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TOWARDS CLUSTERS' PERFORMANCE EVALUATION: THE SYSTEM OF INDICATORS

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Abstract. This paper is composed to specify the indicators identified by scholars used for cluster performance, efficiency or competitiveness assessment. Traditional bibliometric technique was chosen to identify the trends in cluster literature. Articles from the Web of Science database were selected according to the times they were cited which allowed systemizing the aspects of the research and making valuable observations. A system of indicators which should get the most attention in cluster research was composed identifying exceptionally important points to discuss and include in the following studies. In the national level clusters usually are not able to compare their performance for there is no system created to serve this purpose. The close analysis of the indicators of cluster performance would enable cluster evaluation tool formation for cluster performance evaluation in national level.

Keywords: cluster, proximity, indicators, innovations, R&D, performance, competitiveness, knowledge transfer.

JEL Classification: R11.

1. Introduction

The interest in clusters is growing since Marshall (1920) has first described industrial districts as a socio-economic notion, where geographic location is important for growth, competitiveness and agglomeration patterns of regions (Li, Veliyath, & Tan, 2013; Tanner, 2014; Zheng, 2011). The term 'industrial district' is strongly associated with the term 'cluster' which was elaborated by Porter (1990) who is in most cases referred as a founder of the term and refers to cluster as "geographic concentrations of interconnected companies and institutions in a particular field". Competitiveness is emphasized as well as cooperation of companies as it can be stimulated in clusters by increasing business productivity, innovation capacity and stimulating the formation of new business, which also adds to expanding and strengthening of a cluster. Industrial districts and clusters are often used interchangeably in research papers as they both emphasize the importance of geographical proximity as a competitive advantage of companies.

Scholars are analysing clusters and cluster literature in different aspects and employing various techniques for the multidisciplinary nature of the subject which makes it hard to trace the changing themes in cluster analysis (Dobrovolskienė, Tvaronavičienė, & Tamošiūnienė, 2017; Tvaronavičienė, 2017; Razminienė & Tvaronavičienė, 2017; Monni, Palumbo, & Tvaronavičienė, 2017; Tvaronavičienė & Razminienė, 2017; Yang & Černevičiūtė, 2017; Prause & Atari, 2017; Fuschi & Tvaronavičienė, 2016). Literature analysis usually depends on traditional direct citation counts and co-citation analysis (Lazzeretti, Sedita, & Caloffi, 2014; Tvaronavičienė, Razminienė, & Piccinetti, 2015) which in general are past oriented but can help to trace emerging themes or identify the shortage of attention to some aspects worth more examination.

This paper positions itself at the interest of cluster field relying on traditional methods of analysis. Bibliometric technique was chosen to identify the trends in clusters' literature. Indicators of cluster performance is the main interest in this paper as well as emerging topics or lines. The attempt is to compare cluster literature which was selected by the author using traditional bibliometric technique and systemize it according to the indicators identified by scholars used for cluster performance, efficiency or competitiveness assessment.

The purpose of the study is to identify the indicators that are used in the literature of cluster analysis.

The article is structured as follows. Section 2 describes the research design and the method of data collection. Section 3 illustrates the results of literature analysis of the cluster viewed from the indicators perspective. Finally, Section 4 incorporates the conclusive remarks.

2. Data and methodology

The articles that were used for literature analysis in this research paper were found at the Web of Science database. This database was chosen for it contains the world's leading scholarly literature in different categories. 50 articles were selected from this database according to the times they were cited which allowed systemizing the aspects of the research and making valuable observations.

There were some restrictions applied while selecting the articles. Cluster as a keyword works for different categories and can be used in various fields. For this reason, the search must have been restricted to some extent and articles revised after final search results were suggested. At first, research papers that belong to the Web of Science categories, such as business, geography, economics and management, urban studies, environmental studies were selected. Later, the search was refined by publication years from 2013 to 2017 which resulted in 4051 publications. Then, research areas were clarified to business economics, geography, urban studies and international relations. After these steps the final requirement was to select 50 research papers which were cited 8 times at least (see Table 1).

Table 1. Citation report (source: composed by authors)

Results found	50
Sum of the Times Cited	768
Sum of Times Cited without self-citations:	759
Citing Articles	691
Citing Articles without self-citations	683
Average Citations per Item	15.36

The results set was chosen after close inspection to make sure the articles comply with the aim of this article and can add important aspects for further research. The sum of the times cited in the Table 1 applies to the total number of citations to all of the articles found in the results set. Next field displays the total number of citations to all of the items found in the results set minus any citation from articles in the set. The citing articles and citing articles without self citation show the imformation about the selection of the authors of research papers. Average citations per item are calculated using a simple formula that calculates the average number of citing articles for all items in set.

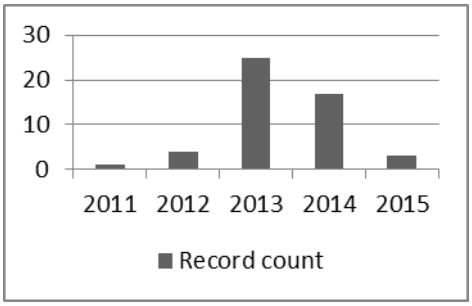

Figure 1. Results analysis by publication years (composed by authors)

Figure 1 presents the number of articles that were published in the selected period. The greatest number of articles which comply to the topic of the research with the relevant rate of citations was in years 2013. The tendency shows the growing interest in the field of cluster research.

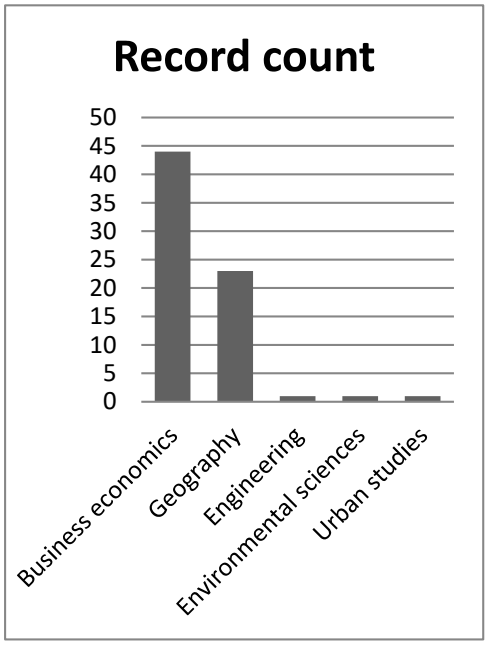

Figure 2. Results analysis by research areas (composed by authors)

The greatest number of articles belongs to business economics as a research area which shows the importance of the topic (see Figure 2). Geography takes one third of all the articles that were chosen for literature analysis and the small-

est part goes to engineering, environmental sciences and urban studies.

Traditional bibliometric technique was chosen to identify the trends in cluster literature. It becomes more difficult to track the recent trends of topics in clusters literature the number of which is growing exponentially. Scholars, who presented their works on literature review aiming at tracing intellectual origins, producing a history of founders or highlighting the most-cited papers usually use direct citation counts and co-citation analysis (Crane, Palazzo, Spence, & Matten, 2014; Hervas-Oliver, Gonzalez, Caja, & Sempere-Ripoll, 2015). In this paper, direct citation counts was identyfied as an appropriate technique which enables to fulfill the main aim of the research, which is to identify the indicators that are used in clusters' research for clusters' performance evaluation model further modelling.

Literature analysis allowed identyfying different aspects that are viewed by sholars in clusters' analysis and as a result 9 groups of indicators were structured, namely: proximity, innovation, knowledge, networking, financial indicators, investition indicators, government indicators, resource indicators and that of sustainability. These groups are given later in the paper with authors and main points ascribed to them as from literature review.

3. The indicators of clusters' performance as viewed in scientific literature

Close literature analysis allowed identifying the indicators that are discussed in research papers when clusters are perceived from the scientific point of view. Here, indicator is used to describe a group of elements, either concrete or abstract, which may serve for selection of smaller units in creating a model of cluster performance measuring. Nine groups of indicators were identified as having a significant value in further formation of clusters' performance evaluation model. These indicators are viewed through identification of authors that have perceived their importance and some general observations marked for deeper understanting of the matter.

The first group of indicators was formed as proximity indicators. Schollars view it as having different impact on clusters' performance (see Table 2).

According to Ben Letaifa and Rabeau (2013), geographic proximity is worth the attention that it gets for it enables collaboration and innovation. However, some clusters still fail to

Table 2. 1st group of indicators as viewed by scholars in scientific literature – proximity (composed by authors)

Authors	Indicator – proximity
Letaifa and Rabeau (2013)	The stress is put on interaction among geographic, institutional, organizational, cognitive and social proximities.
Bindroo, Mariadoss, and Pillai (2012)	Customer cluster proximity's importance on firm innovation.
Boschma, Minondo, and Navarro (2013)	Regional capabilities may show the tendency of new industries to be developed in regions
Carswell (2013)	A 'horizontal' approach with social networks and vertically linked production networks
Casanueva, Castro, and Galan (2013)	How social networks impact the transition of tacit and explicit knowledge.
Castellani, Jimenez, and Zanfei (2013)	The importance of geographical proximity
Crespo, Suire, and Vicente (2014)	Regional resilience through local knowledge sharing.
D'Este, Guy, and Iammarino (2013)	Geographical proximity
Fallah, Partridge, and Rickman (2014)	Proximity to a research university and proximity in the urban hierarchy.
Funk (2014)	Local environments
Helsley and Strange (2014)	Agglomerative efficiencies for the size and composition of cities
Schmitt and Van Biesebroeck (2013)	The relative importance of three dimensions: geographical, cultural and relational proximity
Alcacer and Chuang (2014)	What impact does location have on company's competitive advantage?
Basile, Benfratello, and Castellani (2013)	Location determinants of inward greenfield investments in regions are studied.
Zhu, He, and Liu (2014)	Geographical relocation, outsourcing and plant closure.
Alcacer and Chuang (2014)	Localization and concentration of three points that both supply and demand sides of agglomeration economies must be examined.

collaborate in spite of their geographical proximity. The study is based on the examination of a cluster which fails to collaborate and the stress is put on interaction among geographic, institutional, organizational, cognitive and social proximities. The findings suggest that the most important proximity in collaboration achievements is social proximity and geographic proximity can even be harmful for it may prevent social proximity. What is more, geographic distance may have positive effect on entrepreneurship and innovation. Naturally formed clusters with private entrepreneurial initiatives are more progressive in innovations than those created by economic policies.

Garment cluster in South India was taken to prove that labour should get more attention by Carswell (2013) in global production networks with empirical and analytical studies. A 'horizontal' approach with gender, age, caste and regional connections taken into account is employed to reveal how social relations and livelihood strategies are relevant in comparison to vertically linked production networks. Here effects on workers' livelihoods, social relations and reproductive capacities are discussed as helping to shape local developments of global capitalism.

D'Este et al. (2013) are interested in collaboration between universities and industry as they are considered to be an important channel of potential localized spillovers. According to the article, the factors that are responsible for universities and industry collaboration, especially geographical proximity do not get enough attention from researchers and interested parties. For this reason, authors share their ideas of how clustering and technological complementarity among the firms in partnership contribute to the formation of university and industry research collaborations.

European automotive industry was used as a case to investigate the trends that affect manufacturing of sophisticated goods (Schmitt & Van Biesebroeck, 2013). It is noted that the importance in proximity in the supply chain is growing recently. The relative importance of three dimensions: geographical, cultural and relational proximity was evaluated in the study. The results show that some aspects of proximity are valued in companies' sourcing strategy.

The second group of indicators is innovation. This group is naturally viewed as having significant impact on clusters' performance, although special attention should be paid to the kind of innovations that are implemented in clusters' activities. A closer stufy on innovation would be very necessary for recommendation formation while creating a model of clusters' performance evaluation (see Table 3).

Table 3. 2nd group of indicators as viewed by scholars in scientific literature – innovation (composed by authors)

Authors	Indicator – innovation
D'Angelo, Majocchi, Zucchella, and Buck (2013), Funk (2014), Zhu, He, and Liu (2014)	Innovation
He and Wong (2012), Tan, Shao, and Li (2013)	Innovation performance
Morrison, Rabellotti, and Zirulia (2013)	Innovativeness
Bindroo et al. (2012)	The variation in the different innovation outcomes
Bouncken and Kraus (2013)	Radical innovation or extremely novel revolutionary innovation
Casanueva et al. (2013)	Product innovation
Daddi, Tessitore, and Frey (2012)	Eco-innovation
Tavassoli and Carbonara (2014)	Region's innovation
Wang and Lin (2013)	Technological innovation

The study by Funk (2014) develops and tests a theory of how company's local environments influence the ability to generate innovations. Case study shows that inefficient networks are beneficial as they create and sustain diversity internally even when proximity to industry peers decreases.

The article by Casanueva et al. (2013) is designed to analyse the relation between social networks and innovation in mature geographical clusters. A wide range of ties was analyzed in order to understand how they impact the transition of tacit and explicit knowledge. The results show that a central position is significant in product innovation while the role of structural holes is weaker. Correlation and regression analysis was applied to compare the variables in a single cluster of 52 SMEs. The authors suggest

that further studies can be complemented by the results of recent study and longitudinal studies can follow to examine how different relationships evolve and see the causality between the variables. More detailed study could follow as well taking interactions between the variables in recent study as the independent variables.

Knowledge is ascribed to the third group of indicators. This indicator is one of the most specific attributes in clusters' nature. Needless to say, it also implicate positive and negative fetures depending on the strategies of usage (see Table 4).

Table 4. 3rd group of indicators as viewed by scholars in scientific literature – knowledge

Authors	Indicator – knowledge
Bouncken and Kraus (2013)	Sharing knowledge with the partner, learning from the partner and technological uncertainty. Cooperation
Lai et al. (2014)	Corporate knowledge management
Maskell (2014)	Can be acquired through pipelines, listening posts, crowdsourcing and trade fairs.
Morrison et al. (2013)	Global pipelines, knowledge endowment and internal knowledge transfer
Stanko and Olleros (2013)	Three dimensions are studied: the outsourcing of innovation activities, geographic clustering of companies and mobility of labour.
Tavassoli and Carbonara (2014)	The variety and intensity of internal and external knowledge
Feldman (2014)	Mechanisms and institutions promoting the creation of useful knowledge.

Lai, Hsu, F. J. Lin, Chen, and Y. H. Lin (2014) correlation and regression analysis is applied to investigate the relationships between corporate knowledge management and innovation performance (Lai et al., 2014). The study suggests that industry clustering has positive effect on corporate innovation performance and corporate knowledge.

A comprehensive framework is applied by Maskell (2014) to allow the discussion of the approaches available to companies engaged in globally extended learning. The article explores knowledge and solutions from geographically and relationally remote sources can be acquired through pipelines, listening posts, crowdsourcing and trade fairs.

Correlation and regression analysis enable to find the relation showing that both the variety and intensity of internal and external knowledge matter for region's innovation (Tavassoli & Carbonara, 2014).

The fourth group of indicators is formed as networking. This indicator is viewed through different perspectives by scholars and can add to other indicators respectively (see Table 5).

Table 5. 4th group of indicators as viewed by scholars in scientific literature – networking (composed by authors)

Authors	Indicator – networking
D'Angelo et al. (2013)	One of the key resources
Giuliani (2013)	Different kinds of networking
He and Wong (2012)	Local networking
Li et al. (2013)	Network relational characteristics, such as tie strength, tie stability, tie quality were taken into consideration for companies' performance.
Lorenzen and Mudambi (2013)	Personal relationships – social network.
Tan et al. (2013)	Ties between companies and colleges, ties between companies and industrial associations, and ties between companies
Wang and Lin (2013)	Inter-firm relation
D'Este et al. (2013)	Collaboration between universities and industry

The main concern of the study by Li et al. (2013) is the impact of spatial relationships on firm performance. Industry cluster in China was taken for case analysis, in –cluster and extra cluster ties were accounted for performance of companies. Network relational characteristics, such as tie strength, tie stability, tie quality were taken into consideration for companies' performance. The results show that distant linkages should be development to avoid lock-in and entropic deterioration.

Lorenzen and Mudambi (2013) add to cluster theory a broader understanding by including linkages in the form of personal relationships. This theory of social network allows forming testable propositions. Local spillowers has the

best potential in global linkages with decentralized network structures. There are two contrasting points regarding this theory: clusters may have potential for in-depth (when clusters are linked to the global economy by decentralized pipelines) or in-breadth (when clusters are linked through decentralized personal relationships) catch-up in industries and technologies. The theoretical prepositions are illustrated by case studies in two emerging economies in India.

Tan et al. (2013). The main interest of the study is competitive advantage which is required for companies which at the same time are given the competitive pressures for differentiation and the institutional pressures of conformity (Tan et al., 2013). Measures, such as innovative performance, ties between companies and colleges, ties between companies and industrial associations, and ties between companies are tested. Here, peripheral companies tend to be isomorphic institutionally and competitevily, while central companies avoid institutional conformity and competitive differentiation.

The fith group – financial indicators helps to submit some financial material and to make calculations on that (see Table 6).

Boschma et al. (2013) analyse the emergence of new industries in 50 Spanish regions at the NUTS 3 level in 30 years period to see how regions diversify over time. Econometric evidence is provided after Spanish regions are analysed in terms of capability distance between new export products and existing export products. The results show that regions tend to follow the industrial structure trends rather than that of national industrial structure. This assumption suggests that regional capabilities may show the tendency of new industries to be developed in regions for proximity really matters in this case.

Foreign direct investment (FDI) activities are taken into account in examination of multinational companies and their behavior regarding global cluster networks and global city-region networks (Bathelt & Li, 2014). It is suggested that multinational cluster companies are more likely to set up new foreign affiliates in other, similarly specialized clusters to keep up with global industry dynamics. Vice-versa, non-clustered companies would avoid to invest in clusters. Another hypothesis, that was generally supported by the investigation of 299 FDI cases from Canada to China, considers that cluster networks are generating cnnections that are horizontal and vertical in character and thus shape global city-region networks.

Table 6. 5th group of indicators as viewed by scholars in scientific literature – financial indicators (composed by authors)

Financial indicator	Authors	Main points
Export	Boschma et al. (2013), D'Angelo et al. (2013), Daddi et al. (2012)	Capability distance between new export products and existing export products; The influence on export performance of key resources.
Market efficiency	Alcacer and Chuang (2014)	One of three points that both supply and demand sides of agglomeration economies must be examined.
Returns / profit	Dobusch and Schussler (2013), Stanko and Olleros (2013), Tokatli (2013)	Increasing returns; Profitability; Profit making or capital accumulation
Foreign direct investment (FDI)	Bathelt and Li (2014)	Foreign direct investment (FDI) activities are taken into account in examination of multinational companies
External investments	Isaksen (2015)	External investments often needed for thin regions.
Trade quotas	Smith, Pickles, Bucek, Pastor, and Begg (2014)	Struggling with the removal of trade quotas
Production	Daddi et al. (2012)	The amount of production

The study by Smith et al. (2014) is designed to show the development of clothing industry in Eastern Europe for in recent years it has been struggling with the removal of trade quotas, increasing competitive pressures and the global economic crisis

The sixth group – investment indicators work on deeper investigation of external and internal investment (see Table 7).

Table 7. 6th group of indicators as viewed by scholars in scientific literature – investment indicators (composed by authors)

Investment indicator	Authors	Main points
Research and development (R&D)	Castellani et al. (2013), D'Agostino, Laursen, and Santangelo (2013)	International research and development (R&D) investments; High-tech R&D and medium or low R&D.
Upgrading	Tokatli (2013), Zhu et al. (2014)	Capital accumulation can differ depending on companies upgrade; Products upgrade

The importance of geographical proximity is discussed by Castellani et al. (2013) in the article for multinational enterprises (MNEs) regarding to international research and development (R&D) investments. Gravity model of trade was used to see how geographical distance impacts R&D investments. The results show that geographic distance has a lower negative impact on the probability of setting up R&D than manufacturing plants, while once measures of institutional proximity are accounted for, MNEs are equally likely to set up R&D labs in nearby or in more remote locations.

D'Agostino et al. (2013) study the relationship between a region's home and foreign investments in R&D that affects home's regional knowledge production. The findings suggest that regions of high income would have advantage in high-tech R&D while emerging economies have an advantage in medium or low R&D.

The seventh group – government indicator help to identify the impact of governmental decisions on clusters' performance (see Table 8).

The main concern of the study by Corredoira and McDermott (2014) is how do multinational corporation subsidiaries and local institutions help or hinder emerging market suppliers to upgrade their capabilities. Field work and unique survey data of Argentine auto parts supplier was combined to reveal that process upgrading improves significantly when suppliers have ties to institutions that improve access to a variety of experiential knowledge. Study shows that suppliers benefit from multinational corporation subsidiaries in cases when they collaborate with non-market institutions and are able to recombine experiential knowledge with standards gained from the subsidiaries.

Table 8. 7th group of indicators as viewed by scholars in scientific literature – government indicators

Government indicator	Authors	Main points
Subsidiaries	Corredoira and McDermott (2014)	How do multinational corporation subsidiaries and local institutions help or hinder emerging market suppliers to upgrade their capabilities?
Policies	Crespo et al. (2014)	Policy-oriented analysis
	Ketels (2013)	Policies are mostly focussed on strengthening existing agglomerations
	Nathan and Overman (2013)	Spatial economy and industrial policy interventions.

Ketels (2013) study is designed to review recent researches on competitiveness and clusters for regions and regional policy. The findings show that policies are mostly focussed on strengthening existing agglomerations rather than establishing new ones.

Nathan and Overman (2013) review the development of cluster policies and the evolution of cluster notion. Authors suggest how governments should pay careful attention to the spatial economy and industrial policy interventions.

The eighth group – resource indicators reveals important information on clusters' properties (see Table 9).

D'Angelo et al. (2013) study regional and global pathways to internationalization for SMEs to examine the influence on export performance of key resources, such as innovation, human resource management, networking and the company's experience. Correlation and regression model is applied to compare the variables and the results show that SMEs' export performance varies depending on the geographic scope of internationalization.

Table 9. 8th group of indicators as viewed by scholars in scientific literature – resource indicators

Resource indicator	Authors	Main points
Company's experience	D'Angelo et al. (2013)	One of the key resources
Growth	Jiang and Miao (2015)	Natural cities evolve in nonlinear manners at spatial and temporal dimensions.
Dimensions	Morrison et al. (2013)	Fostering the growth of clusters
Dimensions	Wang and Lin (2013)	Firm attributes, firm size and technological intensity
Cluster's size	De Vaan, Boschma, and Frenken (2013)	Clustering becomes positive after a cluster reaches critical size
Cluster's size	Daddi et al. (2012)	Number of enterprises
Path dependence	Dobusch and Schussler (2013)	Positive feedback of path dependence
Path dependence	Isaksen (2015)	Regional path dependent industrial development is often characterized by lock-in effects
Cluster formation	Letaifa and Rabeau (2013)	Naturally formed clusters with private entrepreneurial initiatives or created by economic policies.
Labour	Carswell and De Neve (2013)	Information on occupations, incomes, migration patterns, caste, education and asset ownership.
Human resource management	D'Angelo et al. (2013)	One of the key resources
Employment	Daddi et al. (2012)	Human resources

Regional path dependent industrial development is often characterized by lock-in effects while dealing with changes, such as path renewal and path creation (Isaksen, 2015). The study suggests that thin regions often need external investments to achieve path renewal and path creation.

Carswell and De Neve (2013) emphasize the importance of labour and highlights that it receives less attention from scholars than it deserves. Labour's multiple and everyday forms of agency are seen as helping to shape local developments of global capitalism as well as producing transformative effects on workers' livelihoods, social relations and reproductive capacities. The research was carried out in one Indian city and its rural hinterland and took more than a year. Quantitative and qualitative information was used for the study and different methods, such as case studies, focus group discussions, in-depth interviews with large number of garment workers, labour contractors, supervisors and company owners. Participation observation research was carried out in a small garment unit and overall study took 300 garment workers collecting information on occupations, incomes, migration patterns, caste, education and asset ownership.

Table 10. 9th group of indicators as viewed by scholars in scientific literature – sustainability indicators

Sustainability indicator	Authors	Main points
Environment	Longoni and Cagliano (2015), Wang and Lin (2013), Wang, Qiu, and Swallow (2014), Zhang and Huang (2012)	Environment integration in operations strategies; Regional environment; Fresh food accessibility; Major business environment changes on manufacturing outsourcing.
Social sustainability	Longoni and Cagliano (2015)	social sustainability is becoming key competitive priority for companies

The ninth group of indicators, which is sustainability reveals how important it is to draw

attention to environmental and social issues (see Table 10). The importance of energy security and sustainability is often emphasized by scholars (Tvaronavičienė et al., 2015; Kendiukhov & Tvaronavičienė, 2017) although they rarely relate it to clusters' activities.

Longoni and Cagliano (2015) have designed an article to examine how environment and social sustainability are integrated in operations strategies for they are becoming key competitive priorities for companies. The findings suggest that traditional operations strategies are slightly modified for market-oriented and capability-oriented strategies need to be supplemented with environmental and social sustainability issues.

The study is designed to research how community gardens and farmer's gardens help to improve fresh food accessibility (Wang et al., 2014). The results show that community gardens tend to cluster with supermarkets.

Zhang and Huang (2012) in the study concern supply chain strategy, aiming to investigate the impacts of the major business environment changes on manufacturing outsourcing in China. The findings show that the coastal part of China is attractive for products for industrial clusters that are formed there and efficient logistics service.

4. Conclusions

Clusters maintain the position of interest with scholars during the recent years and the number of scientific researches in this area keeps on growing. Different aspects are being analysed by scholars and new topics are emerging. Clusters represent a complex form of organization, in which social ties (the community), productive networks of local firms, and the web of local institutions and collective agents form a cooperative and competitive density. Clusters are a characteristic phenomenon in local or regional markets, but their function is to build a competitive advantage for cluster members on a larger scale – not only national but international.

Traditional bibliometric technique was chosen to identify the trends in cluster literature. 50 articles were selected according to the times they were cited which allowed systemizing the aspects of the research and making valuable observations. The findings suggest that cluster performance evaluation should include a number of different indicators which view different aspects of cluster activities to get the best result and enable making suggestions of how the cluster execution could be improved. A system of indicators which should get the most attention in cluster research was composed identifying exceptionally important points to discuss and include in the next research. As for being very extensive from the indicators viewpoint the literature analysis allows researches to create an adequate model for clusters' performance evaluation on behalf of the system of indicators that are suggested in this paper. Clusters' performance evaluation is a very important step for everyone who is concerned in clusters' improvement and further development of successful clusters' activities.

The articles for the analysis were selected according to the number that they were cited. The limitation of the research is that these articles might be viewed as older than that of the recent years. That put the researches under an obligation to update the research periodically. Literature analysis suggests that the system of indicators for evaluation of clusters' performance should be complex and involve a great number of different aspects to make it detailed, comprehensive and objective. All the indicators that are mentioned in previous tables are recommended to be used for clusters' performance evaluation. These indicators should be viewed through different angles, categorized according to their general features and posible dimentions, and the values should be applied regarding to their nature. This paper is composed as a recommendation for further development of clusters' evaluation model and its final formulation. In further research these indicators should be turned into descriptive statements or questions for deeper understanting of the essentials.

Very often clusters' coordinators face a problem of how to evaluate the performance of clusters on the national level and how to make them attractive on the global scale. In the national level clusters usually are not able to compare their performance for there is no system created to serve this purpose. The close analysis of the indicators of cluster performance would enable cluster evaluation tool formation for cluster performance evaluation in national level. These indicators can work as a guide for monitoring cluster activities and evaluating their performance for creating an action plan which could be very effective in working on strategy.

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