

THE IMPACT OF CLUSTERS ON REGIONAL COMPETITIVENESS

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ABSTRACT

Cluster development is one of determinants used in the regional competitiveness that are related to the presence of competitive local suppliers and competitive local industries in the regional economy. The correlation analysis permits to conclude that regions, which are more competitive, have more developed clusters and regions with more developed clusters are more competitive. However, the comparison between competitiveness and cluster development of particular regions reveal that the impact of clusters on competitiveness can differ across regions and countries, thus creating challenges for policy makers. The paper focuses on the evaluation of the clusters' approach in promoting regional productivity, innovation and economic growth leading to increased competitiveness, yet arguing that the targeted cluster development can foster structural change leading to improved economic performance, as well as welfare.

KEYWORDS: *regional competitiveness, regional economy, clusters.*

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Introduction

In economically developed countries, cluster policy is a priority of the national industrial policy, while research in the field of economic clustering is about the challenges of the cluster life cycle, their competitiveness and further development trends. The economy of the U.S. as well as the Europe's developed economies are clustered, i.e., clusters have become structures of the national economy and instruments for improving regional competitiveness. This research work empirically approves the impact of clusters on regional competitiveness at global level based on the correlation analysis of data given in the World Competitiveness Forum Global Competitiveness Report.

Problem. In transition economies, including Latvia, clustering practices are sufficiently new and economic policy makers and civil servants in many cases are not familiar with the cluster approach, as well as its possible benefits for economic development and regional competitiveness. This research may provide additional insights into clusters' impact on regional competitiveness and indicate the necessity for restructuring of industrial policies, as well as prioritizing industries, which have cluster development potential.

Purpose. The purpose of this paper is to research the impact of clusters on regional competitiveness at global and European levels.

Object: clusters and regional competitiveness.

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Tasks:

- To analyse the cluster concept's development and present its practical application possibilities, namely the *Location Quotient* (LQ), for cluster mapping and evaluation of regional, as well as sectoral concentration of enterprises and/or labour.
- To evaluate the relation between regional competitiveness and cluster development taking into account development stages of regions, by applying the correlation analysis based on the World Economic Forum data.
- To perform empirical analysis about the impact of cluster development on competitiveness of individual regions in different stages of development.
- Based on the research to draw conclusions, which could be useful for national and/or regional policy makers.

Methods. The main methods used in this research are literature analysis, statistical analysis, correlation analysis, and comparative analysis.

1. The concept of cluster and its practical application

The idea about business networking started already more than 120 years ago, in the beginning of industrial revolution. Economist Alfred Marshall (1890) wrote about concentration of specialized groups of industry in particular localities or the "localization of industry" (Marshall, 1890: 329) noting the effects of specialization in new industrial areas of England, which served as basis for his famous comment – 'industry secrets are in the air'.

During the 1990s, when more extensive discussions on the nature of clusters started, researchers D. Jacobs and A. P. de Man (1996: 425–437) made an argument that the concept of clusters is not defined and, thus, they were using the main dimensions of the cluster definition of M. Porter to further define the cluster. They were the following:

- 1) geographical or spatial clasterisation of economic activity;
- 2) horizontal and vertical relationships between cluster participants;
- 3) use of similar technologies;
- 4) the presence of the central *player* (e.g., large company, research centre, etc.);
- 5) quality of business cooperation or network. (Jacobs, De Man, 1996: 425–437)

However, in the theory developed by D. Jacob and A. P. de Man the role of a central *player* was determined as the most crucial.

The determining criteria of a cluster were further extended by S. A. Rosenfeld (1997: 3–23) including the size of the cluster, the economic or strategic significance of the cluster, the range of products or services, and similar investments (technology, labour, etc.). However, this scientist did not encourage the definition of the cluster to take into account the size or employment factor of related industries, stressing that many efficient clusters are located in small interconnected industries where there may be no significant concentration of labour. According to S. A. Rosenfeld's definition a cluster is "concentration of geographically related, similar, related or complementary undertakings with assets for business transaction, communication and dialogue channels that jointly use specialised infrastructure, labour market and services, and are exposed to similar threats and benefit from the use of similar opportunities (Rosenfeld, 1997: 3–23). Therefore, this definition clearly indicates that cooperation and social relations between enterprises are essential for the identification of clusters. This definition stresses the joint use of specialized infrastructure as a precondition for clusters' development.

Discussing the concept of a cluster it is also possible to apply the form of a definition offered by the Swedish project "The Cluster Policies Whitebook" (2004: 13). Researchers of this project, recognizing the objective multiplicity of the concept, offer not to formulate it, but specify the key elements of which the con-

cept of *cluster* can be identified. Opposite to M. E. Porter, they offer a broader list of such elements, adding the desired signs of a cluster: 1) specialization – the type of core activity that defines cluster formation; 2) competition and co-operation – this combination describes the link between cluster members; 3) clusters' life cycle – clusters and cluster initiatives are not temporary phenomena; 4) innovation – cluster participants are involved in the process of technological, commercial and knowledge sharing.

In synthesizing the concept development given by M. E. Porter (2008: 213–304) and other researchers, and based on comparative analysis of economic interaction forms, the concept of 'cluster' in the form of a schematic model may be established.

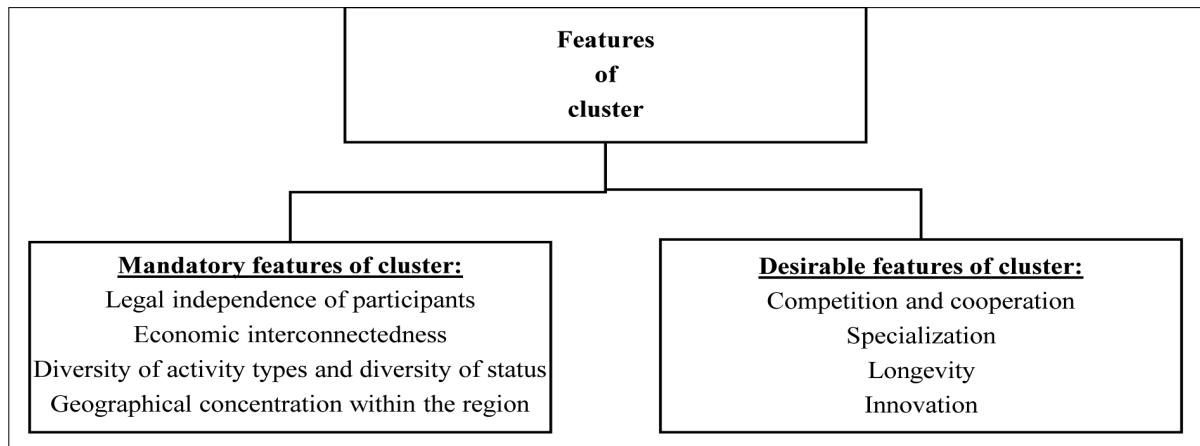


Fig. 1. Conceptual model of the concept of cluster in regional economy

Source: composed by the author.

Research on cluster evolution or life cycle provides evidence that clusters' development is quite slow and during this process they go through different phases of evolution. The cluster life cycle can last many years and even several decades. In turn, as a result of a targeted and active activity, clusters can develop much faster and their development potential may be much higher. Taking into account the important role of innovation in the development of knowledge economy, "clusters of innovation" have become very popular in industrialized countries. It has been argued that the cluster concept captures all the important dimensions of modern innovation process (OECD, 2001: 25). It should be noted that clusters are dynamic systems which, according to R. Martini and P. Sanlay (2006: 395–437), can periodically be located in different phases of evolution, i.e., at the level of development or beginning (when business is started), at the level of growth or maturity (stabilisation), and at the level of recession or rebirth (reorientation) depending on cluster's enterprises ability to change, follow the time, be innovative and creative. In turn, post-recession levels are followed by the level of archivism when the cluster practically terminates its active life.

The concept of a cluster life cycle has evolved in the context of the life cycle and industrial life cycle of a product. Individual researchers (Brenner, 2008: 146–162) have tried to draw parallels between a cluster life cycle and an industry life cycle, arguing that there are relationships between a certain industry business cycle and a cluster of this industry. Usually, a cluster is created at the beginning of the industrial life cycle and is developed simultaneously with the development of the related product market. Clearly, if the industry has reached a maturity stage, markets are saturated and highly competitive, then the cluster typically stabilizes and shows only a small dynamic. At the same time, it should be taken into account that the life cycles of clusters and industries are evolving differently during their periods of life, and therefore only individual relationships can be identified and cannot be fully compared (Menzel, Fornahl, 2007).

For example, according to R. Martin and P. Sanlay (2011: 1299–1319), the following cluster life cycle scenarios are possible:

- The full adaptive cycle of the cluster: creating, developing, declining, and replacing a cluster with a new cluster, followed by a new full adaptive cycle of the cluster. The new cluster is likely to develop with resources and developments from the old cluster.
- Permanent cluster formation: cluster creation, growth and persistent structural and technological changes. This cluster constantly adapts and develops, possibly by developing new related or supportive activities. Such clusters are generally very flexible, adapting quickly to technological change and possibly linked to industries whose technologies have a general character.
- Cluster stabilisation: creation, growth and maturity of the cluster. The cluster is likely to remain in this stage of development for a longer period of time before moving into the stage of further evolution. Although the phase of recession is also possible during the phase of maturity, companies are ensuring continued growth by improving their products or focusing on the niche markets or prestigious market segments. However, downturns at any point in such a cluster are possible.
- Reorientation of the cluster – reaching the stage of maturity or the beginning of recession – undertakes their activities and technology changes, thereby ensuring a rebirth or creating a new cluster. The functioning of such a cluster is considered very effective, perhaps a key role in this process is played by the most innovative cluster companies.
- Cluster failure: the cluster may be created but unable to develop and have target orientated activity. This situation is usually possible if the market share of a cluster is not large enough, and if the level of innovation in companies is very low, the level of development of new companies is low and companies are unable to operate in a long-lasting way.
- Cluster disappearance: cluster develops, reaches maturity, runs through recession and disappears, changes or replaces a cluster with a new cluster. Such a cluster life cycle is considered a classic trajectory of cluster evolution. Unfortunately, in this case, the legacy resources and competencies of the cluster are not sufficient or do not meet the requirements for creating a new cluster.

The characteristics of the cluster life cycle are closely linked to regional policy and competitiveness. For example, clusters include related industries that are important for the rise of regional competitiveness. These may include specialised suppliers of manufacturing ingredients, production facilities, services and providers of specific infrastructure services. Clusters typically consist of products of certain channels and consumer by-products, and complementary products, as well as similar skills, technology or other related to total investments or raw materials. Many cluster organisations also include public administration, i.e., government institutions, as well as higher education and research institutions, agencies, “brain centres”, vocational education training institutions, business support organisations, etc., that provide vocational training, education, information, research opportunities and technical support. Companies creating such synergies, do not only compete but also cooperate for common interest, each representing clusters’ life-development cycles in their activities. Cooperation may exist even in the context of intense competition, as these interrelated companies will, in turn, be linked to a different target group on the customer market and will cooperate with other partners in developing the product.

Since 1990s, according to developed methodologies there are ongoing attempts to identify the potential for cluster formation and development. According to researcher Johanna Möhring (OECD, 2005) and her colleagues the most appropriate method for analysing and identifying clusters in the Central and Eastern European countries (Slovenia, Slovakia, Poland, Hungary, the Czech Republic) has been the *Location Quotient* (LQ). The LQ is calculated by using the available NACE data for capturing regional concentration of enterprises or labour. Their research also includes qualitative research methods, such as analysis, surveys, expert interviews, etc. However, it should be also recognized that the LQ method has some shortages too. For example, in Europe, mostly there are used the NACE data on 2-digit level, while in USA, the 4-digit level data are available. Also, the LQ doesn’t take into account such important factors as export and innovation capacity of enterprises, product life cycle, etc. Therefore, it can be concluded that the cluster analysis methodology is still underdeveloped.

According to the *LQ* method used by the OECD (2005), the *LQ* is defined according to the formula (Indiana's Workforce and Economy, 2006):

$$LQ = (E_{ij} / E_i) / (E_{kj} / E_s), \quad (1.1.)$$

where E_{ij} – number of enterprises or employed in the industry j and the region i ;

E_i – total number of enterprises or employed of the region i ;

E_{kj} – total number of enterprises or employed in the industry of the country;

E_s – total number of enterprises or employed in the country.

As regards cluster formation in the region, according to *LQ* it should be $LQ > 1.25$. Yet in order to assess whether business/workforce localisation in a given region is indeed a cluster, additional analysis of different indicators, such as growth and wages, etc., should be carried out, which should be proportionally higher in the cluster than in the industry as a whole, as well as analysis of the commitments between cluster participants. Nevertheless, the *LQ* method is the most widely used approach for identifying clusters in Europe and also in the Northern America.

The same methodology has been applied by the European Cluster Observatory (ECO). For example, ECO has identified that there are 11 sectoral or industrial clusters of European significance in Latvia, as well as other industries with the cluster development potential (European Commission, 2016).

Research on clusters provides a solid basis for performing the cluster mapping at national and regional levels to evaluate the significance of industrial concentration for economic development leading to the increased growth and welfare. In this respect, cluster research could be an option in prioritizing particular industries, which have European, national or regional level development perspective and use targeted approach for supporting the development of these industries.

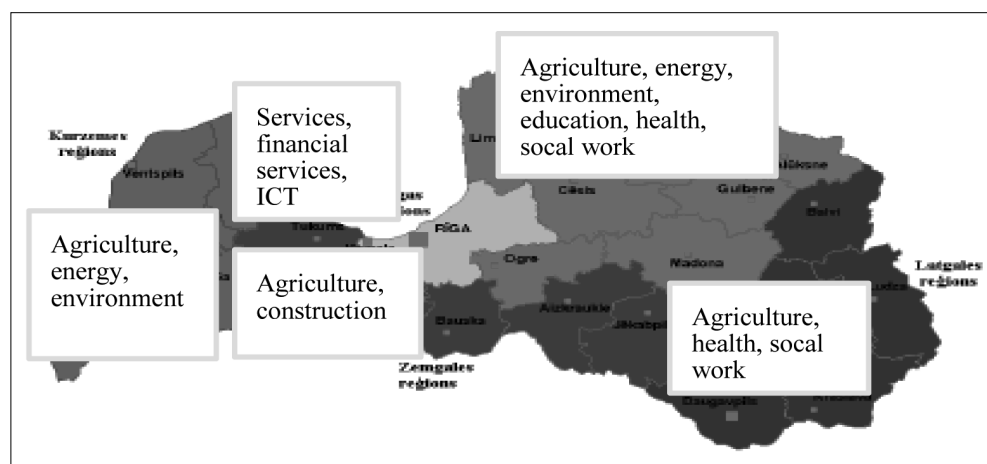


Fig. 2. Regional specialization according to the labour concentration in the regions of Latvia

Source: Journal of Social Sciences (2010: 77–97).

Taking into account that cluster research has never been done on the author together with Dr. V. Boronenko (2010: 77–97) from Daugavpils University has used the *LQ* approach to perform cluster mapping on a basis on the five Latvian regions (Riga and Pieriga regions were united into one region) and using the NACE-2 level labour market data. This approach has provided an opportunity to identify economic sectors with cluster formation potential or evaluate labour concentration trends across the sectors of economic activity on the regional scale in Latvia, which is the basis for regional specialization.

2. The interaction between clusters and competitiveness

The concept of the regional economy had been developing parallel to evolvement of the regional development theory, which led to acknowledging the importance of cities and regions or territories. In the light of a debt crisis of the late 1980s and the early 1990s, as well as increasing globalization, the success factors behind achieving the economic development became even more significant and led to applying new approaches when attracting resources necessary for development, such as turning regional comparative advantages into competitive advantages, thus resulting in a new development stage of a territory – competitiveness.

The most well-known organizations working on the competitiveness research are the World Economic Forum (WEF) and the World Competitiveness Research Centre of the Swiss International Management Development Centre (IMD WCRC). Also, the European Commission (EC) has published the EU Regional Competitiveness Index (RCI) results on 2011 and 2014 and it has been built according to approach of the Global Competitiveness Index (WEF). This is the first composite indicator which measures territorial competitiveness of the 27 EU Member States on NUTS 2 level (European Commission, 2017). The definitions of competition proposed by the three above mentioned organizations are as follows:

- WEF (2006: 36): competitiveness is a combination of institutions, policies and factors, which determine the productivity level of a territory, which, in turn, determines the welfare level adequate for the economic development.
- IMD WCRC (2005: 34): regional competitiveness is a part of the economic theory, which analyses factors and policy instruments that influence the ability of a region to create and support the favourable environment and provide possibilities for enterprises to create added value, whereas for inhabitants – to achieve welfare.
- EC (2017: 2): regional competitiveness is the ability of a region to ensure attractive and sustainable life and work environment for enterprises and inhabitants.

The authors consider that competition advantage of regional stakeholders is the desired result of competitiveness, not a factor. This approach is based on the thesis of the Harvard University professor Michael Porter (1998: 171) on developing new guidelines of a new regional competitiveness concept: “The new theory must give answers to the following questions: why do one companies working in certain countries be able to innovate more than others and why some countries provide a business environment that gives companies the opportunity to improve and develop their activities faster than their foreign competitors?” (Porter, 1998: 171).

According to professor Michael Porter (1990: 8), there are four main determinants, which serve as a basis of regional competitive advantages or environment that is created and sustained by each region:

- Production factors determine the position of a region in relation to such production factors as qualified labour force and infrastructure, which is necessary to stand against forces of competition in a particular sector.
- Demand factors of the regional market are related to products and services of a particular sector.
- Related and supportive industries – competitive sectors (enterprises) on the global market and presence of suppliers or related industries in the region – include also the presence of business clusters.
- Strategy, structure and competition – regional conditions for the emergence of stakeholders, stakeholders’ organizations and management, as well as internal competition.

These factors determine the creation of a business environment for regional stakeholders. Each of the aforementioned determinants is typical for a particular region and their combination provides important preconditions for global competitiveness of regional enterprises.

The competitiveness and competitive advantages are important concepts for the economic development and growth because they are firmly tied with the strategies and management of cities and regions (territories) for improving their inhabitants’ welfare (Anderson, 1999).

The WEF Global Competitiveness Report uses the empirical indicator – State of Cluster Development – to award regions with cluster development rankings on the scale of 1 to 7, i.e., from the stage ‘no clusters’ to ‘clusters are created by numerous sectors’.

To evaluate the relation between regional competitiveness and cluster development the author has to follow the defined algorithm:

- It is necessary to define the shape, mathematical direction and strength of the correlation between cluster development and competitiveness of regions’ which are included in the global competitiveness ratings in 2015, 2016 and 2017, by calculating the correlation coefficient between the rankings of the competitiveness index and cluster development status indicators.
- The correlation force referred to in the 1st paragraph must be analysed according to the groups of regions located at different stages of competitiveness, i.e., the stage of production factors, the stage of efficiency and the innovation stage, with an objective to identify at which stage of competitiveness the relationship is stronger and more significant. Technically, it is done by calculating the correlation coefficient of rankings, previously dividing the array of data into three groups corresponding to the regional development stages.
- The correlation referred in the 1st paragraph above must be evaluated according to the groups of regions of the European Union divided according to their stages of competitiveness, with an objective to understand significance and strengths of the relationship between competitiveness and cluster development.

The implementation of the above algorithm allows proving the impact of clusters on regional competitiveness. For this purpose, each region’s rankings by cluster development status indicator and after the competitiveness index, as well as the competitiveness stage and affiliation of each region, were analysed using the SPSS program.

Firstly, in order to capture the interaction between regional competitiveness and cluster development the correlation analysis was performed using the Global Competitiveness Index rankings of the regions and rankings of the cluster development status of the same regions.

The correlation diagram in Figure 3 shows the Global Competitiveness Index rankings of the regions on the vertical axis and rankings of the cluster development status on the horizontal axis.

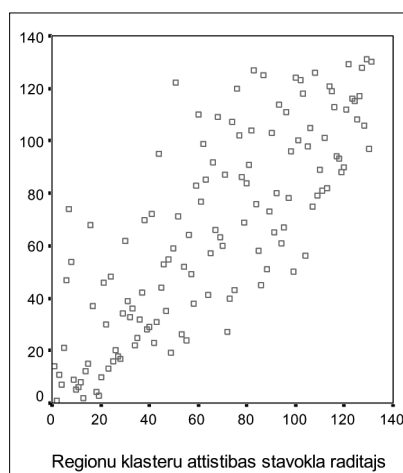


Fig. 3. Example: correlation diagram of rankings, 2017, $n = 137$

Source: the author’s calculation according to “The Global Competitiveness Report” (Schwab, 2018: 42–315).

Similar correlation analysis was performed for three consecutive years (2015, 2016 and 2017), and the results were quite similar. Figure 3 provides an example of the correlation analysis of 2017 showing that re-

gional competitiveness and cluster development were intertwined with linear direct correlation, i.e., clusters were better developed in regions with higher competitiveness, or vice versa, regions with better developed clusters were also more competitive. The linear nature of the relationship means that by increasing competitiveness of the region, the development level of clusters, increased arithmetically proportionally (Krstins, 2003: 218–225). Conversely, because of the development of regional clusters, their competitiveness increased proportionally.

Further, the correlation coefficient of the Spearman rankings determines the strength of the correlation relationship that is not dependent on the mathematical – direct or inverse of the relationship – and is determined by the absolute value of the correlation coefficient. The absolute value of the maximum possible correlation coefficient is $r = 1,000$, a minimum of $r = 0,000$. The correlation coefficient for Spearman rankings was chosen because both variables belong to the ranking scale because the analysis takes the absolute values of the index of competitiveness and cluster development status, but their rankings.

Table 1. Correlation between regional Global Competitiveness Index (GCI) and Cluster Development Status (CDS) indicator rankings, Spearman's rank correlation coefficient, 2015-2017

Indicators		2015		2016		2017	
		GCI	CDS	GCI	CDS	GCI	CDS
GCI	Spearman's rank correlation coefficient	1.000	0.744**²	1.000	0.760**	1.000	0.735**
	Reciprocal significance	0.000		0.000		0.000	
	Number of regions	140		138		137	
CDS	Spearman's rank correlation coefficient	0.744**	1.000	0.760**	1.000	0.735**	1.000
	Reciprocal significance	0.000		0.000		0.000	
	Number of regions	140		138		137	

Source: the author's calculations according to K. Schwab (2015: 91–373, 2016: 93–369, 2017: 42–315).

According to the calculations, it can be concluded that in all the ratings to be analysed, the correlation between the two variables is tight or moderately tight – in 2015, the correlation coefficient was 0,744, in 2016 – 0,760, and in 2017 — 0,735, as well as very significant, as the correlation coefficient in all cases achieves a level of statistical significance $p \leq 0,01$ (see Table 1). In all three periods (2015, 2016, 2017), the relationship is positive, it means that the higher the region's competitiveness index, the greater the indicator of development status for the region, or vice versa. Taking into account that the Spearman's rank correlation coefficient does not indicate the “logical”³ direction of this relationship, i.e., does not indicate which variable has the determining role and which one the resulting role, then we can conclude that the nature of the impact of clusters on regional competitiveness depends on the competitiveness stage of this region. In turn, the result of the correlation analysis is the quantitative measurement of this effect.

It is possible that, depending on the stage of development of the region, the correlation between its competitiveness and cluster development may vary widely. This can be verified by dividing the array of data into groups according to competitive stages and calculating the correlation coefficient of Spearman rankings between the competitiveness of regions and the development of clusters within each group.

² **Correlation is significant at the level of 0,01 reciprocal statistical significance.

³ The term offered by the author to distinguish between two directions principally different by their character: “logical” and “mathematical”, which are always analysed at the same time during the correlation analysis.

Table 2. Correlation between the regional GCI and CDS rankings in each of the competitiveness stages, Spearman's rank correlation coefficient, 2015-2017

Stage of competitiveness	2015, <i>n</i> = 140	2016, <i>n</i> = 138	2017, <i>n</i> = 137
Production factors' stage	+0.465** ⁴	+0.525**	+0.396*
Efficiency stage	+0.419* ⁵	+0.443*	+0.452*
Innovation stage	+0.761**	+0.716**	+0.727**

Source: the author's calculations according to K. Schwab (2015: 91–373, 2016: 93–369, 2017: 42–315)

According to the calculations, it can be concluded that, at the stage of innovation, the correlation between the regional competitiveness index and the cluster development status indicator is close and very significant (in 2015, $r = 0.761$, $p = 0.000$, 2016 $r = 0.716$, $p = 0.000$; in 2017, $r = 0.727$, $p = 0.000$) (see Table 2). However, in other competitiveness stages – the stage of production factors and the efficiency stage – the correlation between regional competitiveness index and cluster development status is moderate and less significant.

The average rankings of both the regional competitiveness index and the cluster development status indicator vary significantly in each stage of competitiveness, but the correlation between these two variables exists at all stages, although at the stage of innovation it is considerably stronger and goes along with the theoretical assumptions that specialized factors, including clusters, have the biggest impact on regional competitiveness – by 30 % (innovation stage), compared with 10 % in efficiency and 5 % in the production factor stage.

Therefore, in relation to the production factor and efficiency stages, it can be concluded that the higher the level of competitiveness of the region, the higher the level of development of clusters is achieved by the regional economy. Conversely, if the competitiveness of the region is lower that the development of clusters of this particular region is worse. In turn, the results of the innovation stage analysis show that if the level of development of clusters is higher, then also competitiveness of this region is greater. Therefore, the contribution of clusters to regional competitiveness is greater at the stage of innovation of a particular region.

Taking into account that this research is focusing on the regional competitiveness within the EU, the next stage of research is devoted to comparing the regional GCI to the CDS rankings between the EU and non-EU countries.

Table 3. Correlation between the regional GCI and CDS between EU member states and non-EU countries, Spearman's rank correlation coefficient, 2015–2017

EU or non-EU countries	Spearman's rank correlation coefficient, <i>r</i>	Statistical significance, <i>p</i>	Number of countries, <i>n</i>
2015, <i>n</i> = 140			
EU countries	+0.793**⁶	0.000	28
Non-EU countries	+0.688**	0.000	112
2016, <i>n</i> = 138			
EU countries	+0.793**	0.000	28
Non-EU countries	+0.721**	0.000	110
2017, <i>n</i> = 137			
EU countries	+0.866**	0.000	28
Non-EU countries	+0.678**	0.000	109

Source: the author's calculations according to K. Schwab (2015: 91–373, 2016: 93–369, 2017: 42–315).

The results of correlation analysis summarized in Table 3 show that, while a close and statistically significant correlation between the regional global competitiveness index and cluster development status rankings is observed for both the EU countries and other countries in the world, it is still stronger for the EU countries

⁴ **Correlation is significant at the level of 0.01 reciprocal statistical significance.

⁵ *Correlation is significant at the level of 0.05 reciprocal statistical significance.

⁶ **Correlation is significant at the level of 0.01 reciprocal statistical significance.

in all three years (2015, 2016, 2017) of this study. It can be assumed that the linkage of the global competitiveness and cluster development is a “European transformation”, which is more typical of the EU than the whole world. This assumption may be tested by a partial correlation method verifying possible impacts of the competitiveness stages of regions on the variable correlation of research subjects (see Table 4).

According to the “clean” (without stages of competitiveness) correlative relationships between the regions’ GCI and CDS rankings, the closest linkage between the global competitiveness of the regions and the development state of clusters are indeed more typical for the EU countries, although it is also typical for the whole world.

Table 4. Partial correlation⁷ between the regional GCI and CDS between EU Member States and non-EU countries, Spearman’s rank correlation coefficient, 2015–2017

EU or non-EU countries	Spearman’s rank correlation coefficient, <i>r</i>	Statistical significance, <i>p</i>	Number of countries, <i>n</i>
2015, <i>n</i> = 140			
EU countries	+0.750	0.000	28
Non-EU countries	+0.525	0.000	112
2016, <i>n</i> = 138			
EU countries	+0.734	0.000	28
Non-EU countries	+0.556	0.000	110
2017, <i>n</i> = 137			
EU countries	+0.832	0.000	28
Non-EU countries	+0.529	0.000	109

Source: the author’s calculations according to K. Schwab (2015: 91–373, 2016: 93–369, 2017: 42–315).

3. The impact of clusters on regional competitiveness

The fact that the process of globalization has been influenced by a principled change in regional competitiveness determinants can be illustrated by data from the Global Competitiveness Survey of the World Economic Forum, which vividly shows that today regional competitiveness in the global market provides direct competition and not comparative advantages (see Table 5).

Table 5. Comparison of the EU with its main competitors, 2015⁸

Indicators	Japan	USA	EU28	EU15
Technology				
Technological readiness	6.35	6.48	5.14	5.19
Technology uptake at enterprise level	6.23	6.30	5.13	5.14
Licensing of overseas technologies	5.45	5.15	5.04	5.05
Quality of scientific research institutions	5.57	6.44	5.05	5.09
Research and development costs at enterprise level	5.81	5.91	4.58	4.64
Domestic competition intensity	5.87	6.27	5.69	5.72
Number of experts	75	158	2130	1142

Source: the author’s calculations according to K. Schwab (2015: 91–373).

⁷ Tested variable – competitiveness stage of regions.

⁸ Points from 1 (minimum) to 7 (top).

Data reflected in Table 5 provides a possibility to compare the technological development of the EU with Japan and the USA. Experts of the WEF underline that the fact that the EU in terms of technological development is lagging behind is hard to explain taking into account the overall rather strong European economic development. The explanation proposed is: “the results of industrial activity play a greater role in shaping the concept of economic development in the region than the overall development indicators”. This statement is based on the results of analysis of the global financial literature, where the level of development of the capital market is largely explained directly by industrial, but not regional development factors. However, the European industry’s export structure is steadily dominated by technological output of around 50%. At the same time, export of low technologies is 30% and high technological export – only 20% of the total EU industrial exports. It should be noted that in the global export structure, all these indicators are approximately the same. This allows the conclusion that European industry focused mainly on the production of average level technological production.

Also, among other factors the unemployment, especially among youth, remains elevated in Europe. This suboptimal situation is often referred to as the ‘new normal’. Although many possible explanations for this situation have been advanced, including Lawrence Summers’ “secular stagnation” (which describes an economy where aggregate demand is so low that it necessitates high borrowing and/or very low interest rates to absorb potential output) argument, the aging of population in most advanced economies and some emerging countries, and declining capital investment, i.e., slowing productivity growth, is undoubtedly part of the story, especially in emerging markets (in advanced economies, productivity has declined already before the crisis). In the last decade, productivity in most regions has grown more slowly than in the decade before (Sala-i-Martin et al., 2015: 3–42). There is no general agreement on the factors driving the slowdown in productivity growth. However, commonly suggested explanations include: technological inventions of the last decade, such as social networks and the sharing economy, having a more limited effect on productivity than the Internet revolution of the previous decade (and also creating value of a kind not captured in national accounts and hence not showing up in productivity data) (IMF, 2015: 102–204); barriers to knowledge diffusion that prevent smaller companies from assimilating knowledge from larger firms (OECD, 2015-2016: 38); and a slowdown in the growth of global trade, which is only partly explained by the slowing growth in GDP. Other structural factors at play include a slower pace of trade liberalization or even the introduction of trade barriers, and a slower expansion of cross-border value-chain trade (IMF, 2015: 59).

Trade and competitiveness are intimately connected. As the East Asian “miracle economies” (Hong Kong SAR, the Republic of Korea, Singapore, and Taiwan) prove, trade and investment integration can improve competitiveness through two channels: first, by increasing the size of the market available to domestic firms; and second, by driving productivity and innovation thus exposing firms to international competition, expertise, and technology. No country has developed successfully in modern times without opening its economy to international trade, investment, and the movement of people across borders.

Factors that contribute to the GCI can also help to explain the slowdown in productivity growth: these include lack of infrastructure, rigid labour and goods markets, underdeveloped financial markets, inefficient use of talent, lack of access to or poor quality of education, slow adoption of technologies, and low innovation rates. Raising productivity growth increases potential output and can contribute to boosting overall growth.

Another explanation for the low economic growth, particularly in Europe, is that lending has not yet fully recovered since the financial crisis (Sala-i-Martin et al., 2015: 3–42). Despite very low interest rates, banks are reluctant to lend because of the uncertain environment and, arguably, also because of much stricter regulations that were implemented in the wake of the financial crisis to stabilize the banking sector. Small- and medium-sized enterprises are being particularly affected (OECD, 2016)⁹.

Seeking for a greater impact on the regional competitiveness, it is important that the creation of cluster organizations or initiatives is based on the so-called “triple helix” approach, ensuring cooperation between companies with science and research institutions, as well as national agencies with a view to fostering innovation and competitiveness (Leydesdorff, Etzkowitz, 2002: 55–61). Consequently, companies are provided

⁹ OECD. (2016). *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics*. Paris: OECD Publishing.

with the opportunity to cooperate with education and scientific research institutions, to develop a closer dialogue with other companies of the same industry or related industries, and to share their views with representatives of public and local authorities on the needs of certain industrial companies in order to mitigate the conditions or obstacles that hamper business and economic development. Therefore, cluster support programs and policies are important tools for building competitive clusters and powerful innovation systems that are essential for improving business competitiveness.

Research data from the Maastricht Centre for Economic and Social Studies and Innovation and Technology Training (UNU-MERIT) on the level of innovation in the EU27 Member States (European Innovation Scoreboard) shows that there is a strong link between national innovation systems and innovation indicators. This, in turn, shows that the external or state support for innovation and hence the development of clusters is necessary.

The level of cluster development is one of the indicators included in the PEF Global Competitiveness Report, as it shows the ability to mobilize and involve key players of the economy to cooperate for promoting growth and developing innovation.

This research work empirically identified the impact of clusters on regional competitiveness at global level based on a correlation analysis of the data from the PEF Global Competitiveness Report.

Considering that the correlation coefficient is the average quantitative value, for deeper assessment of the competitiveness of the EU and Latvia in relation to clusters, we should look at some individual cases by analysing individual regions at different stages of their development by comparing their rankings of competitiveness and cluster development.

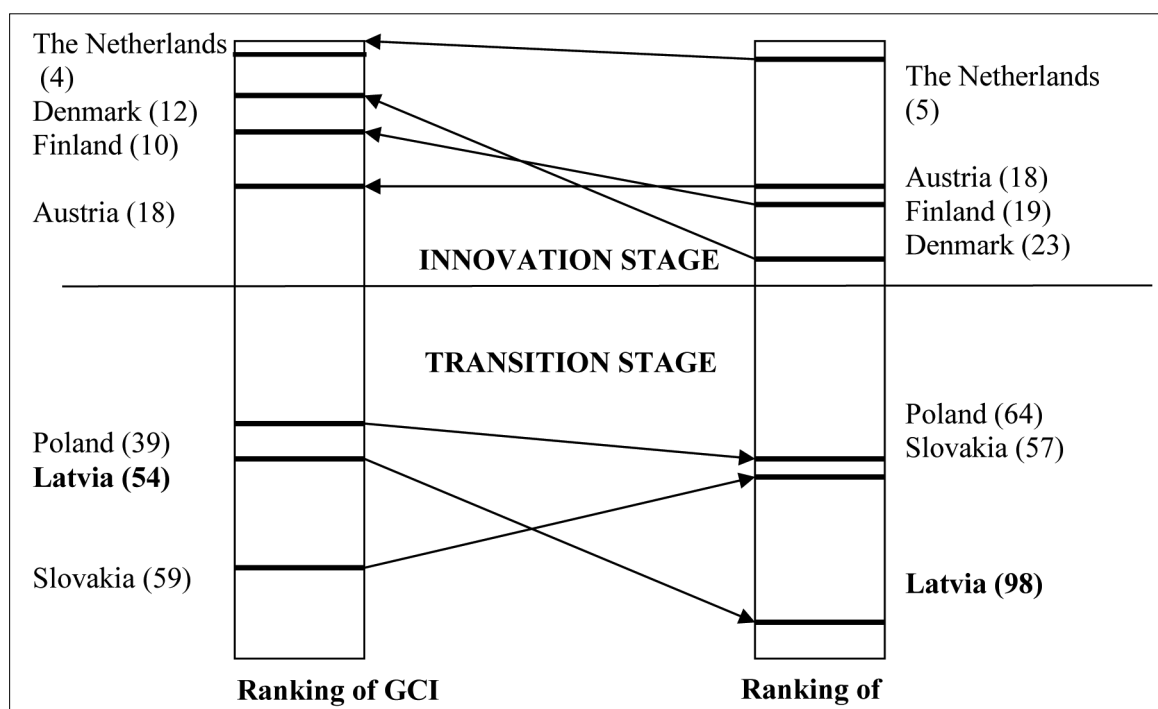


Fig. 4. Comparison between GCI and CDS rankings of individual EU countries, 2017, n=137

Source: the author's calculations according to K. Schwab (2017: 93–369).

Figure 3 shows that the rankings of the individual EU countries according to competitiveness and cluster development rankings can coincide (e.g., Austria and the Netherlands), while in other cases it may vary considerably (e.g., Latvia and Poland), indicating the different nature of the impact of clusters on competitiveness in different regions. The different directions of this discrepancy may also be observed, such as in Latvia, competitiveness is outpacing its cluster development, while in Slovakia the situation is opposite: the

development of its clusters outpaces competitiveness, which can be explained by the fact that the Slovakia has a sufficient level of competitiveness to encourage cluster development. The mismatch between competitiveness and cluster development observed in the case of Denmark, which is at the stage of innovation, can be explained by the fact that in Sweden, in terms of competitiveness, the role of clusters is not so significant than in Austria and the Netherlands.

The research results imply that the impact of clusters on the regional competitiveness is stronger for regions or countries, which are in the innovation stage of development than for those regions, which are in the production factors' or efficiency stages. This means that cluster have more favourable environment for development in regions with higher level of competitiveness, i.e., those which are on the innovation stage, while regions, which are in the production factors' or efficiency stages, such as Latvia, should stimulate their cluster development to increase the overall growth and welfare. Therefore, the state support policy for cluster development should be revised and strengthened. Also, the national level cluster development strategy would be desirable and cluster support measures should be envisaged by national development programs and policy documents related to the SMEs support and regional competitiveness facilitation. In addition, the cooperation between enterprises should be encourages considering that lack of such cooperation is a barrier for innovation and knowledge transfer. Thus, the cluster approach could be used in promoting cooperation and networking among enterprises as well.

Conclusions

The characteristics of the cluster life cycle are closely related to regional policy and competitiveness. For example, clusters include related industries that are important for the rise of regional competitiveness, as well as specialised suppliers of manufacturing ingredients, production facilities, services and providers of specific infrastructure services.

Research on clusters gives a solid basis for performing the cluster mapping at national and regional levels to evaluate the significance of industrial concentration for economic development leading to the increased growth and welfare. In this respect, cluster research could be an option for prioritizing particular industries, which have the European, national or regional level development perspective, and use a targeted approach for supporting development of these industries.

The level of cluster development is one of the indicators included in the PEF Global Competitiveness Report and it shows the ability to mobilize and involve key players of the economy to cooperate for promoting growth and developing innovation.

The research results showed that clusters are better developed in regions with higher competitiveness, or vice versa, regions with better developed clusters are also more competitive. In addition, the nature of the impact of clusters on regional competitiveness depends on the competitiveness stage of a particular region and depending on this factor the correlation between its competitiveness and cluster development may vary widely. The findings of the innovation stage analysis imply that if the level of development of clusters is higher, then the competitiveness of this region is greater as well. Therefore, the contribution of clusters to regional competitiveness is greater at the stage of innovation of a particular region.

Correlation analysis performed in this study allows to conclude that the closest linkage between the global competitiveness of regions and the development state of clusters are more typical for the EU countries, although it is also typical of the whole world.

Thus, facilitating the creation of cluster organizations or initiatives based on the so-called "triple helix" approach, ensuring cooperation between companies with science and research institutions as well as national agencies with a view to fostering innovation and competitiveness could be a solution seeking for a greater impact on the regional competitiveness. Considering a strong link between national innovation systems and innovation indicators, also including clusters, cluster support programs and policies are important tools in building competitive clusters and powerful innovation systems that are essential for improving business competitiveness.

Summing up, the previous conclusions have been supported by the correlation analysis of this study, which indicates that the impact of clusters on regional competitiveness is stronger in those regions or countries, which are in the innovation stage of development than in the regions, which are at the production factors' or efficiency stages. Therefore, clusters have the more favourable environment for development in regions with a higher level of competitiveness, i.e., in those regions which are at the innovation stage. Whereas regions that are at the production factors' or efficiency stages should stimulate their cluster development to increase the overall growth and welfare.

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KLASTERIŲ POVEIKIS REGIONŲ KONKURENCINGUMUI

ZANE ZEIBOTE

Baltijos tarptautinė akademija (Latvija)

Santrauka

Pereinamojo laikotarpio šalyse, įskaitant Latviją, klasterizavimo praktika gana naujas dalykas, o ekonominės politikos kūrėjai ir valstybės tarnautojai dažnai nėra susipažinę su klasterio metodu ir galima jo nauda ekonominei plėtrai bei regionų konkurencingumui. Šis tyrimas gali suteikti papildomų įžvalgų apie klasterių poveikį regionų konkurencingumui ir parodyti būtinybę restruktūrizuoti pramonės politiką, taip pat teikti pirmenybę pramonės šakoms, turinčioms klasterio plėtros potencialą. Šiame straipsnyje siekiama ištirti klasterių poveikį regionų konkurencingumui pasaulio ir Europos mastu. Klasterių vystymasis yra vienas iš regionų konkurencingumo veiksnių, susijęs su konkurencingų vietos tiekėjų ir konkurencingų vietos pramonės šakų dalyvavimu regioninėje ekonomikoje. Koreliacinė analizė leidžia daryti išvadą, kad konkurencingesniuose regionuose labiau išsivystyti ir geriau veikia klasteriai. Tačiau palyginus tam tikrų regionų konkurencingumą ir klasterius galima teigti, kad pastarųjų poveikis konkurencingumui regionuose ir šalyse gali skirtis, taigi ir regioninės politikos kūrėjams gali kilti skirtingi iššūkiai. Straipsnyje vertinamas klasterių metodas, skirtas skatinti regionų našumą, inovacijas ir ekonomikos augimą, didesnę konkurencingumą, tikslinę klasterių plėtrą gali paskatinti struktūrinius pokyčius, dėl kurių gerėja ekonominė veikla, auga regionų gerovė.

Šiame tyrime atlikta koreliacinė analizė leidžia daryti išvadą, kad artimiausia pasaulio regionų konkurencingumo ir klasterių vystymosi būdo sąsaja būdingesnė ES šalims, nors būdinga ir visam pasauliui. Tyrimas rodo, kad organizacijų ir bendruomenių iniciatyvų klasterių gausa didina regiono konkurencingumą, o taikomas *trigubos spiralės* metodas užtikrina mokslo bei mokslinių tyrimų institucijų ir nacionalinių agentūrų bendradarbiavimą, siekiant skatinti naujoves bei konkurencingumą.

Kadangi nacionalinės inovacijų sistemos ir inovacijų rodikliai glaudžiai susiję, įskaitant klasterius, klasterių palaikymo programos ir politika yra svarbios, kuriant konkurencingus klasterius ir galingas inovacijų sistemas, kurios būtinos, siekiant didinti verslo konkurencingumą.

PAGRINDINIAI ŽODŽIAI: *regionų konkurencingumas, regionų ekonomika, klasteriai.*

JEL KLASIFIKACIJA: R11, R13