based on the assumption that companies are registered and operate in a sector they have a comparative advantage in within a given geographical area. Company data therefore provides a better basis than employment data for calculating cluster scores for the geographic agglomerations of Serbian industry and services. Furthermore, company data is relatively reliable since the Serbian Business Registers Agency keeps a single registry of all commercial entities in Serbia. For that reason, the herewith-presented analysis took both the data on the number of employees and the data on the number of enterprises into account.

The second significant methodological change was in the definition of a threshold for size, dominance and specialisation, since the figures applied by the European Cluster Observatory were excessively high for Serbian conditions. In the case of Serbia, clusters were classified with a star for criteria on size if employment or the number of companies in a regional cluster represented more than 7%[2] of national employment or the total number of companies in the sector concerned. The same cut-off of 7% was also applied in the case of

[2] The cut-off criteria of 7% was used in cluster-mapping exercise in Turkey, on which basis policy makers in Serbia decided to use the same figure.

dominance. For specialisation, meanwhile, a cluster was awarded a star if the regional specialisation ratio in the respective sector exceeded the national one.

In geographical terms, the analysis focused on administrative districts and on local levels (cities and municipalities). Given that Kosovo is governed under the United Nations' Security Council Resolution 1244, however, there was a constraint in accessing the necessary data and therefore this region and its five administrative districts were excluded from the cluster-mapping analysis.

At the time of this analysis, Serbia used NACE, Rev. 1 as a basis for classification of enterprises modified for Serbian conditions, which was consistent with UN ISIC, Rev 3. However, the analysis by the European Cluster Observatory principally uses NACE, Rev. 2. In 2010, Serbia adopted a new system for classification of enterprises that complies with current EU standards.

DATA

Data was collected from two different sources: (i) the Serbian Business Registers Agency, which supplied the complete business registry for December 2009, and (ii) the Republic Institute for Health Insurance, which supplied information on the number of employees per company as at February 2010. The data on employment included only officially registered employees, not those employed in the grey sector.

These two sources were merged into a single data set with information on 337,000 companies and entrepreneurs, and 1.2 million employees. Companies in liquidation or bankruptcy were purged from the dataset.

Although the dataset include some data on Kosovo, this was insufficient to reach any valid conclusions.

LIMITATIONS TO THE ANALYSIS

There are many limitations that may affect the results of the cluster mapping. However, the following three limitations are identified as being the most important. Firstly, employees working in branch offices of an enterprise are registered at the headquarters of the enterprise, regardless of their actual place of employment. This weakness particularly pertains to large companies with activities spread out over Serbia (banks and insurance companies, public enterprises, oil/gas and energy companies, etc).

The second limitation relates to the dependency of the analysis on the accuracy of the classification of these companies. According to the business registry law, companies have to choose a main classification code in which their business operates. Nevertheless, companies may be registered under one classification code and then operate and supply goods or services that relate to another.

The applied methodological changes have limited the comparability of the results with other EU regions, which presents the third important limitation of this analysis.

The analysis presents only a statistical mapping of the geographic concentration of employment and companies per cluster sectors. Lack of financial data has limited the analysis in terms of determining the economic strength of the identified clusters.

KEY FINDINGS

The data, which is analysed by sector in Appendix A (Maps & Analysis) using geographical mapping, allows us to make the following three key observations:

First conclusion: Belgrade, Novi Sad and occasionally Niš, are dominant in those cluster categories that are typically considered as service industries. These categories comprise: Business Services; Communication and Equipment; Distribution Services; Education and Knowledge Creation; Entertainment; Financial Services; Hospitality and Tourism; Information Technology; Publishing and Printing; Sporting, Recreational and Children's Goods; and Transportation and Logistics: in total, 11 cluster categories.

Second conclusion: A number of cluster categories are insignificant in Serbia with low levels of employment and/or a small number of registered companies, e.g. Aerospace; Analytical Instruments; Automotive Components; Fishing and Fishing Products; Footwear; Heavy Machinery; Jewellery and Precious Metals; Leather Products; Medical Devices; Oil and Gas Products and Services; Power Generation and Transmission; Textiles; and Tobacco. Each of these 13 cluster categories accounts for less than 1,000 companies.

Third conclusion: The remaining 14 categories are characterised by a greater concentration in Serbian districts and cities outside Belgrade, Novi Sad and Niš. These cluster categories include: Agricultural Products; Apparel; Biopharmaceuticals; Building Fixtures, Equipment and Services; Chemical Products; Construction Materials; Forest Products; Furniture; Heavy Construction Services; Lighting and Electrical Equipment; Metal Manufacturing; Plastics and Rubber; Processed Food; and Production Technology.

CONCLUSION

Agglomerations and concentrations of firms and employment have been researched for more than a century. In the last two decades, research in this field has intensified among academics and policy makers as clusters have become widely recognised as a valuable tool in fostering economic development. In that regard, many methodologies and tools have been developed in order to better understand the benefits and possible constraints of the agglomeration of economic activities per sector.

Cluster mapping is the methodology first developed by Michael Porter and subsequently further advanced by the European Cluster Observatory. The methodology is based on the observation of the employment distribution within 38 cluster categories in NUTS 2 regions of the European Union. In order to obtain reliable and robust results, the employment statistics need to be complete and accurate, which is the main obstacle in applying this methodology to transitional and developing countries.

Employment statistics from the Republic of Serbia are not reliable since there are no institutional mechanisms that can accurately determine how many employees are in Serbia at any given moment. Moreover, the high level of grey employment distorts the official statistics. A solution was found in using the concentration of companies in addition of employment since these statistics are significantly more reliable. Nevertheless, using companies as a subject of analysis also has its shortcomings, mostly due to the methodological issues concerning their classification per sector.

This paper describes a pioneering attempt to adapt the standard cluster mapping methodology to the conditions extant in the Republic of Serbia and to draw conclusions that are useful and reliable for academics and policy makers. However, there is a need to extend this research in several respects. Firstly, the research should be extended to the geographic coverage of the NUTS 2 planning regions as established by the Law on Regional Development of the Republic of Serbia. Secondly, in 2010, Serbia adopted a new system for

the classification of companies based on NACE Rev 2, which is consistent with current EU standards. Thirdly, the European Cluster Observatory has recently increased the number of defined cluster categories from 38 to 42, which should also be taken into account in any future research. The findings of this analysis also need to be verified with qualitative research to be conducted at the district and municipal level.

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