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## CREATIVE CLUSTERS AGAINST THE BACKGROUND OF THE DEVELOPMENT OF CLUSTERS IN POLAND

**Abstract.** This article presents the characterization of creative clusters on the background of the development of clusters in Poland. The obtained research results are the effect of analysis on thorough inventory of clusters in Poland, which took place with the participation of the author. The description has been made in five basic areas: the number of clusters, year of creation, number and structure of cluster members, employment in clusters, cluster specialization. The tools used in the research were: telephone interviews, e-mail questionnaire and expert assessment.

**Keywords:** creative clusters, clusters in Poland.

### 1. Introduction

The development of clusters in Poland indicates certain stabilization, both in terms of quantity and scope of their activity. This also applies to clusters of the creative industry. It has long been recognized that industrial clustering benefits businesses by giving them access to skilled staff and shared services, and the opportunity to capture valuable knowledge spillovers. This is equally true of the creative businesses, as exemplified by Hollywood or Silicon Valley. The aim of the article is to present clusters operating in the creative industry against the background of cluster development in Poland. Cooperation with the Polish Agency for Enterprise Development in the project on cluster inventory in Poland, was of assistance in the discussion on cluster development in Poland. Research has been extended with the results of analyzes conducted among creative clusters as part of the research project *Models of knowledge management in networks and clusters of creative industries in Poland and EU countries*. It was assumed that in terms of volume, clusters operating in creative industries have an increasing participation in the development of clusters in Poland in general. The article presents in particular: the number of clusters in Poland, the number and structure of cluster

members, employment and specializations of clusters. Against this background, the characteristics of creative clusters in Poland are presented.

## 2. Creative clusters as new challenge for industry development - literature research

The notion of "creativity" and its various declinations - creative class<sup>1</sup>, creative economy, creative sector<sup>2</sup>, creative cities<sup>3</sup>, creative clusters<sup>4</sup> - have in recent years been the subject of numerous research. These activities are aimed primarily at increasing entrepreneurship and the development of regions, cities and businesses. Creativity, knowledge and innovation have become the main driving force of territorial development: economic, social and cultural.

In recent years, creative branches have been developing faster than most economy sectors, including employment and export. Their increasing share of GDP and economic weight arouse interest not only among enterprises but also public authorities interested in boosting economic growth. The experience of polish representatives of the creative sector has shown that keeping up with changes is possible, what is more, success can be built upon them, when based on cooperation.

Activities in the area of culture and creative industries are becoming an important element in shaping the qualitative development of local communities. T. Borrup points out ten development strategies which are the examples of activities for local communities, five of which concern the economic development, and another five regard the social development<sup>5</sup>.

In the area of economic development, the following strategies are indicated:

Strategy 1. Create jobs.

Strategy 2. Stimulate trade through cultural tourism.

Strategy 3. Attract investment by creating live/work zones for artists.

<sup>1</sup> Florida R.: *The rise of the creative class*. Basic Books, New York 2002.

<sup>2</sup> Jayne M.: *Creative industries: the regional dimension?* "Environment & Planning C: Government & Policy", No. 23, 2005, p. 537-556; Caves R.: *Creative industries: contracts between art and commerce*. Harvard University Press, Harvard 2000; J. Hartley (ed.): *Creative industries*. Blackwell, Oxford 2005.

<sup>3</sup> Landry C.: *The creative city: a toolkit for urban innovators*. Earthscan, London 2000; Klasik A. (red.): *Kreatywne miasta i aglomeracje. Studia przypadków*. Katowice 2009; Klasik A.: *Sektor kultury i przemysł kreatywny w rozwoju regionu na przykładzie Aglomeracji Górnośląskiej*. [http://www.kongreskultury2010.pl/?p=pl/menu/04\\_badania/04/04](http://www.kongreskultury2010.pl/?p=pl/menu/04_badania/04/04).

<sup>4</sup> Business clusters in the U.K.: A first assessment. Report by trends business research. United Kingdom, Department of Trade and Industry, London 2001; Pratt A.C.: *Creative clusters: towards the governance of the creative industries production system?* "Media International Australia", No. 112, 2014, p. 50-66; Lazzarotti L., Boix R., Capone F.: *Do creative industries cluster: mapping creative local production systems in Italy and Spain*. "Industry and Innovation", Vol. 15, No. 5, 2008, p. 549-567; Lazzarotti L., Boix R., Capone F.: *Why do Creative Industries Cluster? An analysis of the determinants of clustering of creative industries*. IERMB Working Paper in Economics, No. 09.02, Apr., 2009.

<sup>5</sup> T. Borrup: *The Creative Community Builders Handbook. How to Transform Communities Using Local Assets, Arts and Culture.*, Fieldstone Alliance, Saint Paul 2006, p. 5.

Strategy 4. Diversify the local economy.

Strategy 5. Improve property and enhance value.

In the area of social development, the following actions are indicated:

Strategy 6. Promote interaction in public space.

Strategy 7. Increase civic participation through cultural celebrations.

Strategy 8. Engage youth.

Strategy 9. Promote stewardship of place.

Strategy 10. Broaden participation in the civic agenda.

On the other hand, we observe the dynamic development of clusters all over the world. The term *klaster* comes from the English *cluster* and has emerged in the industrialized economies. Another name for *klaster* is: agglomeration (geographical, spatial), industrial district, local production system, growth pole, pole of competence, innovative milieu<sup>6</sup>. The concept of clusters is not a new form of business networks. As early as at the beginning of the twentieth century, A. Marshall<sup>7</sup> described the fundamentals of industrial districts, but, in fact, M. Porter's<sup>8</sup> study (1990) initiated the period of a rapid development of the cluster theory<sup>9</sup>, and the attempt to hold an empirical verification of this concept, which is now widely understood as "... a group of subjects from different backgrounds: business, science, self-government and civil society, operating in a specific ecosystem, focused on a specific territory and / or around a specific specialization. The synergy effect is achieved through formal and informal relationships, shaped by the cluster's potential and social capital, which not only describe the way in which the cluster operates, but also emerge and develop on the basis of joint ventures (including innovations), knowledge exchange and competence development<sup>10</sup>.

Considering clusters in terms of entrepreneurship theory is justified by the cooperative theory of the enterprise, which assumes that among a group of institutions and organizations one can distinguish networks of enterprises whose functioning is described by: game theory, business theories as part of cooperative systems or network theories. In the last decade, clus-

<sup>6</sup> Maskell P., Kebir L.: What Qualifies as a Cluster Theory? Danish Research Unit for Industrial Dynamic 2005, Dania 2005, p. 2.

<sup>7</sup> Marshall A.: Principles of Economics. Macmillan, London 1890, 1930 (1986 edition).

<sup>8</sup> Porter M.E.: The Competitive Advantage of Nations. The Free Press, New York 1990.

<sup>9</sup> There are several dozen of cluster definitions. Synthetically, there are four concepts of defining the notion of cluster, in line with the networking paradigm that cluster is a group of entities and their relationships: the classical agglomeration refers to the concentration of industry, where the government and the local and regional authorities play an important role; an industrial cluster is a complex of companies concentrated in a specific territory, based on specific sales and purchasing relationships of companies which seek to reduce transaction costs and to improve competitiveness; social network is a "club" model, centered on social bonds and trust, which facilitate cooperation and innovation; the knowledge hub is an "expert model", based on collaboration between research and business units, to create new knowledge and revolutionary innovations. More on this topic: Gordon I.R., McCann P.: Innovation, Agglomeration and Regional Development. "Journal of Economic Geography", Vol. 5 2005, p. 523-543; Iammarino S., McCann P.: The Structure and Evolution of Industrial Clusters: Transactions, Technology and Knowledge Spillovers. "Research Policy", No. 35, 2006, p. 1018-1036; Knop L.: The process of cluster management, [in:] Sroka W., Hittmar S. (eds.): Management of network organizations. Theoretical problems and the dilemmas in practice. Cham: Springer, 2015, p. 105-119.

<sup>10</sup> Knop L.: Zarządzanie klastrem. Koncepcje, strategie, modele. Wydawnictwo Politechniki Śląskiej, Gliwice 2013, s. 33.

ters have become the subject of many studies: the processes of initiation and development of clusters in the region<sup>11</sup>, the creation and development of clusters as a network of companies and institutions<sup>12</sup>, in particular SMEs<sup>13</sup>, as social networks<sup>14</sup> or as a means of developing competitiveness, innovation, diffusion of knowledge, technology transfer<sup>15</sup>, etc.

The emergence and development of creative clusters is the key element of a creative society, supporting a knowledge-based economy, and through dynamic development, creative clusters change the economic and social architecture of cities and regions. The appearance of the assumption of entering the age of creativity in the literature of subject has led to the fact that the development of "creative clusters", similarly to previously industrial or economic ones, is regarded as one of the major challenges of a new global economy based on knowledge. It is emphasized that art and culture are key factors that ensure successful economic activity and job creation in the 21st century.

In his monograph, S. Olko, using these assumptions, presented a broad literary study defining creative clusters<sup>16</sup>, concluding that a creative cluster can be regarded in three senses<sup>17</sup>:

- as a group/agglomeration of entities in creative sector distinguished in the industry classification system (e.g. NACE, SIC),
- as a network, that is a group of entities with various relations, especially of interpersonal nature that determine further cooperation

<sup>11</sup> Karlsson Ch. (ed.): Handbook of research on cluster theory. Edward Elgar Cheltenham, Northampton 2008; Martin R., Kitson M., Tyler P. (eds.): Regional competitiveness. Routledge, London, New York 2006; Henning M., Moodysson J, Nilsson M.: Innovation and regional transformation. From clusters to new combinations. Elanders, Malmö 2010; Pachura P.: Regional cohesion. Effectiveness of network structures. Springer-Verlag, Berlin Heidelberg 2010.

<sup>12</sup> Breschi S., Malerba F. (eds.): Clusters, networks, and innovation. Oxford University Press, Oxford – New York 2005; Czakon W.: Sieci w zarządzaniu strategicznym. Oficyna a Wolters Kluwer business, Warszawa 2012.

<sup>13</sup> Parrilli M.D.: SME cluster development. A dynamic view of survival clusters in developing countries. Palgrave Macmillan, New York 2007; MacGregor RC, Hodgkinson AT (eds.): Small business clustering technologies: Application in marketing, management, IT and economics. IGP 2007.

<sup>14</sup> Castells M: The rise of the network society. Blackwell Publishing, Oxford 1998; Stachowicz J.: Towards the theory of social capital on the regional level [in:] Stachowicz J. (ed.): Intellectual capital management in regional pro-innovative networks. Akademicka Oficyna Wydawnicza EXIT, Warszawa 2006.

<sup>15</sup> Bojar E. (ed.): Clusters. Politics. Management. Good clustering practices in the world. TNOiK, Dom Organizatora, Toruń 2009; Carayannis E.G., Campbell D.F.J. (eds.): Knowledge creation, diffusion, and use in innovation networks and knowledge clusters. Praeger, Westport – Connecticut –London 2006; Gorynia M., Jankowska B.: Klastry a międzynarodowa konkurencyjność i internacjonalizacja przedsiębiorstwa. Difin, Warszawa 2008; Henning M., Moodysson J., Nilsson M.: Innovation and regional transformation. From clusters to new combinations. Elanders, Malmö 2010; Knop L.: Zarządzanie klastrem. Koncepcje, strategie, modele. Wydawnictwo Politechnik Śląskiej, Gliwice 2013; Martin R., Kitson M., Tyler P. (eds.): Regional competitiveness. Routledge, London, New York 2006;

<sup>16</sup> L. De Propriis, L. Hypponen: Creative Clusters and Governance: the Dominance of the Hollywood Film Cluster" [w:] Ph. Cooke, L. Lazzeretti (red.): Creative Cities, Cultural Clusters and Local Economic Development, Cheltenham: Edward Elgar 2007, p. 258-286; 103 C. Chapain, Ph. Cooke, L. De Propriis, S. MacNeil, J. Mateos-Garcia: Creative clusters and innovation. Putting creativity on the map., NESTA London 2010, p. 11; B. Jankowska: Koopetycja w klastrach kreatywnych. Przyczynek do teorii regulacji w gospodarce rynkowej., Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań 2012; S. Szultka (red.): Klastry w sektorach kreatywnych – motory rozwoju miast i regionów. PARP Warszawa 2012.

<sup>17</sup> Olko S.: Zarządzanie wiedzą w klastrach i sieciach w przemysłach kreatywnych. Wydawnictwo Politechniki Śląskiej, Gliwice 2017 (in print).

– as an organization, that is a network with a specific organizational form. In accordance with the essence of conducting cluster policy, in Poland a cluster might be described as an organization which complies with the requirements given by PARP and is identified by it.

Compared to other types of clusters, creative clusters are characterized by the following key challenges and features, resulting from the specific role of creative clusters<sup>18</sup>:

- increasing the participation of the society in culture,
- sale and licensing of copyrighted works,
- accessibility of stages, exhibition venues, public spaces,
- popularity; creation of the image of places (cities, agglomerations, regions),
- private and public patronage of cultural products,
- preserving and sharing the cultural heritage of the nation and the region,
- joint promotional and image projects,
- joint ventures in the distribution of cultural products.

### **3. Clusters in Poland**

#### **3.1. The scope of research**

Realization of the article's objective was organized in two stages:

- I stage – presentation of thorough inventory of clusters/cluster initiatives in Poland. The description of clusters in Poland was presented based on several fundamental criteria: the number of clusters, year of creation, number and structure of cluster members, employment in clusters and cluster specializations.
- II stage – characteristics of creative clusters against the background of other clusters operating in Poland. Based on International Confederation of Societies of Authors and Composers reports we analyzed 11 sectors to provide an overview of the growth drivers and key challenges to each: Advertising, Architecture, Visual Arts, Performing Arts, TV, Radio, Music, Books, Gaming, Movies, and Newspapers and Magazines.

The conducted research was an answer to the question posed in the introduction to this article concerning the characteristics of creative clusters on the background of the development of clusters in Poland. The first stage of research was based on telephone interviews and e-mail questionnaire, while the second one on expert assessment being the result of interviews and meetings with coordinators and creative cluster members in Poland.

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<sup>18</sup> Ibid.

### 3.2. Stage I – the number of clusters in Poland

The greatest difficulty with defining the number of clusters in Poland precisely is related to the fact that a cluster is more a phenomenon than an entity. The minimum level of formalization is an agreement or partnership agreement that is concluded for an indefinite period of time, therefore its actual existence cannot be verified. Considering this, the most important action determining the number of clusters should be defining the criteria by which we can determine whether we are dealing with an active (functioning) cluster or not.

Out of the initial number of over 750 records in the base of clusters/cluster initiatives/cooperation connections operating in Poland, 294 clusters and potential clusters have been identified. This population also included inactive clusters, which for various reasons do not continue to operate. These clusters were then verified against five criteria: formalization, specialization, membership differentiation, membership services, and cluster communication. All criteria were met by 203 clusters, which were subjected to further in-depth research describing cluster activity, available resources and implemented projects. Complete information in this area was provided by 156 clusters.

As a general population - the number of clusters in Poland might be amounted to  $N1 = 294$  clusters, yet it could include clusters that were created but are currently inactive. Therefore, as a general population we should assume the number  $N2 = 203$  verified clusters, which are regarded as active (they meet the 5 basic criteria). The total number of clusters in Poland will be subject to fluctuations in the future. No significant changes in this regard are anticipated and the dominant tendency will be a decrease rather than increase in their numbers. A decline in the total number of active clusters ( $N2$ ) can be expected, which results from the fact that more clusters limit their activity than new clusters emerge. The number of clusters in voivodeships is uneven, the most active in this respect are voivodeships with a large number of inhabitants as well as industrialized ones. Table 1 presents the number of clusters in voivodeships at different stages of research.

Table 1

The number of clusters in voivodeships

Lp.	Voivodship	The number of inventoried, potential clusters	The number of verified clusters	The number of verified, validated clusters
1	Lower Silesia	25	16	12
2	Kuyavia-Pomerania	15	7	5
3	Lublin	19	13	11
4	Lubuskie	9	6	5
5	Lodzkie	9	8	5
6	Malopolska	19	12	12
7	Mazovia	42	29	18
8	Opole	6	3	2
9	Subcarpathia	22	17	13
10	Podlaskie	15	9	8

cont. table 1

11	Pomerania	13	9	6
12	Silesia	45	38	32
13	Swietokrzyskie	11	5	5
14	Warmia-Masuria	10	6	2
15	Wielkopolska	24	16	14
16	zachodniopomorskie	10	9	6
	<b>TOTAL</b>	<b>294</b>	<b>203</b>	<b>156</b>

Source: own elaboration based on inventory results.

Among the voivodeships that have the biggest impact on the population of clusters (N1, N2 and n), the first three are: Silesian, Mazovian and Lower Silesian or Wielkopolskie voivodeship. Figure 1 presents voivodeship rankings in terms of the number of verified and validated clusters. The first position is taken by Silesian voivodeship (32), then Mazovian voivodeship (18 clusters) followed by Wielkopolskie voivodeship (14 clusters) The biggest difference in relation to the structure of the general population of N1 in terms of the number of clusters is indicated by the Lower Silesian Voivodeship - for 25 potential clusters, in the final stage 12 clusters took part, i.e. less than a half.

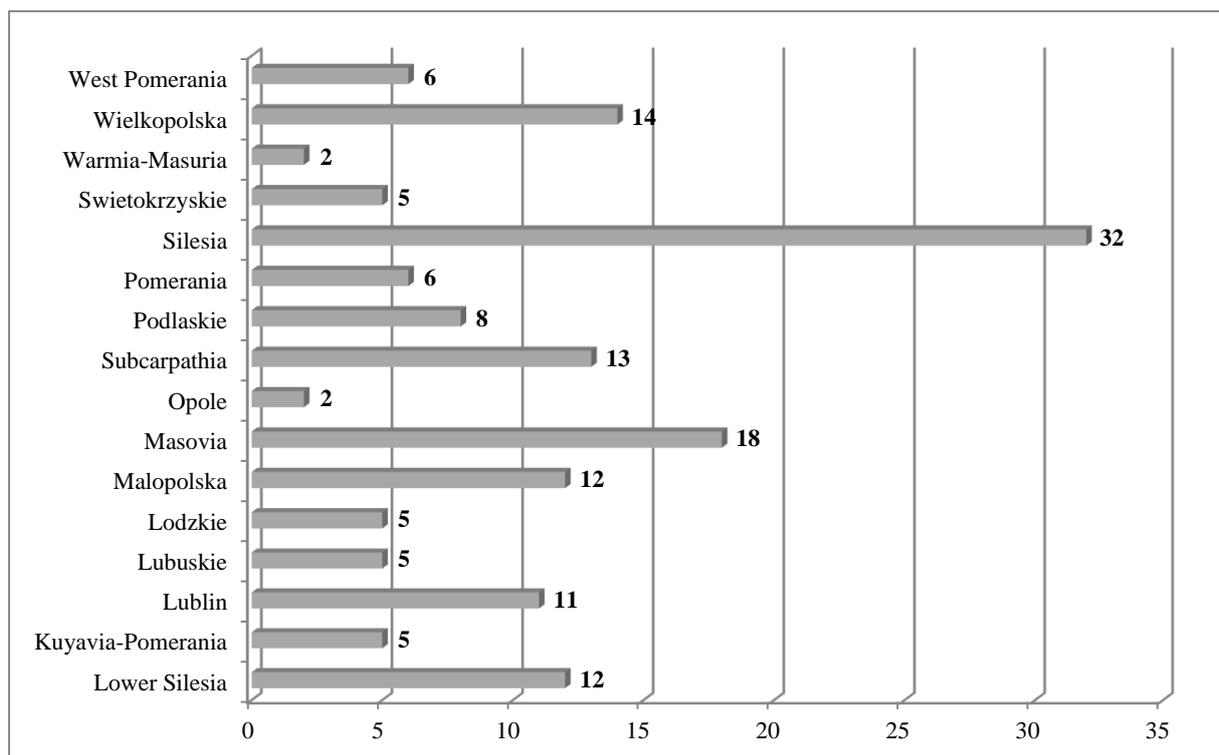


Fig. 1. Ranking of voivodeships in terms of the number of verified and validated clusters (n=156)

Source: own elaboration based on inventory results.

The number of clusters in the voivodeships is proportional not only to the size of the voivodeship and the level of its industrialization but also to the number of innovation centers that

are potential clusters coordinators<sup>19</sup>. Centers of particular significance are institutions such as science parks, technology parks, incubators (entrepreneurship and technology), as well as local and regional development agencies. The business environment of these units are companies with a specific specialization, which in consequence leads to a situation in which innovation centers are coordinators or members of clusters. This is confirmed by the results of the inventory.

### 3.3. Stage I – Clusters classified by the year of creation

The date of Poland's accession to the EU 2004 can be considered as the start of systematic clustering in Poland. Figure 2 shows the number of clusters formed in the years 2004-2015. The largest population of 294 clusters was analyzed. It may be noted that before 2004 interesting initiatives were undertaken, including the Aeronautical Valley (formed as an association in 2003) or the Pleszew boiler cluster, however, a notable increase in the number of clusters was observed in 2007, with 29 created clusters. The year 2011 was by far the most abundant in terms of the number of clusters created (57 formed).

It can be observed that in 2015, the number of clusters being created was much lower than in previous years. According to the premises of European cluster policy resulting from the past observation of existing clusters in Europe, increase in the number of clusters is not necessary, but clusters of higher quality are needed<sup>20</sup>. Introduced actions resulting from the adopted clustering policy in Poland assume greater focus on key initiatives in the country and regions, which in consequence will lead to a reduction in the number of clusters<sup>21</sup>.

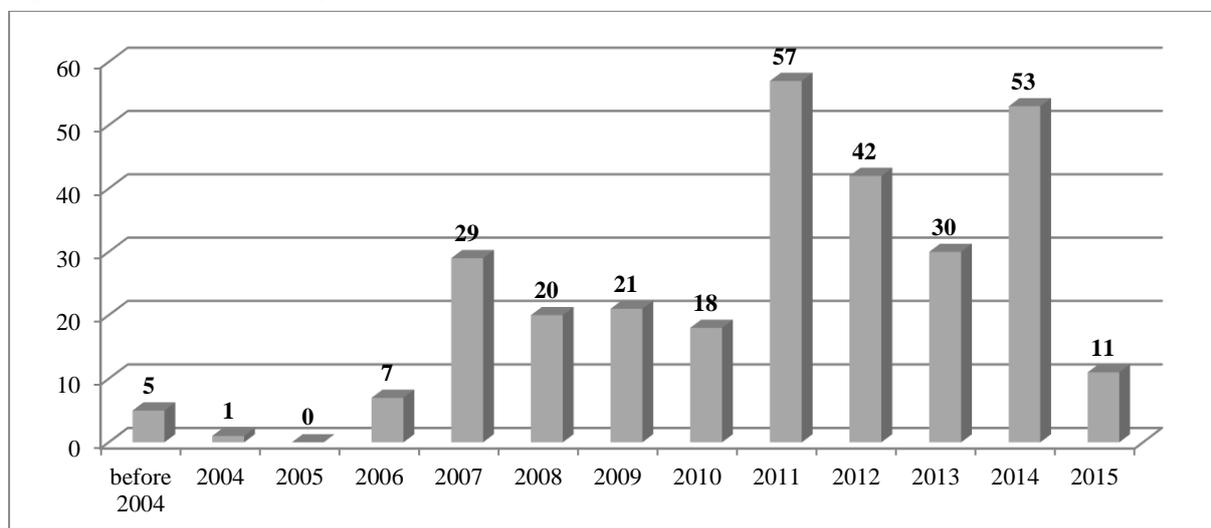


Fig. 2. The number of clusters in terms of the year of creation ( $N_1 = 294$  potential clusters)

Source: own elaboration based on inventory results.

<sup>19</sup> Bąkowski A., Mażewski M. (red.): Ośrodki innowacji i przedsiębiorczości w Polsce. Raport 2012. PARP, Warszawa 2012, s. 14.

<sup>20</sup> White Paper - Emerging of European World Class Clusters. Europa InterCluster, Bruksela 2010.

<sup>21</sup> Dzierżanowski M. (red.): Kierunki i założenia polityki klastrowej w Polsce do 2020 roku. Rekomendacje Grupy roboczej ds. polityki klastrowej. Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2012.

Fig. 3. presents the number of created clusters in ascending order since 2004 for the broadest defined general population ( $N_1 = 294$  clusters). It must be emphasized that in this group we discuss clusters which have emerged, however not existing yet. In most cases, when we deal with partnership agreement or agreement constituting the cluster, 'dissolution of cluster' is not anticipated. This causes significant problems with defining the status of certain cluster existence, which can be based on the coordinator declarations or activities verification in a cluster.

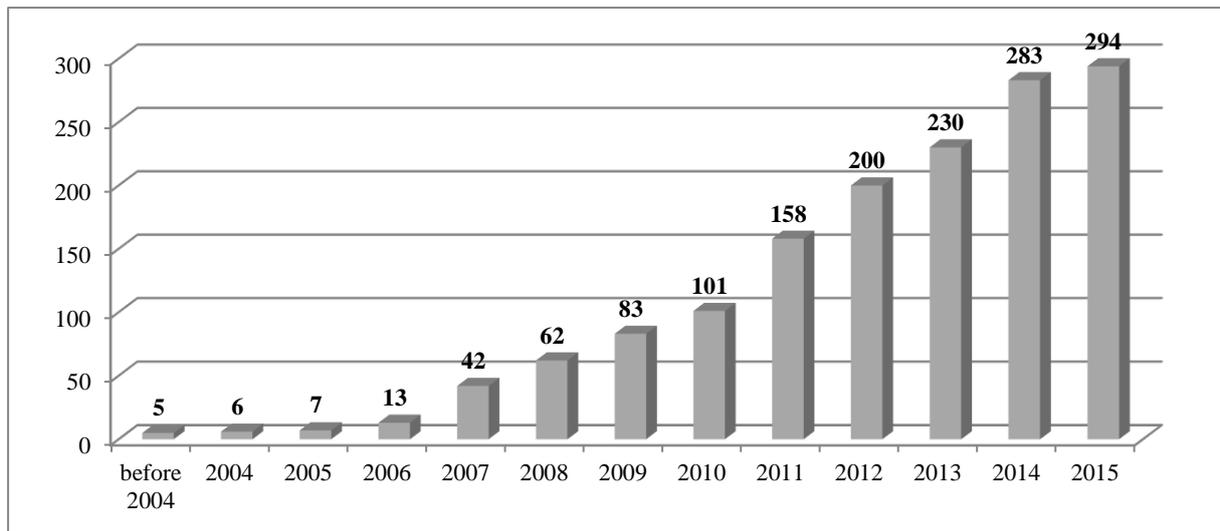


Fig. 3. The number of created clusters in Poland – in ascending order ( $N_1 = 294$  potential clusters)  
Source: own elaboration based on inventory results.

It should once again be stressed that precise determination of the number of clusters is difficult due to the process nature of this phenomenon. This primarily results from the requirements in operational programs before cluster projects. These requirements determined in particular the "minimum" organizational form (agreement, contract) and the minimum number of members. It was important for pragmatically-oriented project promoters to meet the minimum requirements.

Figure 4 shows an increase in the number of clusters among the confirmed clusters ( $n$ ). We are dealing with a set of clusters that exist, i.e. they demonstrate basic activity and services for their members. Similarly to the  $N_1$  general population, the time when the biggest number of clusters emerged was the year 2011. The increase in the number of clusters in individual years is fairly even. The number of clusters confirmed  $n = 156$  is slightly higher from the one we can find comparable to the number of clusters on the Innovation Portal's cluster map, which amounts to 134<sup>22</sup>. The difference caused by the limitation of cluster activity in the first place, ultimately leads to a situation in which the cluster exists only on paper or on the Internet.

<sup>22</sup> At the end of the third quarter 2015 there were 198 clusters on the Cluster Map PARP, Innovation Portal, [www.pi.gov.pl](http://www.pi.gov.pl), access: 14.11.2015.

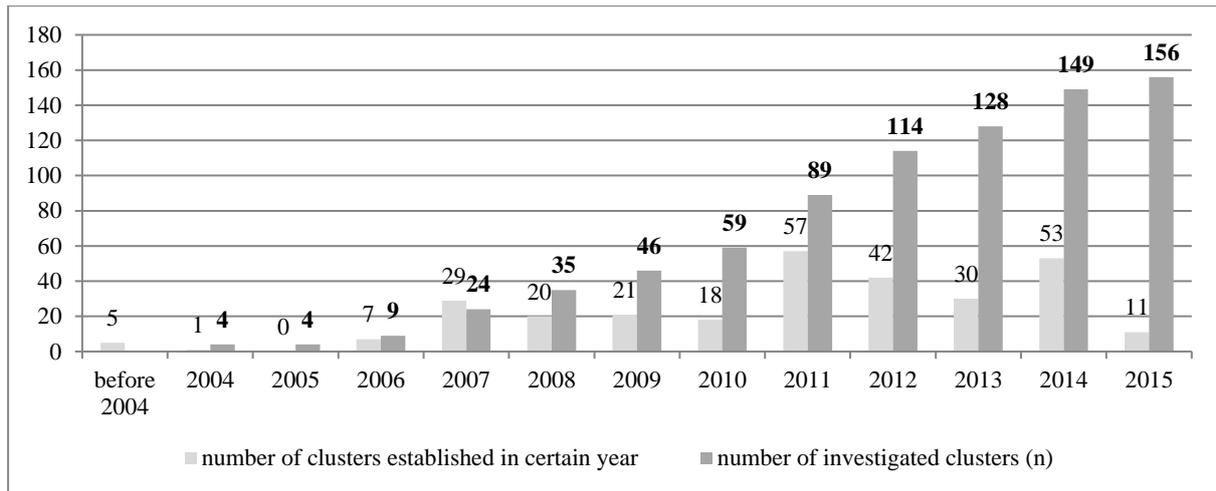


Fig. 4. The number of clusters created in Poland among the verified clusters (n = 156)

Source: own elaboration based on inventory results.

Apart from the processes of limiting the activity of clusters, we can also observe clusters consolidation processes, for example the formation in June 2015 of the Lubuski Cluster of Entrepreneurship and Tourism as well as the merger of Lubuski Cluster of Tourism and the Cluster of Entrepreneurship and Education. This is a very positive solution because it does not waste the effects of the created clusters and benefits from their most valuable experiences and built-up social capital. In the near future, we may witness more of such phenomena, with these processes having horizontal consolidation nature (around specialization) and vertical (along the added value chain).

### 3.4. Stage I – The number and structure of entities in clusters

While specifying the number of entities in clusters, emphasis was given to the number of declared subjects and not those indicated in the analysis of local clusters. Research has shown that in Poland the dominant type are small clusters (up to 20 members in total), amounting to 42. The analysis of the number of clusters, which is the primary measure of cluster size, indicates that the median of the number of members within the analyzed N1 group, is 29. The largest clusters in Poland in terms of number of members is the Baltic Group sEaNERGIA with 311 members, coordinated by Sea Development company in Kołobrzeg. In terms of turnover, the largest cluster is the Aviation Valley, which is also impressive in terms of the number in relation to other clusters in Poland - 95 members.

A large number of small clusters in Poland owes its origins to cluster policy, which has supported small consortium projects. Taking action for a large number of members is both cumbersome and due to the complexity of action network in a cluster, highly labor-intensive. Only some clusters in their strategy take the risk of increasing the number of members, in spite of the conditions being created. We must also be aware of the fact that, even in relatively large clusters (ie more than 50 members), the exchange of functional knowledge useful for entrepreneurs is limited to several entities. A similar numerical structure occurs in the group

of verified and validated clusters, ie those that meet all the verification criteria and participated in all stages of the research. Despite the differences in relation to the N1 population analyzed, the descriptive statistics are very similar, the median number of subjects in the sample  $n$  is 33 and the average is 42 (see Figure 5).

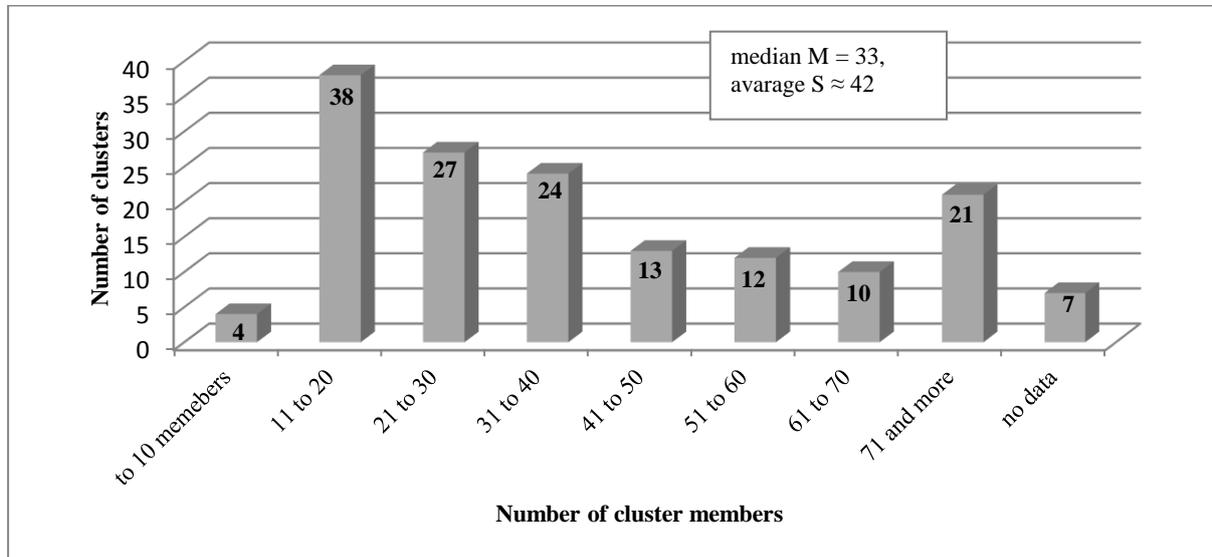


Fig. 5. The number of clusters in the sample of clusters with validated data ( $n = 156$ )  
Source: own elaboration based on inventory results.

According to the premises behind the concept of triple helix innovative environments, including clusters, should integrate representatives from three backgrounds: business, science and administration. The adopted research assumptions took into consideration the following entities: enterprises (including micro enterprises, small enterprises, medium-sized enterprises, large enterprises), business environment institutions mostly representing administration and scientific units. Figure 6 shows the structure of entities in clusters on a sample of clusters with validated data. It is an overall structure of entities, that is, taking into account the number of all entities declared by the clusters. As expected, the largest group are enterprises (more than  $\frac{3}{4}$  of entities are enterprises). Among enterprises the largest group are micro-enterprises (37%), then small enterprises (21%), medium-sized enterprises (14%) and large companies (6%). Business environment institutions constitute 5% of the structure of the entities, scientific units are 9%, and other entities 8%. It should be noted that there may have been situations in which the same scientific units are present in several clusters, which is quite common among large scientific units, whereas very rare in the case of enterprises.

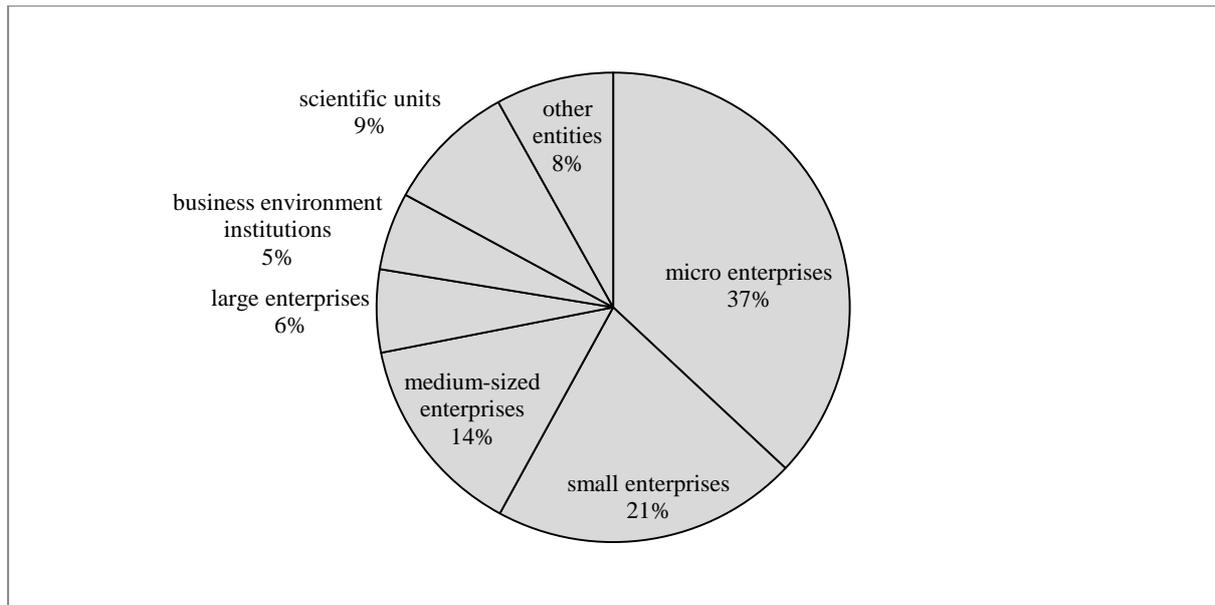


Fig. 6. The structure of entities in a sample of clusters with validated data (n = 156)  
Source: own elaboration based on inventory results.

Table 2 shows detailed statistical characteristics of entities in the cluster, taking into account the descriptive statistics of the main groups of entities forming the cluster. Minimal values in subgroups are usually equal to 0, only for the total number of enterprises the minimum is 4, similarly in the case of business environment institutions, the minimum is 1. This means that each cluster in the analyzed group has at least 4 enterprises and at least 1 institution from the business environment. The maximum value for companies does not exceed 146, an interesting fact is the high value of participation of scientific entities – 18 entities (Mazovian Cluster of Chemistry) and the business environment institutions – 16 in the case of the Lublin Cluster of Business Environment Institutions. The number of other entities in the cluster is small (median is 1 and average value 4) – usually these are local government units, associations and other non-commercial institutions.

Table 2

A detailed structure of entities in clusters (n = 156)

Entity type	Minimum	Median	Average	Maximum
<b>Enterprises, including:</b>	4	23	32	146
<i>Micro enterprises</i>	0	10	15	100
<i>Small enterprises</i>	0	6	15	58
<i>Medium-sized enterprises</i>	0	4	6	79
<i>Large enterprises</i>	0	1	2	50
<b>Business environment institutions</b>	1	2	3	16
<b>Scientific units</b>	0	2	4	18
<b>Other entities</b>	0	1	4	60

Source: own elaboration based on inventory results.

### 3.5. Stage I – Employment in clusters

Information on the structure of employment in cluster entities are not standardly gathered by cluster coordinators. Complete data on employment were provided by 73 coordinators, while 86 supplied information about employment in enterprises – cluster members. A summary statement of this data is shown in Table 3.

Table 3

Employment in entities belonging to clusters

Entity type	employment	%
<b>Enterprises, including:</b>	211 350	46,08
<i>Micro enterprises</i>	5 407	1,18
<i>Small enterprises</i>	15 062	3,28
<i>Medium-sized enterprises</i>	51 767	11,29
<i>Large enterprises</i>	139 114	30,33
<b>Business environment institutions</b>	4 604	1,00
<b>Scientific units</b>	204 144	44,51
<b>Other entities</b>	38 548	8,40
<b>TOTAL</b>	<b>458 646</b>	<b>100</b>

Source: own elaboration based on inventory results.

In comparison to the structure of entities in the cluster (see Figure 7), the structure of employment in the different types of entities is the opposite: microenterprises, which are dominant in clusters, account for only 1% of total employment in clusters. On the other hand, research institutions, small in number in relation to the number of enterprises, in terms of employment constitute the largest group of entities in clusters. This is best illustrated in Figure 7. Total employment in enterprises that are members of clusters is smaller than in other entities belonging to clusters. Business environment institutions, that play a very important role in clusters as coordinators or providing specialized proinnovation services, have a low position with 1% in terms of employment structure. Other entities, whose role is complementary (local government units, social organizations) have a relatively high proportion in the employment structure. The structure of employment in clusters does not reflect the structure of involvement of entities in cluster activity, which is best visible in large institutions (enterprises, universities, local government units), which involve a small number of employees in cluster activity. For these reasons, the employment rate in cluster entities should be considered as complementary.

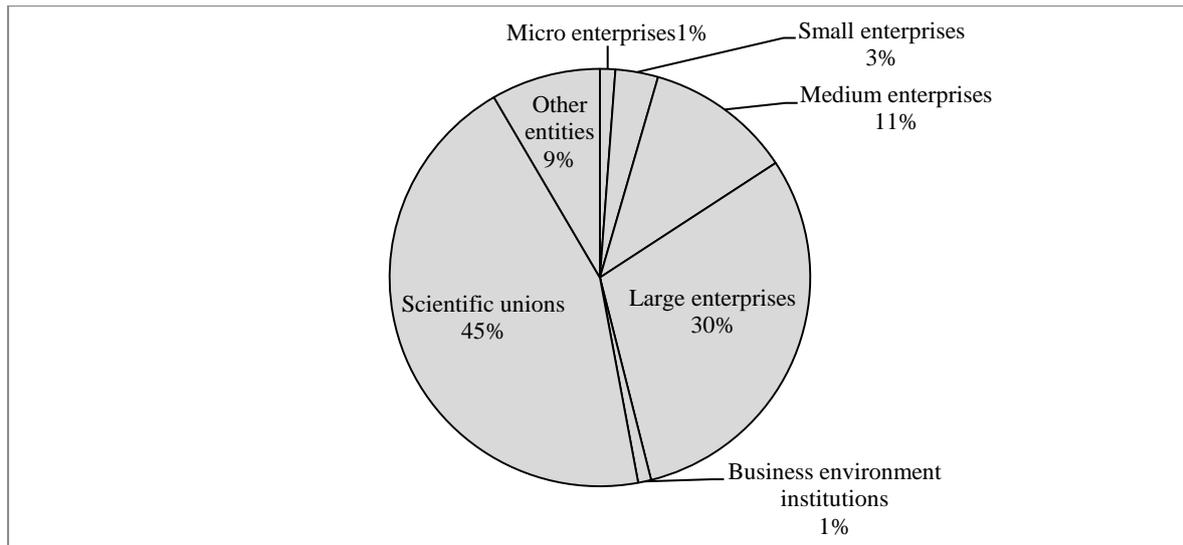


Fig. 7. Structure of employment in cluster entities ( $n_1 = 86$ )  
Source: own elaboration based on inventory results.

### 3.6. Stage I – Cluster specialization

Cluster specializations most often refer to the sectors in which they operate, with the sector most often understood in the context of the value chain (aviation, motorization) or technology (nanotechnologies, ICT). Figure 8 shows grouped cluster specializations. The majority of clusters occur in the broadly understood ICT sector - 22 clusters. According to currently existing Polish Classification of Activities (PKD), the ICT sector - Information and Communication Technologies is defined as: *an economic sector encompassing enterprises, whose main type of activity is production of goods and services allowing for electronic recording, processing, transmitting, retrieval or display of information*. This sector covers 22 classes of activity in the production area (6 classes) and services including sales (2 classes), telecommunication services (4 classes) and IT services (10 classes)<sup>23</sup>. The clusterobservatory portal within the ICT sector distinguishes the IT sector, which mainly includes production (3 classes of activity) and software activities (3 classes of activity)<sup>24</sup>. Similarly varied is the nature of ICT clusters in Poland. Specializing in metalworking, involving clusters operating in the sectors of foundry, welding, plastics processing and other specialist areas rank second place in terms of the number of clusters (21 clusters). This group does not include motor and aviation clusters that have well defined own sectors.

Clusters are also very common in the construction sector (16 clusters), in which a specific subgroup is energy-saving, passive and intelligent construction. It is a very well-defined sector with many complementary areas and many thematic areas (materials, design, building control, RES technologies for the building industry). There is some difficulty in separating the

<sup>23</sup> S. Olko: Przegląd istniejących/działających klastrów ICT w województwie śląskim oraz analiza ich potencjału <https://obserwatoriumict.pl/site/assets/files/1393/klastry.pdf>.

<sup>24</sup> Cluster Observatory – Sectors, <http://www.clusterobservatory.eu/>, access: 12.11.2015.

specialization of construction and power industry because in the case of energy clusters, which associate suppliers of building solutions, some part of issues and entities of these clusters complies with those in building clusters. Tourism as a specialization of clusters is relatively well identifiable - it is represented by 14 clusters, including traditional tourism related to the place (tourism, leisure, cultural tourism), as well as medical tourism and resort and spa tourism.

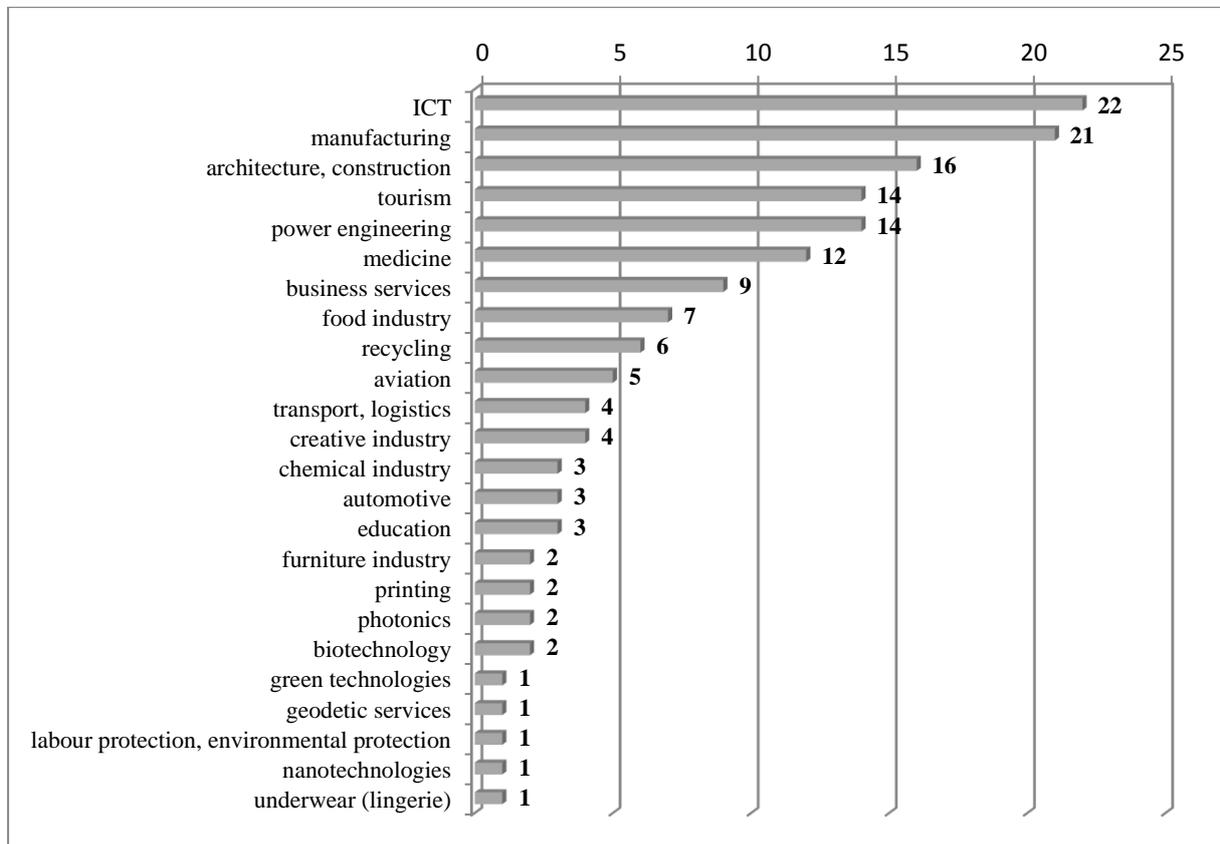


Fig. 8. Cluster specializations (n = 156)

Source: own elaboration based on inventory results.

Energetics as a specialization of clusters primarily includes renewable energy technologies (RES). 14 clusters in the analyzed group specialize in this area. In many cases this specialization is in line with the smart specializations of the regions. In practice, clusters of commercial power generation do not occur in Poland. Energy cluster members offer solutions for individual and institutional construction. As mentioned before, there is a common part of the specialization of construction and energy. Medicine is a specialization represented by 12 identified clusters. This is a vital specialization of many regions in Poland as well as National Smart Specialization. That is why the mechanisms of cooperation of entities within this specialization are of such importance.

Business services constitute a specialization grouping 9 clusters in Poland, yet the range of these services is varied in particular clusters. This specialization is definitely not related to any technological area.

The food industry, which as a sector includes the value chain from cultivation and breeding to processing, storing and distribution of food products, is represented in Poland by 7 clusters located in different regions of Poland.

Aviation as a sector includes the production of airplanes, helicopters and other aircraft and components for their production, as well as aviation service. It is a widely globally spread sector, therefore the Polish manufacturers clusters in this industry are part of global production chains. In Poland, however, we might find entities producing final products: aircraft and helicopters. Producers cooperate with numerous subcontractors, causing the aviation clusters to be interconnected within the production chain. In addition to the largest Polish cluster - the Aviation Valley, which has the status of National Key Cluster, there are also: Wielkopolska Aviation Cluster, Silesian Aviation Cluster, Aircraft Construction and Technology Cluster, Podkarpace Cooperative Coalition - Light and Ultralight Aviation Cluster.

#### 4. Stage II – Creative clusters in Poland

The characteristics of cluster specialization revealed the number of creative clusters in Poland. According to the declared specializations, until 2016 in Poland there were 4 creative clusters, including: Cluster of Creative Industries, Krakow Film Cluster, Made in Silesia, Silesian Design Cluster. Brief characteristics of these clusters (according to accepted criteria) are shown in Table 4.

Table 4

Brief description of creative clusters in Poland

<b>Silesian Design Cluster</b> are designers, innovative companies, research institutes, non-governmental organizations and universities from the silesian voivodeship. It is a panel of experts, who assist companies in devising and implementing new products and services, and help cities and regions to design public space.			
Year of creation: 2011	Number of entities: 30	Structure of entities 17 enterprises (over 75% micro enterprises), 5 research units, 4 business institutions, 4 other entities	Employment in the cluster: no detailed data (cluster coordinator does not keep such statistics)
<b>Made in Silesia Cluster</b> aims to promote creative industries especially in the silesian region. The cluster's assumption is that creative industry is a common field for creativity, culture, economy and technology, which is characterized by the ability to create and spread intellectual capital as well as the possibility to generate profit, new workplaces and expert revenue, while at the same time works for social inclusion, cultural diversity and human development. Unfortunately, since 2016 (after termination of the research) the activity of the cluster has weakened considerably.			
Year of creation: 2014	Number of entities: 41	Structure of entities: 35 enterprises (over 90% micro enterprises); 2 business units; 4 research units.	Employment in the cluster: no detailed data (cluster coordinator does not keep such statistics)

cont. table 4

The overarching objective of <b>Creative Industries Cluster</b> is to build a platform of cooperation for companies and institutions related to the creative sector, associating both market practitioners as well as stakeholders, including researchers, enthusiasts and forecasters. The main task of the cluster is to organize joint, authorial, non standard projects, promote technological and organizational solutions and social innovations with a significant impact on the development of local creative sector.			
Year of creation: 2012	Number of entities: 66	Structure of entities: 60 enterprises (39 micro enterprises, 19 small enterprises, 2 medium-sized enterprises); 4 business institutions; 2 research units	Employment in the cluster: the total of 600 people employed in enterprises
<b>Krakow Film Cluster</b> is an association of professional companies, organizations, experienced individuals from the film industry in the Małopolska region. It is a platform for cooperation, information exchange, promotion, education and support for innovation.			
Year of creation: 2015	Number of entities: 33 union members (39 non-union). More than 300 representatives from the film industry are currently related to the cluster	Structure of entities: 27 enterprises (23 micro enterprises and 4 small enterprises); 1 business institutions, 2 research units; 3 other entities	Employment in the cluster: more than 200 people (union entities)

Source: own elaboration based on inventory results and expert interviews.

Research on clusters, which identified the creative sector as a specialization, showed little contribution to cluster development in Poland overall. It can be hypothesized that cooperation in this sector is not particularly visible and cluster structures are not popular. However, the picture is completely different when we consider the definition of the creative industry from a broader perspective<sup>25</sup>.

Research carried out as part of the project *The models of knowledge management in networks and clusters of creative industries in Poland and the EU countries* has allowed to establish that in the years 2003-2015 44 clusters and cooperation networks operating in the creative industry emerged<sup>26</sup>. Similarly to other clusters in Poland, many of the established creative clusters are gradually reducing or significantly altering their activity, ceasing to actually be a cluster (e.g. Creativro, BizArt, and Inret). However, the structure of the specialization is much wider, as shown in Figure 9.

The specializations of creative clusters in Poland are similar to the leading specializations of such clusters in the EU. The ICT sector is dominant among the specializations of creative clusters and other clusters. However, this is a very broadly understood sector, hence the following classes of activities were used for the study: 58.21 Publishing in the field of gaming, 58.29 Publishing in other software activities, 62.01 Software activities, 63.12 Internet portal activities. There are 12 ICT clusters among the creative clusters, followed by clusters representing visual and performing arts (8). This cannot be disputed, because these activities are

<sup>25</sup> We analyzed 11 sectors to provide an overview of the growth drivers and key challenges to each: Advertising, Architecture, Visual Arts, Performing Arts, TV, Radio, Music, Books, Gaming, Movies, and Newspapers and Magazines. Conversely, according to the classification adopted by European Cluster Observatory.

<sup>26</sup> Por. Olko S.: Zarządzanie..., op.cit.

closely connected with the culture industry<sup>27</sup>, which is actively developing. Together with the media (TV, Radio, Music, Books) it is the second leading group of clusters in the creative industry. The remaining clusters represent three groups: newspapers and magazines (2 clusters), movies (2 clusters), design (2 clusters) and advertising (1 cluster).

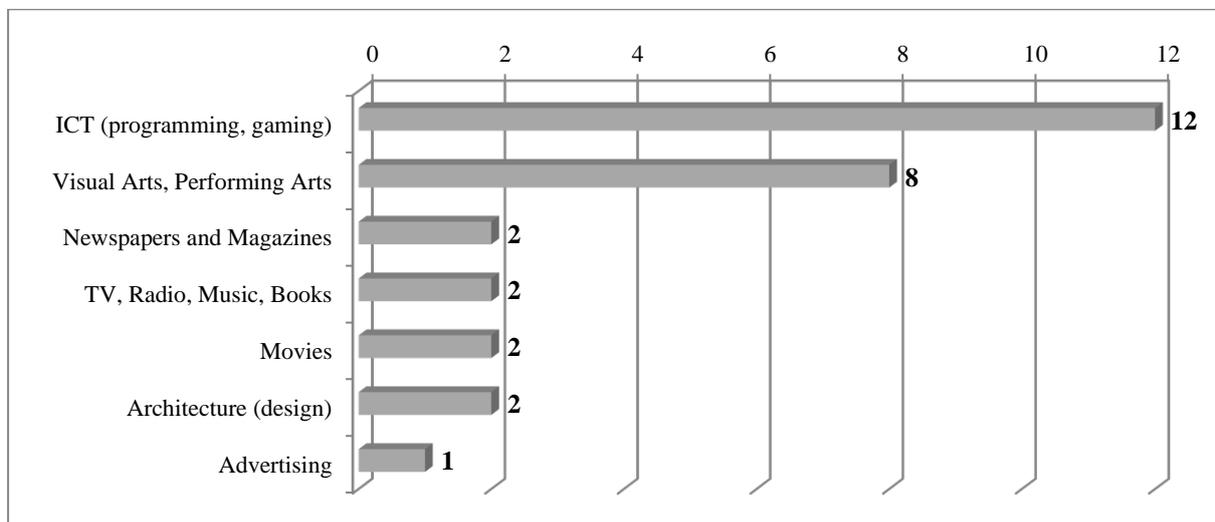


Fig. 9. Specializations of creative clusters in Poland

Source: own elaboration based on data on creative clusters Olko S.: *Zarządzanie...*, op.cit. verified against data obtained from cluster inventory in Poland.

The total number of verified clusters in the creative industries is 29, which accounts for almost 19% of all verified clusters in Poland. These clusters were created in 2006-2015 (2006 - 1, 2007 - 5, 2008 - 3, 2009 - 2, 2010 - 2, 2011 - 3, 2012 - 5, 2013 - 2, 2014 - 4, 2015 - 2). The average number of entities operating in these clusters is 42 (it is similar to the average of all studied clusters  $n$ , which is 38 entities). The structure of entities is similar to the statistical values of all clusters studied ( $n = 156$ ). Among enterprises the largest group are micro-enterprises (35%), then small enterprises (24%), medium-sized enterprises (12%) and large companies (3%). Business environment institutions constitute 7% of the structure of the entities, scientific units are 10%, and other entities 7%. The biggest problem is to determine the level of employment in the creative industry clusters. More than half of the surveyed clusters do not keep this kind of statistics, primarily due to high employment fluctuations resulting from the project organizational structures of cluster members.

The study was based on the analysis of five basic pieces of data that identify clusters. The limitation of the research is that it does not assess the degree of clusters' maturity, their effectiveness and continuity of activities or the extent of impact on local or regional development. The article presents only a part of the research, including basic criteria for an inventory of clusters in Poland, with particular emphasis on creative clusters. It shows primarily the scale

<sup>27</sup> Culture industry encompasses all enterprises in the area of culture, art, media operating according to market rules. Smoleń M: *Przemysły kultury. Wpływ na rozwój miast*. Jagiellonian University, Faculty of Management and Social Communication, Institute of Public Affairs, Cracov, 2003, p. 20-22.

of the phenomenon, based on the telephone interviews, e-mail questionnaires and partly on expert assessment. In-depth analysis would require interviewing not only cluster coordinators, but also their leaders. So far, the studies have only been carried out with regard to the assessment of management standards. It would therefore be necessary to analyze the problem dynamically, i.e. to analyze the same criteria at several intervals.

The work carried out within the framework of the project realized with the PARP was aimed at assessing the standards of cluster management, but the results of the research may allow for a broader discussion concerning, inter alia, the number and scope of joint projects and schemes, the cooperation with R & D, the number and scope of innovative activities, etc. Similar research may concern creative clusters, taking into account and developing the specifics of their specialization.

## 5. Summary and conclusions

The dynamic start of cluster development in Poland can be dated to 2004, yet most of them were created in the years 2011-2015. The number and specializations of clusters and the number and structure of entities provides us with basic data on clusters in Poland. The PAED inventory of clusters in 2015 enabled the cluster population to be determined, the number and characteristics of which are derived from the quantity and quality of the information obtained. The reason for that is, among others, the fact that coordinators do not tend to systematically gather data on cluster members. Many clusters still do not have web pages, or the information presented there is residual or outdated. For all these reasons, not all analyzes could be performed on the whole identified cluster population<sup>28</sup>, and drawing conclusions became limited. Therefore, it was even more difficult to make an inventory of clusters in the creative industry. Combining research conducted by PAED (in which the authors of the article participated) with the research being part of the project *The models of knowledge management in networks and clusters of creative industries in Poland and the EU countries* allowed for the first relatively complete identification of clusters. However, their inventory, to a large extent carried out by S. Olko, should be dynamic (continuous) primarily in order to verify comparable data, secondly to indicate the development, stabilization and / or concentration of creative clusters, and thirdly to assess their impact on the development of the creative industry.

The conducted research revealed the significant role (quantitatively) of clusters operating in the creative industry against the background of cluster development in Poland. Both the number of clusters and the number of cluster members active in the creative industries account for about 20% of the total population of clusters and entities in the cluster. Obviously,

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<sup>28</sup> Eventually, PAED accepted the final number of cataloged clusters of 134, excluding over 20 clusters due to lack of information about employment.

these data are not sufficient to claim the dominant role of the creative industries in cluster development, but based on the assumption that developed European countries put emphasis on the creative sector, also for Poland this industry can be a rapidly growing area of economy. The creative activity of talented and ambitious individuals, based on skills, individual talents and unique knowledge, supported by intellectual law, is becoming a desired value in modern economies. A value that can be supported and developed through cooperation in structures, such as clusters.

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