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# Cluster Benchmarking in Poland – Edition 2014

## General Report



Bogusław Plawgo

# **Cluster Benchmarking in Poland Edition 2014**

*Report*

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Dear Readers,

I am pleased to present the Report of Polish Agency for Enterprise Development's benchmarking review, *Cluster benchmarking in Poland – Edition 2014*. This is a final Report summarizing findings of the survey, performed for the third time following 2010 and 2012 reviews, and intended as a periodical activity.

The purpose of this survey was to assess the state of Polish clusters, but also to identify trends in cluster development over the last six years. While two previous surveys have been solely based on the cluster coordinators accounts, this time we have also obtained information from the cluster members. As always, an important part of the project was to draft recommendations for various groups of stakeholders, including cluster coordinators and members, business support organisations, research institutes and central and local governments, on how to improve competitiveness and innovation capacity of Polish cluster constituents. The desired directions and mechanisms of cluster development have been identified and outlined as good practices that can be implemented by the stakeholders.

Benchmarking outcomes and conclusions provide an interesting reading material, while also being a starting point for drafting new cluster support measures for the 2014-2020 financial period. In this context, it is worth noting that in the last two years, the enterprises operating in clusters achieved 7% employment growth, while the rate for the rest of Polish businesses had not changed significantly.

A new part of the survey introduced this year, is opinion polling on a number of important topics such as outcomes resulting from collaboration in the cluster, role of cluster coordinator, cluster management, and benefits from economies of scale within the cluster. Opinion polling complemented by interviews with cluster coordinators, have confirmed advantage of cluster cooperation over single company operations. Cluster members also indicated the need to strengthen coordinator's leadership. In recent years, the role of coordinator is evolving, from an operator focused on animation of relationships and interactions between the cluster actors, to highly specialized skill and service broker.

Benchmarking conclusions provided a base for setting out specific recommendations for each and every coordinator of the surveyed cluster as well as for cluster entities. If introduced, the changes suggested to the areas where indicators were below the average for a certain cluster, will positively affect the development of the whole cluster group in question, and the regions alike. As evidenced from the benchmarking 2014, Polish clusters still require a variety of support measures and instruments to be provided at national and regional levels.

I would like to thank all the interviewed respondents, the cluster coordinators and members who contributed to our project, for spending time to share with us information and data about their clusters.

I wish you a nice reading.

Bożena Lublińska-Kasprzak  
President of the Polish Agency for Enterprise Development

PARP, Warsaw 2014

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## 1. Introduction

Considering characteristics of cluster structures that are demonstrated by a range of surveys, their development is seen as a major factor that could be driving the innovation and competitiveness of the European and thereby of the Polish economy. Evaluating how far clusters in Poland have become effective instruments of economic development and primarily determining specific mechanisms that may contribute to taking more advantage of clusters to enhance the innovation and competitiveness of enterprises and regions is the issue at stake.

This Report summarises the results of a survey conducted as part of the **Polish Agency for Enterprise Development's initiative named *Cluster Benchmarking in Poland – Edition 2014***. The present benchmarking survey comes as the third in a sequence, after the editions of 2010 and 2012. This survey was conducted among 35 clusters based on a dedicated methodology developed in 2008 and then modified by a team of experts in 2010 and 2012.<sup>1</sup> Opinions by members of clusters examined have been a valuable addition to the research methodology in the current edition of the benchmarking. The survey intended to assess quality and effects of cluster operation from the viewpoint of their constituent entities. A total of 618 entities out of 1917<sup>2</sup> members of 35 clusters subjected to benchmark analysis took part in the survey.

### **The following clusters have participated in the 2014 benchmarking:**

1. Kielce Trade Fair Cluster
2. Leszno Printing and Advertising Cluster
3. Life Science Cluster Kraków
4. Lublin Eco-Energy Cluster
5. Metal Cluster of Lubuskie Province
6. Metal Cluster
7. Nutribiomed Cluster
8. OPTOKLASTER – Mazovian Innovative Photonic Technology Cluster
9. Podlaskie Lingerie Cluster
10. Bydgoszcz Industrial Cluster
11. Wielkopolska ICT Cluster
12. Eastern Foundry Cluster KOM-CAST
13. Association West Pomeranian Chemistry Cluster “Green Chemistry”
14. Leszno Flavours
15. Metalika Metal Cluster
16. Southern Wielkopolska Food Cluster
17. Sustainable Infrastructure Cluster
18. Leszno Construction Cluster
19. Mazovian Energy Alliance
20. Subcarpathian Cooperative Connection - Light and Ultralight Aviation Cluster

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<sup>1</sup> „*Benchmarking klastrów: Opracowanie i opis metodyki benchmarkingu klastrów w Polsce*” dr hab. A. Nowakowska, dr Z. Przygodzki, dr M. Sokołowicz, dr J. Chądzyński, dr hab. K. Matusiak, M. Klepka, 2008, with changes, PARP

21. Eastern ICT Cluster
22. Klaster.info
23. Aviation Valley Cluster
24. Mazovia ICT Cluster
25. Eastern Poland IT Companies Cluster - KLASTERit.pl
26. West Pomerania ICT Cluster (Klaster.IT)
27. INTERIZON – Pomeranian ICT Cluster
28. Małopolskie and Podkarpackie Clean Energy Cluster
29. Bioregion Wielkopolska Association
30. Dolnośląskie Renewable Energy Cluster
31. Polish Wood Cluster
32. Eastern Metalworking Cluster
33. Silesian Aviation Cluster
34. Podkarpackie Renewable Energy Cluster
35. Eastern Construction Cluster

Out of this group, 31 clusters were involved in the 2012 survey and 20 in the 2010 survey. The high consistency of the test samples in 2012 and 2014 can be assumed to provide grounds for conclusions concerning development trends affecting these clusters in the period under study. Conclusions regarding the change dynamics of these clusters compared to 2010 must be more cautious, but still possible. This offers a unique opportunity for the continuing observation of development processes in the structures under examination.

Data for benchmarking analyses was primarily obtained through questionnaire interviews with 35 cluster coordinators, which are defined as legal entities that perform coordinating functions in clusters.

Additionally, 618 cluster members, from 1917 total members of 35 clusters, were queried about their opinions, including 237 micro-enterprises (0-9 employees), 143 small enterprises (10-49 employees), 91 medium-sized enterprises (50-249 employees), 41 large enterprises (250 plus employees), 48 scientific organizations, 7 local authorities, 16 business support institutions, 19 non-government organizations, and 16 other organizations.

Apart from the section dedicated to the research methodology, this report encompasses Chapters 4-8 that present benchmarking results, and Chapter 4 that offers general characteristics of the clusters studied, while four subsequent chapters examine in detail the following key areas: cluster resources, processes in the cluster, cluster performance, and cluster growth potential. The primary source of data is interviews with cluster coordinators. Attempts have been made to check the information received from cluster coordinators against the opinions provided by cluster members. However, most of their opinions are included in the Chapter 9, which is specifically dedicated to this issue.

Three successive benchmarking studies have provided data for comparative analysis presented in the Chapter 10 “Trends in cluster development in Poland for the period 2010-2014.”

Chapter 11 that comprises recommendations for various stakeholder groups, is the most significant part of the Report.

23 best practices presented in the report can also be understood as recommendations related to specific issues. They constitute valuable suggestions, particularly with regard to identified difficulties with or barriers to cluster development. The best practices show new ways of efficient course of action that could be disseminated and implemented.

## 2. Summary of results

This Report offers a diagnosis of 35 clusters operating in Poland and characterised by an advanced stage of development. Interviews with coordinators of all the clusters surveyed and opinions from 618 (from 1917) members of these clusters have been the primary sources of knowledge. Providing clusters with an effective tool for improving their action, acquiring knowledge, and learning are the chief objectives of the research and the resultant reports dedicated to individual clusters and this General Report. The presentation of best practices identified as part of the research plays an important role in this respect. A multi-dimensional analysis of the results has helped to formulate recommendations for cluster coordinators concerning actions for the development of the clusters themselves. The possibility of the coordinators taking measures to directly support competitiveness and innovation in SMEs has been indicated as well. Recommendations on cluster support policies have also been developed and submitted to representatives of central and local authorities. Separate recommendations have been addressed to scientific institutions, research institutes, and centres supporting innovation and entrepreneurship. Since the present benchmarking study follows the 2010 and 2012 projects, it significantly expands knowledge concerning the trends of cluster development and contributes to the promotion of clustering in Poland.

Clusters have been benchmarked in four key areas: cluster resources, processes in a cluster, cluster performance, and growth potential, as well as 15 sub-areas in the framework of these areas. The analysis is based on a total of 50 detailed indicators. Key conclusions of this research are introduced below, and they are arranged along four areas of the benchmarking and preceded by a section containing conclusions regarding the overall role of clusters in the Polish economy.

### *Role of clusters in the Polish economy*

Based on the survey of cluster coordinators, a more than 7% employment growth has been noted in entities belonging to the group of clusters examined during the last two years. Given that numbers of people employed have virtually remained steady in Poland in that period, the rising employment in clusters is proof that they concentrate entities characterised by great competitiveness and expansiveness. This must be regarded as a key result of the study, an expression of the dynamics and role of clusters in the economy, as well as a strong argument for policies in their support.

The research has affirmed the natural feature of clusters as a pro-innovation environment. Enterprises belonging to clusters display higher innovation than the average for the entire enterprise population (the survey has shown nearly 58% implemented some innovations in the last two years). For almost 40% of enterprises involved in implementing innovations, clusters have proved of assistance, while the very high impact of clusters on the implementation of innovations has been indicated by approximately 8% of firms implementing innovations. On the one hand, this may be interpreted as proof of the effectiveness of innovation improving projects pursued by clusters. The still relatively low participation of clusters themselves in boosting enterprise innovation suggests more innovative enterprises are probably more willing to become increasingly involved in cluster structures. Taking all this into account, some conclusions concerning the role of clusters as a pro-innovation environment have been posited. Clusters can be treated as a key instrument of improving the innovation of both the national and regional economies. They ought to become subjects of national and regional innovation strategies and operational programmes insofar as they concern promoting innovation.

Clusters should also be perceived as a valuable building block of social capital in Poland.

### *Cluster resources*

The clusters analysed vary widely in respect of their economic potential as measured with the number of employees in a cluster's core (from 36 to 23 782 individuals). Any support instruments or model methods of cluster management cannot be developed without taking cluster size into consideration. It is even reasonable to posit separate definitions for various types of cluster structures; on the one hand, those linked to local markets, and, on the other hand, those supporting external markets. There are a number of arguments for expanding cluster size. The survey has revealed large clusters (more than 61 entities) have a substantial advantage over medium-sized (29 to 60 members) and small clusters (up to 28 members) in the sub-area *Creation of knowledge and innovation*. Large clusters provide better conditions for innovation activities, including R&D. They enjoy a greater potential and significance in local and regional environments. Cluster coordinators should weigh both reasons for and limitations to quantitative growth that would combine more entities and their economic potential. The rationality that the operations of small clusters are closely linked to the potential of regions where they are based should be remembered as well.

The deteriorating situation of financial resources appears to be the key adverse development in the area *Cluster resources*. The synthesised indicator in the sub-area *Financial resources of clusters* had indeed risen from 1.06 to 2.08 between 2010 and 2012, but it fell to 1.25 in 2014. Rising members' share in cluster maintenance ought to be the proper trend towards assuring the financial stabilisation of clusters. With regard to fixed costs, membership contributions should be more closely tied to adequate services to be offered to members.

Clusters should be provided access to external public sources of financing, which ought to be combined with implementation of economic policy objectives, particularly as far as the development of leading national and regional sectors (smart specialisations) using clusters is concerned. This could be understood, for instance, as cluster coordinators' support in return for specific services to enterprises, such as training, R&D facilities, or promotion in new markets.

Considering access to infrastructure resources, the availability of office space or conference rooms to clusters can generally be said to be sufficient. The development of more advanced aspects of infrastructure resources is a current challenge. Clusters are dramatically stratified with regard to the *Availability of laboratories to cluster members*. The survey of members' opinions has demonstrated that merely 4.37% of respondents took advantage of testing equipment at the disposal of clusters. Added to this, as many as 74.1% of participants responded that they had not used any fixed assets possessed by clusters. Clusters' support for members concerning access to material infrastructure resources continues to be limited. Therefore, it is important to provide opportunities for clusters to carry out infrastructure projects, including R&D undertakings.

The indicator of employment in R&D activities in cluster cores equalled 0 in 29 cases. This is partially affected by the high number of such staff indicated by the leading cluster (7 221 individuals). Data collected during interviews additionally imply no R&D staff worked in six clusters. The absence or very restricted shares of R&D human resources in a majority of clusters suggest that clusters still concentrate R&D entities and enterprises with R&D facilities to an insufficient degree. Attempts should be made to raise R&D staffing in clusters by attracting more scientific units, research institutes, as well as enterprises having R&D facilities.

### *Processes in a clusters*

The negative changes in the sub-area *Creation of knowledge and innovation*, part of the area *Processes in clusters*, are the gravest threat to the proper development of the surveyed population of 35 clusters. This is due both to a fall of the synthesised indicator for that sub-area, from 5.84 in 2012 to 4.68 in 2014, and primarily to the growing role of innovation in contemporary economy. Clusters' work on innovative products and processes, as well as on the organisation of joint training in consideration of cluster requirements, is needed. However, the most adverse trend could be noted concerning the *Joint work on organisational and marketing innovations* with the indicator collapsing from 4.94 in 2012 to 3.4 in 2014. The assessment of process quality with regard to innovation should refer, e.g., to relevant results concerning numbers of firms to have implemented innovations. The indicator for the *Number of cluster firms to implement innovations in the last 2 years* ranges as low as 1.86. Data concerning the *Number of innovations developed or purchased, including legally protected innovations, introduced to clusters in the last 2 years*, are particularly depressing, with the average for all clusters amounting to barely 0.53. This indicates a maximum stratification of the group surveyed in respect to innovation activities. With regard to implementing unique/breakthrough innovations by the group of 35 clusters under examination, three groupings of clusters can be distinguished as follows: 3 leaders with high or significant innovation potential, a group of 10 clusters implementing few legally protected innovations, and the remaining 22 clusters that are not involved in legally protected innovation activities. Clusters must focus their actions on stimulating innovation processes in their constituent enterprises, including product, process, organisational and marketing innovations.

The status of R&D activities in enterprises belonging to clusters is relatively high, with the average value of as much as 5.60 for all clusters. This has also been confirmed by the survey of member opinions, since 51.4% of enterprises have declared such activities. However, the impact of clusters themselves on R&D activities was significant for a mere 30.6% of firms engaging in such operations (found 'very significant' or 'significant').

Presently, projects carried out in clusters have not brought satisfactory results involving market expansion. Approximately 40% of members of an average cluster have been involved in or delivered their finished 'contributions' of products and services to a cluster's offer. This is partly caused by the fact that only a negligible number of projects have been aimed at improving market activities of clusters and their member enterprises in particular. Clusters' strategies and actions ought to be oriented towards fostering the market expansion of enterprises, including preparation of joint market offers to a far greater extent.

The limited commitment of cluster members to actions in the sub-area *Marketing and PR* is a suggestion for cluster coordinators to revise marketing strategies with a view to the need to promote shared market offers and offers from particular members. The survey has disclosed that less than a half of cluster entities participate in national business events organised by clusters.

Forms of communication adopted by a cluster should match specific conditions of a given cluster in consideration of a phase of its development. It should be clearly suggested that, whatever the stage of cluster's development, internal communication tools in the form of ICT platforms should be established.

### *Cluster performance*

Results of the survey indicate a dwindling clusters' activity in relation to improving competences of clusters' member staff. The indicator *Number of joint trainings in a cluster in the last 2 years* has been observed to fall to 0.82 from 1.66 in 2012 and 2.22 in 2010. Considering that the clusters under analysis have arranged for a total of 590 trainings during the last two years, it can be estimated that around 9% of employees, or circa 4.5% of all employees of cluster members per annum, have been trained. Such a standard of training activity can already be described as significant; however, this far below objective requirements of cluster members.

Clusters still note and realise the task of a comprehensive improvement of the competences of their members' personnel, especially enterprises' personnel, to an insufficient degree. The supply of specialised educational and training services should become part of strategies of cluster development and their on-going operations as a key function of cluster coordinators, while public authorities ought to show support in this regard. It is also worthwhile to view clusters as environments for practical education of their own human resources and other community groups, e.g. students or school pupils, as part of practical education.

Adjustment of the trade education system to the needs of the economy, in particular of clusters, will be a desirable action of public authorities for the benefit of clusters' development. Adjustment of both subjects of study and methods of instruction that will guarantee the provision of specific competences expected by clusters should be taken into consideration. Implementation of the "dual education"<sup>3</sup> with clusters as partners may be an appropriate form.

Details concerning the share of exports in total sales of clusters, and primarily their dynamics, point to a substantial export potential of clusters. The average number of markets supported by a cluster is 27 at the moment, yet this number varies heavily across the clusters studied. The research has demonstrated a high potential for clusters' impact on the internationalisation of enterprises that is not realised in full at present. Opinions of cluster participants show 70.9% of the 144 enterprises that have experienced rising exports revenue have characterised the influence of clusters in this respect as "very low" or "minor," with merely 13.2% evaluating the effect of clusters on the growth of exports revenue as "large" or "very large." Support for enterprise internationalisation should become a key task of cluster coordinators. Clusters should also be major subjects of internationalisation support policies on all levels. Forms of knowledge and experience sharing between clusters with regard to the internationalisation of clusters themselves, but primarily the support of foreign enterprise expansion (e.g. by means of 'The Clusters' Club'), ought to be established.

### *Cluster growth potential*

The issue of leadership is currently the central problem in the field of cluster management. Without firm leadership, clusters will be unable to undertake a range of necessary pro-development actions. Research is needed into leadership processes in clusters, as well as provisional training and sharing of experience on leadership practices.

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<sup>3</sup> The dual education system envisages instruction in two locations: in the workplace and the school. The objective of the system is to provide the optimum possible professional education, i.e. a properly designed education profile enabling acquisition of skills, knowledge, and qualifications required to perform a given job in the changing circumstances of the labour market. In addition, the system helps to gain the required professional experience. A student finishing his or her education as part of the dual system is formally qualified to take a job. Cf. D. Dziewulak, *Kształcenie zawodowe w Polsce i w wybranych państwach Unii Europejskiej*, Analizy BAS (Biuro Analiz Sejmowych), issue 6/95, 22 April 2013.

Standards of performance, and presumably of management, in the clusters under examination have become strongly diversified and the processes of shared learning and transfer of experience are not sufficient. Knowledge flows among cluster members and between clusters attaining varied results must be improved, so that clusters that have merely stabilised their performance in absolute terms could be better able to bridge the widening gap to best clusters. A system of improving the management competences of cluster coordinators ought to be established.

The role of cluster coordinators as “competence brokers” for the benefit of cluster entities can be mentioned at this point. Coordinators would be tasked with constantly identifying competences required by cluster members and organising the process of their development in partnership with public authorities, job market institutions, schools, and universities.

Clusters encounter relatively varied attitudes of authorities in regions where they are based. Sharing of cluster policy experience between public authorities of diverse regions needs to be stimulated.

Public authorities should regard clusters as partners in the process of determining strategic directions of regional and national development, including the “smart specialisations.”

Concerning promotional efforts on the regional level, individual regions should be highlighted as attractive locations for the particular sectors. The presence of clusters ought to be treated as a major element boosting investment attractiveness and clusters themselves as partners of promotional actions.

Cluster members should be prepared for joint actions within, and this includes development projects, particularly of a commercial nature, where various groups of entities from a given cluster could become potential beneficiaries. “Business projects,” which are fully commercial undertakings, need not be feared, but they must come in an appropriate legal form (e.g. consortia or companies).

A concept of regional cluster policies should be adopted that would not only provide adequate support for the realisation of cluster projects but would primarily orient activities of coordinators and cluster members towards actions in line with regional policies in place.

### 3. Objectives, scope and methodology of cluster benchmarking in Poland and cluster member opinion survey

The objective of cluster benchmarking analysis was to:

- provide clusters with a useful tool for improving their operation, learning and broadening the knowledge;
- show the best solutions and practices used in Polish clusters;
- indicate the recommendations for cluster coordinators with respect to the development of cluster members, especially micro and SMEs, as well as to increase their competitiveness and innovative character;
- indicate the recommendations with respect to cluster support policy for the representatives of government and local government institutions whose goal is to improve the competitiveness and innovativeness of entrepreneurs, regions and Poland;
- indicate the recommendations for other entities supporting clusters and cooperating with them, in particular academic and research institutions as well as innovation and enterprise support centres;
- broaden the knowledge of the situation and trends in development of clusters in Poland;
- promote the concept of clusters in Poland.

The scope of analysis included evaluation of the functioning of clusters with the use of the benchmarking approach and obtaining the opinion of cluster members through a survey.

#### A. Benchmarking study

The benchmarking study covered 35 clusters operating in Poland. The clusters qualified for the study included mainly the ones which had participated in previous studies, and in particular in the second cluster benchmarking study carried out in 2012. Such a sample was to enable analysis of cluster development trends in the years 2010-2014. Eventually, this year's benchmarking included 31 of the 35 clusters which were involved in the 2012 benchmarking study. The remaining 4 clusters which were to complement the sample were selected on the basis of the following criteria: specific form of business; concentration around a dominant industry and geographic concentration; durability of cooperation; involvement in common initiatives – implementation of common projects and existence of common value chain links between enterprises/other entities operating in the cluster; diversity of entities making up the cluster (companies, representatives of the R&D and academic sector, public authorities, support institutions); cluster having its own development strategy.

Among the clusters which participated in the latest edition of the study, 20 clusters participated also in the *Cluster benchmarking in Poland – 2010* study.

High uniformity of the sample of 2012 and the one analysed in 2014, which was composed of the same entities in nearly 90%, allows to draw some conclusions on change tendencies in the development of the analysed clusters. Legitimacy of the above statement is even more justified if we take into account the fact that the assumed principles of recruitment of additional clusters into the analysed sample ensured their relatively high level of development and thus a significant uniformity with the group of clusters analysed in 2012. Whereas taking into account the fact that the sample of clusters analysed in 2014 and 2012 agreed with the one of 2010 in less than 50% (20 per 47 clusters), the results from before 2010 must be compared very carefully and bearing in mind that such a comparison cannot be deemed totally reliable. Nevertheless, taking the above limitation into account it is worth comparing the

benchmarking results for the entire analysed period of 2010-2014 and paying greater attention to the achieved results whenever they form specific trends in the entire period or may be interpreted from the perspective of additional observed factors.

Cluster benchmarking was performed in four major areas and in 15 specific areas (sub-areas) identified within the major areas, with the use of 50 indicators. Logical breakdown of benchmarking areas and sub-areas is presented in Table 1.

**Table 1. Cluster benchmarking areas and sub-areas**

Benchmarking areas	Benchmarking sub-areas
<b>I. Cluster resources</b>	<b>I.1. Human resources and cluster know-how</b>
	<b>I.2. Financial resources</b>
	<b>I.3. Infrastructure resources</b>
<b>II. Processes in a cluster</b>	<b>II.1. Market activity</b>
	<b>II.2. Marketing and PR</b>
	<b>II.3. Internal communication</b>
	<b>II.4. Creation of knowledge and innovation</b>
<b>III. Cluster performance</b>	<b>III.1. Human resources development</b>
	<b>III.2. Increasing the competitive advantage of a cluster</b>
	<b>III.3. Improvement of cluster innovation capacity</b>
	<b>III.4. Cluster internationalisation</b>
<b>IV. Growth potential</b>	<b>IV.1. Regional conditions</b>
	<b>IV.2. Public authorities' policy supporting cluster development</b>
	<b>IV.3. Associated institutions</b>
	<b>IV.4. Cluster management</b>

Source: *Metodyka benchmarkingu klastrów 2014*, PARP.

Trends in the changes occurring in clusters in 2010-2014 were evaluated on the basis of the analysis of arithmetic means in individual sub-areas (sub-synthetic indicators) and then arithmetic means in areas (synthetic indicators). Due to higher comparability of the study results of 2014 and 2012, a comparison on the level of 50 individual benchmarking indicators was also applied to this period.

Questionnaire-based interviews with representatives of cluster coordinators, understood as administration and legal entities performing a coordinating function in a cluster, were the basic method of obtaining information for benchmarking analysis. The interview was performed on the basis of a structured questionnaire and a detailed *Guidelines for interviewers conducting benchmarking studies of clusters in Poland*. Besides, during the calibration workshops for Experts whose task was to carry out interviews with cluster coordinator representatives, such issues as the manner of holding interviews, filling out questionnaires and identifying good practices were discussed.

The benchmarking methodology taken into account in the questionnaire applies both quantitative and qualitative methods, whereas in order to ensure transparency of the method

these methods were used separately in individual areas. Quantitative analysis was used to evaluate cluster resources and performance whereas the qualitative one to assess cluster growth potential and processes within clusters. In the case of quantitative questions when assessing the situation in a cluster respondents provided specific figures. In this case the benchmarking methodology requires the answers to be calibrated and encoded. Respondents' answers were transposed onto a 10-point scale with the use of an interval, and then encoded and entered into a spread sheet in the next step. The data were transposed onto the 10-point interval scale in accordance with the following formula:

$$Y = \frac{x_{\max} - x_{\min}}{n}$$

where:

$Y$  – interval,

$x_{\max}$  – maximum value of standardised variable  $x$ ,

$x_{\min}$  – minimum value of standardised variable  $x$ ,

$n = 10$ .

It should be noted that the values of specific clusters' results, including changes of the results in time, arise from a relative relation to the clusters with the best results in a specific measurement. This means that a significant improvement of the results of one cluster may lead to a substantial deterioration of the results of other clusters regardless of whether from an objective point of view they achieve worse results or not. It is necessary to take into consideration this benchmarking feature when interpreting both the results of individual clusters and average values for sub-areas or areas in which the above-mentioned manner of determining the position on a 10-point scale was applied.

In the case of the questions related to a qualitative analysis respondents were asked to express their subjective opinion on different aspects of their clusters' operation with the use of a 10-point scale where 1 meant “very poor”, whilst 10 – “very good”. In the case of questions where an ordinal scale was used the values indicated by individual respondents were entered directly into the data base and formed the basis for benchmarking analysis. Analysis of such questions requires understanding of the limitations imposed by the assumed methodology. First of all, individual respondents may demonstrate varying levels of optimism in evaluating different phenomena. This level of optimism may change with time and may also change if the respondents representing a given cluster are replaced by others in subsequent editions of the analysis. In order to minimise the subjectivism of qualitative evaluation the guidelines for the Experts conducting the study included a set of auxiliary questions which were to be used for assessment of individual indicators and which were to make the opinion expressed by a coordinator more objective. This, however, did not ensure full objectivity and comparability of all respondents' opinions. It is worth noting that the grading scale is large (highly sensitive) as a result of which different respondents could indicate different scores on the 1-10 scale for a similar level of a given phenomenon.

For the purposes of analysing the obtained data it was assumed that the analysed cluster collection is not a uniform group. Clusters differ from the point of view of various criteria such as size, sector of operation, level of innovation, region of operation, age or number of shared projects in the cluster. The clusters whose character is similar from the point of view of such measurements have a potential to achieve comparable results in individual analysed areas, sub-areas and benchmarking indicators. If such a situation is observed it may prove the existence of cause-and-effect relations. Therefore, the team of experts established which

sections of clusters might determine the results most strongly and it was decided that additional analyses would be performed in three sections:

- 1) **Age of a cluster.** In order for every group to be represented evenly two sections were created: 1-3 years and 4 years and more (“younger clusters” and “older clusters”). The first group was made up of 10 clusters whereas the second one (4 years or more) consisted of 25 clusters. The assumed criterion allows to specify the level at which e.g. the experience in cooperation translates into the results achieved by a cluster. The phase of development criterion used in the previous edition of the benchmarking study (2012) was abandoned, since according to the rules of classification applied at that time all the clusters analysed in this edition would get into one group (growth/maturity phase).
- 2) **Number of enterprises in a cluster.** This cluster cross-section was deemed significant since it shows the importance of achieving a “critical mass” in a cluster. In order for every group in the cross-section to be evenly represented three size brackets were established: up to 28 entities in the cluster (“small clusters”), 29-60 entities in the cluster (“medium clusters”) and 61 and more entities in the cluster (“large clusters”). As a result of such a division it turned out that there were 7 small clusters, 15 medium clusters and 13 relatively large ones.
- 3) **Number of implemented projects.** 3 groups of clusters were created: 0–3 projects (“least active clusters”); 4–8 projects (“active clusters”); 9 and more projects (“most active clusters”). The group of clusters implementing the smallest number of projects consisted of 11 clusters whilst the group of clusters with average activity (4-8 projects) and the group of the most active ones consisted of 12 clusters each. On the basis of this criterion it can be established to what extent the level of activity in project creation and implementation contributes to cluster development processes.

With respect to every section sub-synthetic and synthetic indicators were calculated for a given group of clusters – representatives of the given cross-section. It should be mentioned here that for the purposes of preparation of the reports dedicated to some clusters an additional section was distinguished based on the core activity industry. Dividing clusters by industries resulted in an insufficient number of clusters in individual industries thus making the analysis based on such a criterion impossible.

### ***B. Cluster member opinion analysis***

The purpose of opinion analysis was to assess the functioning of a cluster as well as the results of functioning in a cluster from the perspective of an entity belonging to it. According to a general assumption results of such an analysis may be a perfect source of information for cluster coordinators in the context of improvement of management processes.

The opinions of cluster members were collected on the basis of a questionnaire prepared by the contractor through Computer-Assisted Web Interviews and Computer-Assisted Telephone Interviews. The detailed investigated areas included in particular:

- the level of satisfaction of the functioning of a cluster and participation in it;
- the level of satisfaction of coordinator's activity, including the level of satisfaction/evaluation of the quality of the services provided by a coordinator;
- evaluation of a manner of financing of common cluster activities/projects;
- the level of satisfaction of the access to the R&D infrastructure and common innovative activities of the cluster;
- the quality of cooperation between companies and higher education institutions in the cluster;
- evaluation of the impact of the cluster on the level of innovation of cluster member's products/services;

- evaluation of international cooperation as part of the cluster;
- evaluation of the impact of operation in the cluster on the financial result of the entities involved in the study.

The requirement that a given population is to be made up of at least 20% of all members of every cluster was met. According to the assumption of the study, entrepreneurs were a definite majority (over 80% of all analysed entities) of the group involved in the study. The study involved the total of 618 entities from 1917 members of 35 clusters. Among them there were 237 microenterprises (0-9 employees), 143 small enterprises (10-49 employees), 91 medium-sized enterprises (50-249 employees), 41 large enterprises (250 and more employees), 48 academic institutions, 7 local government entities, 16 business environment institutions, 19 non-governmental organisations and 16 other organisations.

Part of the questions used in the opinion questionnaire for cluster members were qualitative in nature and they required from a member to evaluate a given phenomenon on a 1 to 5 scale where 1 meant a very poor assessment whilst 5 – a very good one. Other questions were related to facts, for example to participation in cluster projects or use of shared resources of the cluster. A special set of questions was prepared for enterprises. These questions took into account certain issues specific for this group of members such as innovation, economic results, market expansion and internationalisation as well as the impact of participation in a cluster on such issues.

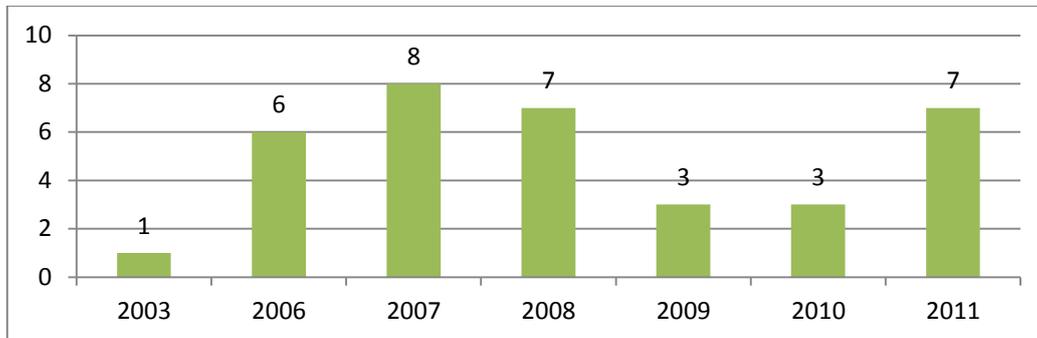
In certain cases opinions of cluster members were verified in a cross-section of entities depending on the activity measured on the basis of the number of projects implemented together – entities implementing 0-3 projects (“not very active entities”) and 4 and more projects (“active entities”).

## 4. Characteristics of clusters in Poland.

### 4.1. Number and structure of cluster members

The analysed population of clusters is dominated by the clusters formed in 2007, 2008 and 2011. The oldest one was established in 2003 whilst the youngest in 2011. The average age of the clusters involved in the study is approximately 6 years (Chart 1).

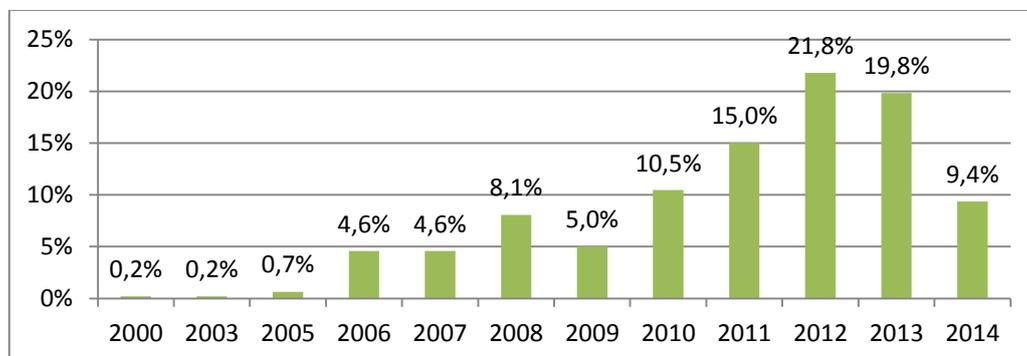
**Chart 1. Year of cluster establishment**



Source: Own analysis based on the results of the research among coordinators of 35 cluster.

Average experience of entities functioning in clusters is approx. 5 years. A decisive majority of members of the analysed cluster population (76.5%) have nearly 4 years of experience in operation within a cluster structure (Chart 2).

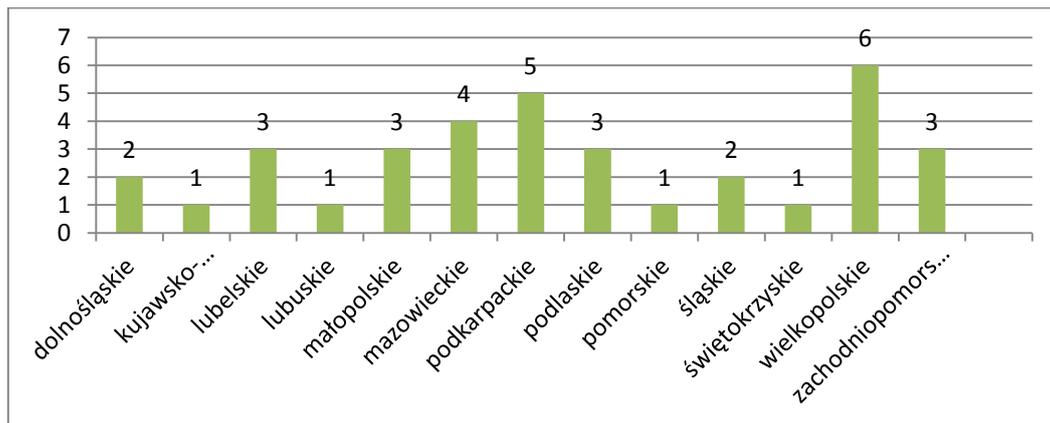
**Chart 2. The year as of which an entity has been a cluster member**



Source: Own study based on CAWI/CATI surveys carried out among members of 35 clusters.

Geographic distribution of the analysed clusters indicates that these clusters are located in 13 voivodeships. Łódzkie, Opolskie and Warmińsko-Mazurskie do not participate in the survey. The largest number of the clusters involved in the study is from the Wielkopolskie (6) and Podkarpackie (5) voivodeships, whereas only one representative of such voivodeships as Lubuskie, Pomorskie and Świętokrzyskie each qualified to the analysis (Chart 3).

**Chart 3. Region in which a cluster is rooted**

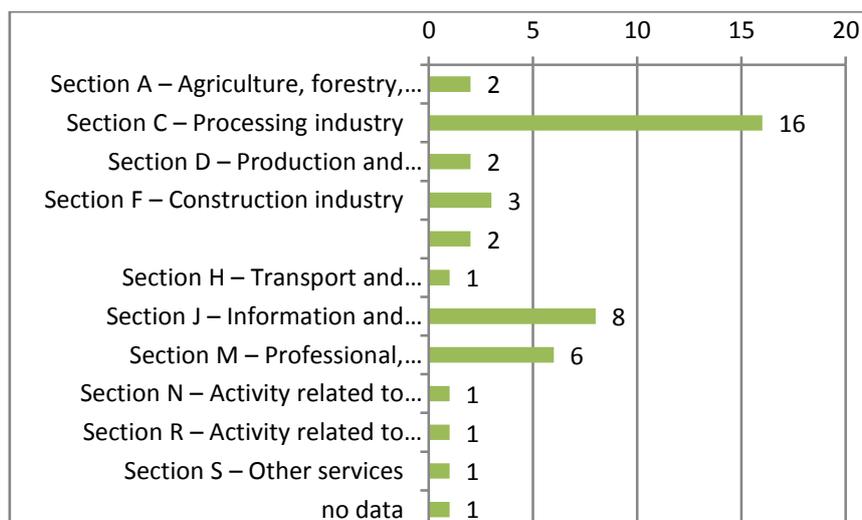


Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

Nearly half of the clusters involved in the study (16 of 35) operate in the processing industry (section C). The basic activity of the next eight clusters falls within section J of the Polish Classification of Activity (PKD list) – information and communication. Six clusters are dominated by professional, academic and technical activity (section M of the PKD list). The next three clusters represent construction, that is section F of the PKD list; agriculture, forestry, hunting and fishing as well as wholesale and retail and production and provision of power and gas – these activities are represented in the population by 2 clusters each (section A and section G, respectively, of the PKD list). Such fields of operation as transport and warehouse management, activity related to administration services and support activity, activity related to culture, entertainment and recreation as well as other services have one representative each in the population involved in the study. There was one cluster in which it was impossible to establish the leading industry. Respondents indicated more than one industry despite the fact that theoretically there should have been only one. Hence 44 answers provided by 35 analysed clusters.

This means that the industries leading in the analysed group of clusters are traditional industries and in a vast majority the analysed clusters may be considered traditional ones.

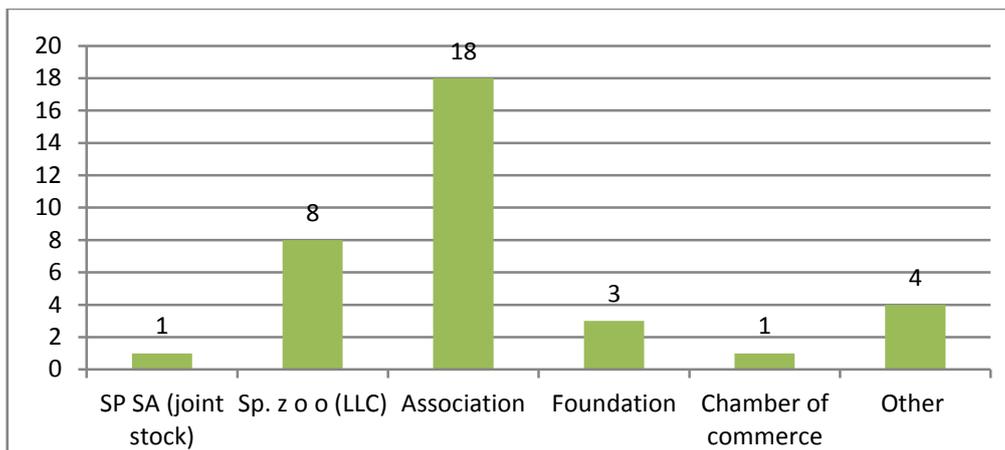
**Chart 4. Cluster operation sector (industry as per the Polish Classification of Activity)**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

In the analysed group of clusters an association is the dominant form of business. Almost 50% clusters involved in the study operate in that form at the moment. In eight cases clusters have the form of a limited liability company. (Chart 5). The next three clusters operate in the form of foundations. In isolated cases clusters operate in the form of a joint stock company or a chamber of commerce. Other forms of cluster operation included: a local government entity, Regional Chamber of Commerce, research institution and a combination of a higher education institution with a natural person.

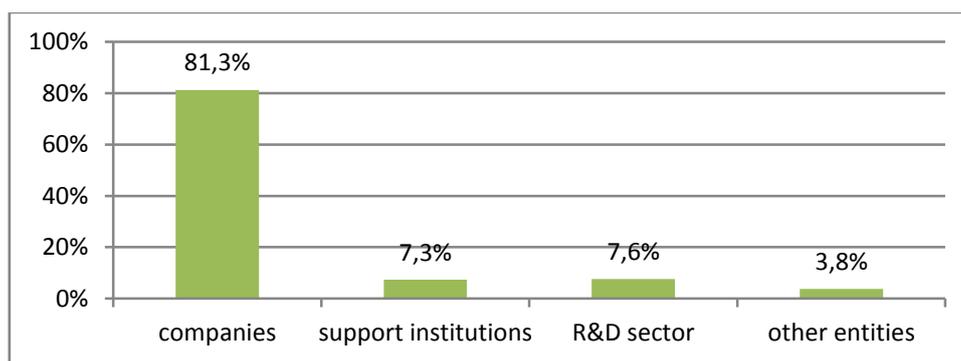
**Chart 5. Form of business**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

The main group of members of the analysed clusters consists of companies which make up 81.3% of the studied population, that is, in total, 1559 companies. Support institutions make up 7.3% (139) of the analysed population whilst the R&D sector makes up 7.6% (146) of the entity structure of the clusters involved in the study. The remaining entities make up 3.8% (73) of general population (Chart 6).

**Chart 6. Structure of entities in clusters**

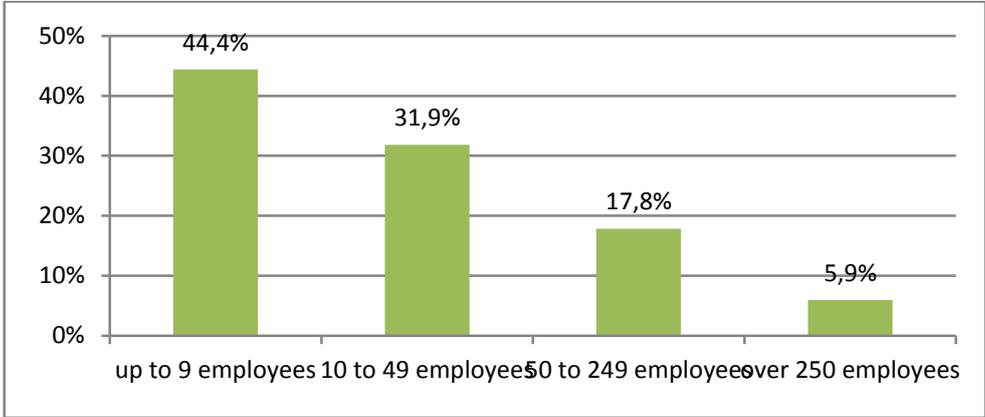


Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

The group of entities which make up over 81% of all entities of the studied clusters is dominated by micro enterprises i.e. the ones employing up to nine people. Micro enterprises make up 44,4% of all enterprises in clusters, whereas the companies with 10 to 49 employees make up 31,9% of all enterprises. Thus it should be assumed that the character, scale and dynamics of development processes in analysed clusters is shaped to a large extent by micro and small enterprises whose total share in all entities of the analysed clusters is 76.3%.

The remaining part of the structure of enterprises broken down by the number of employees consists of medium-sized enterprises (50 to 249 employees) which make up 17.8% of all enterprises and large companies (250 and more employees) which make up 5.9% of the enterprises operating in the studied clusters (Chart 7).

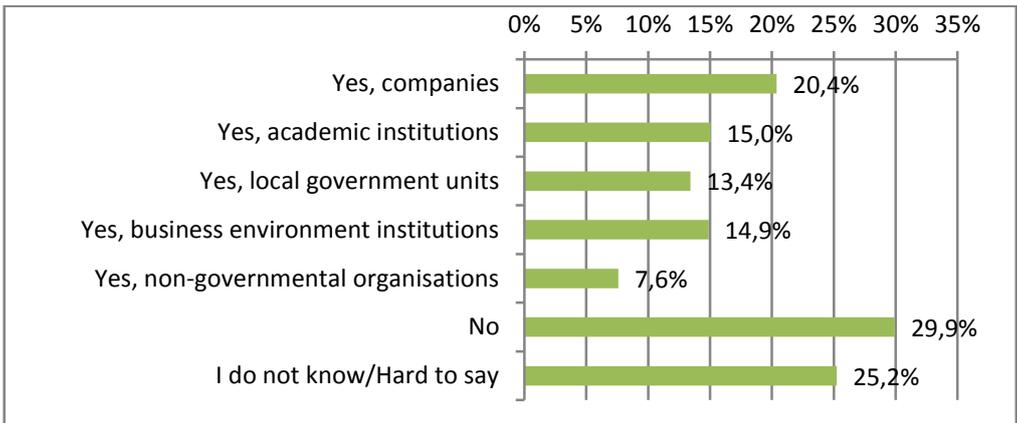
**Chart 7. Enterprise structure in clusters based on employment levels**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

It is a good idea to look at the structure of the studied clusters broken down by enterprises from the point of view of entities – cluster members. Nearly 30% of the members involved in the study indicate that the current entity structure is appropriate. At the same time in the opinion of 20.4% members the entities whose number should be increased in the first place are companies. 15% and 14.9% of respondents pointed at the lack of a sufficient number of academic institutions and business environment institutions, respectively. On the other hand, in the opinion of 13.4% of respondents there should be more local government units in the entity structure of clusters and according to the next 7.6% the share of non-governmental organisations should be increased (Chart 8/question no. 6<sup>4</sup>).

**Chart 8. Opinion of cluster members about what type of entities are missing in the cluster**



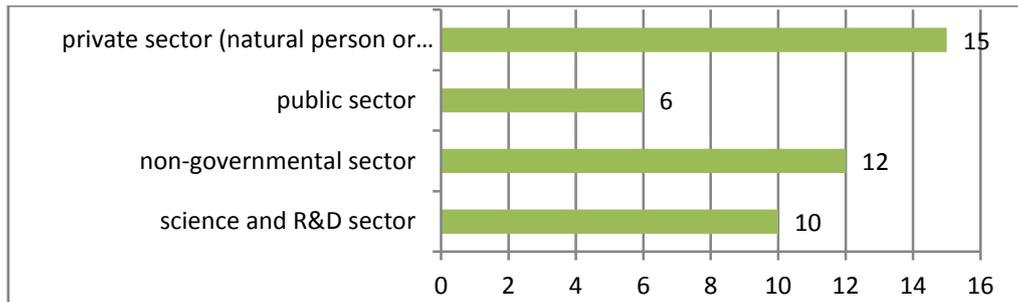
Source: Own study based on CAWI/CATI surveys carried out among members of 35 clusters; multiple-choice question; N=618.

<sup>4</sup> Reference to the Question no. 6 pertaining to cluster members' opinion included in the statistical Annex at the end of the Report in the part entitled "Member opinion analysis"

## 4.2. Cluster development types, models and phase

Usually establishment of clusters in the world and in Poland is triggered by one or more factors. Also in this case coordinators indicated several initiators of establishment of specific clusters. In fifteen cases formation of a cluster was initiated by a company from a private sector whilst in the next six cases – by entities representing a public sector. Other sectors which contributed to the formation of clusters from the analysed sample include the non-governmental sector which participated in establishment of twelve clusters and the science and R&D sector which inspired establishment of nine clusters (Chart 9).

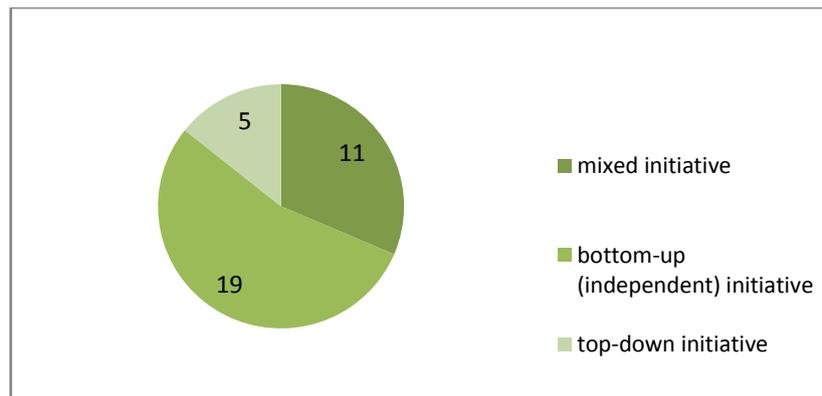
**Chart 9. Cluster initiator**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters. Some respondents pointed more than one cluster initiator.

In 19 cases clusters were formed as a result of a bottom-up initiative which means a situation in which cooperative associations and groups of enterprises are formed automatically and cluster formation is an outcome of own activity of companies. Formation of the next 11 clusters was inspired by bottom-up initiatives of enterprises and at the same time by either public authorities or support institutions (Chart 10). Only 5 of 35 clusters were formed as a result of encouragement given by an entity from outside the enterprises sector that is from a public sector – top-down initiative.

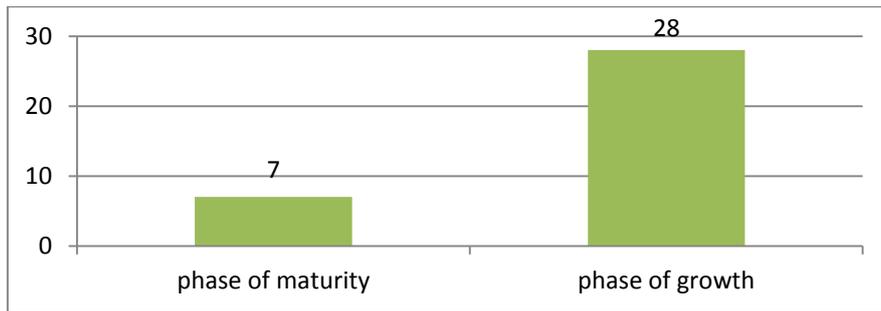
**Chart 10. Cluster development type**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

7 of the 35 clusters involved in the study are in the maturity phase, whereas twenty eight of them are in the growth phase (Chart 11).

**Chart 11. Development phase of the studied clusters**



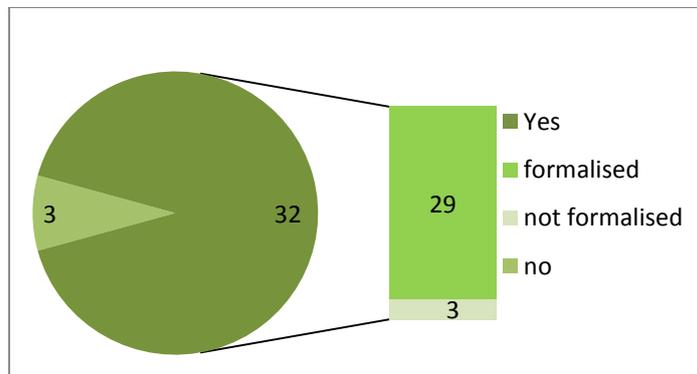
Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

### 4.3. Cluster goals

The directions and dynamics of development processes very frequently depend on precisely defined goals and consequences of their pursuit. In the case of clusters development goals are very often defined and included in development strategies. This applies also to the cluster population involved in this study.

Coordinators of thirty two clusters confirmed that they had a cluster development strategy and twenty nine of these strategies were formalised. The strategy of the remaining three clusters has not been formalised yet. Only three clusters did not have their goals defined and formalised in the form of a cluster development strategy.

**Chart 12. Cluster development strategy**



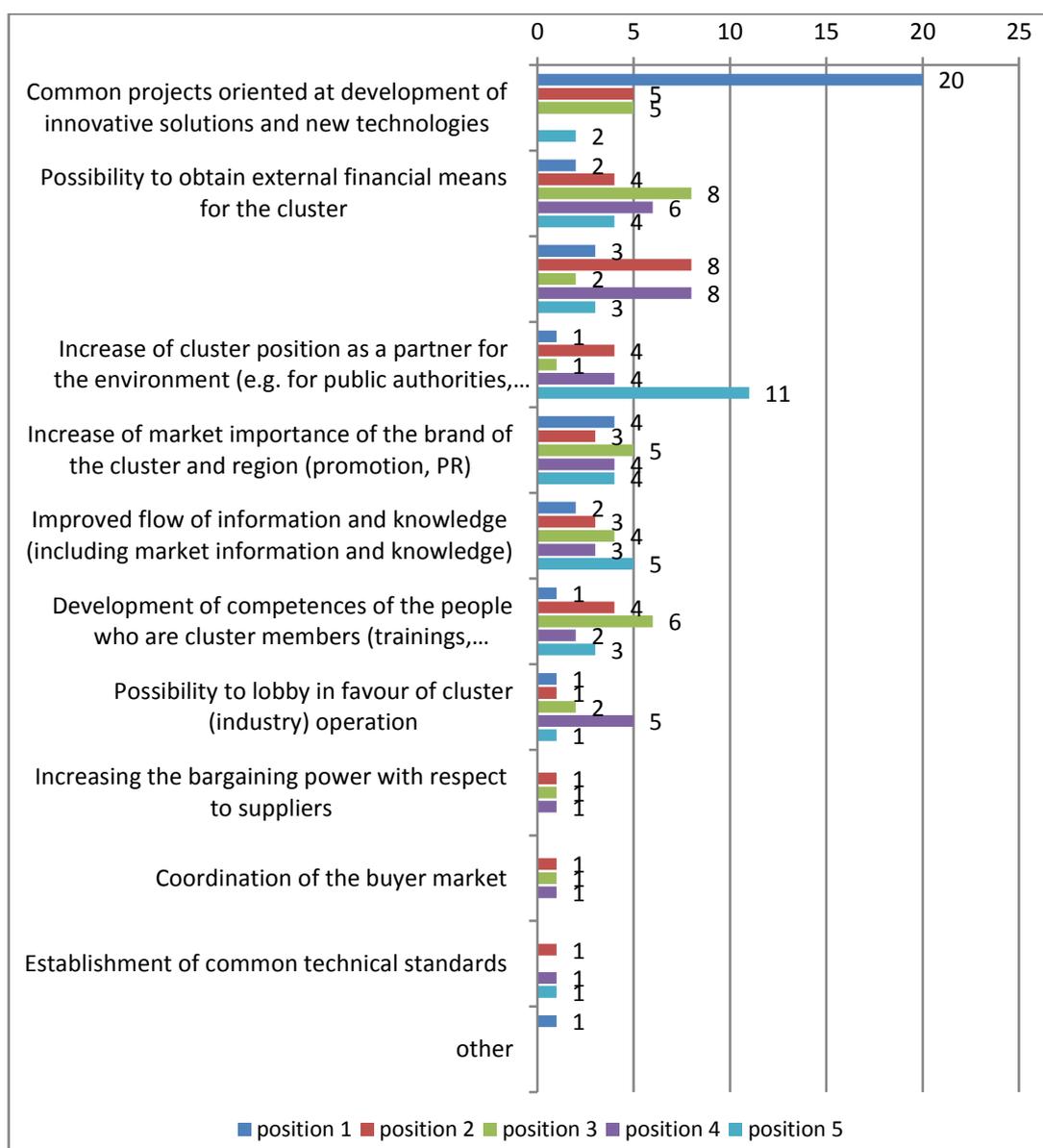
Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

The main strategic goals of cluster functioning which have been pointed out most frequently by the coordinators participating in the study include first of all (Chart 13):

- 1) Common projects oriented at development of innovative solutions and new technologies – this goal was mentioned thirty two times (twenty times in the first place and five times in the second place);
- 2) Increasing the level of cluster internationalisation and its international competitiveness – this goal was indicated twenty four times (three times in the first place and eight times in the second one);
- 3) A possibility to obtain external financial means for the cluster – this goal was indicated twenty four times (twice in the first place and four times in the second place);
- 4) Strengthening the cluster position as a partner in the eyes of the environment (e.g. public authorities, market environment institutions) – mentioned by respondents twenty one times (once in the first place and four times in the second place);

- 5) Increase of market importance of the brand of the cluster and brand of the region – pointed out by respondents twenty times (three times in the first place and four times in the second place).

**Chart 13. Strategic goals of development of analysed clusters and their hierarchy (position)**

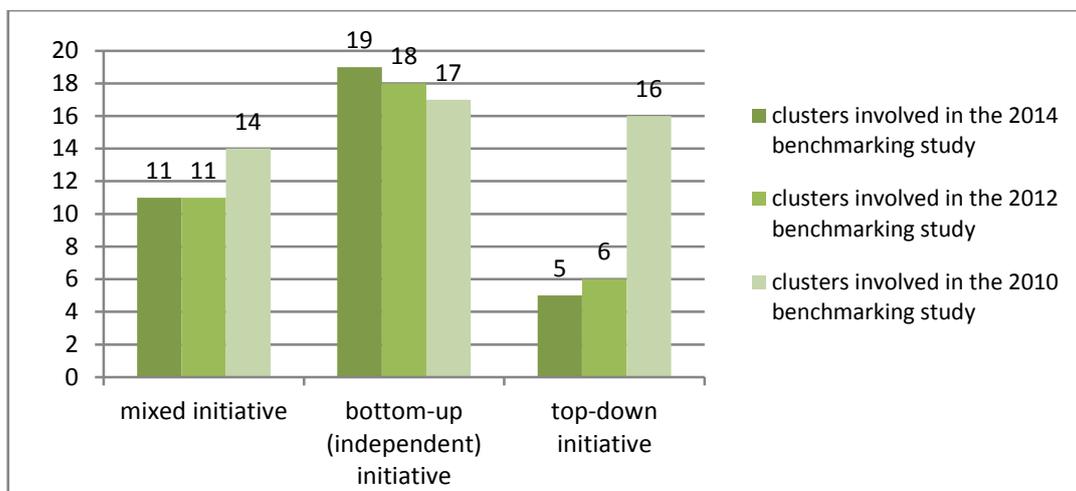


Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

#### 4.4. Changes in cluster characteristics in 2010-2014

In the context of changes in the characteristics of clusters in the years 2010-2014 it should be said that cluster populations analysed in individual benchmarking editions were dominated by the clusters formed through bottom-up processes (Chart 14).

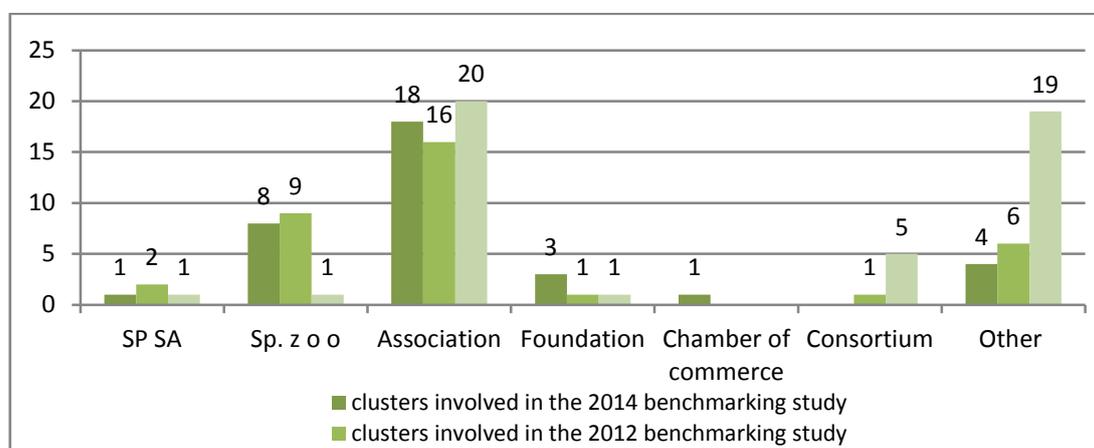
**Chart 14. Cluster development type – comparison of the study results of 2010, 2012 and 2014**



Source: Own analysis based on the results of the research among cluster coordinators in 2010, 2012 and 2014.

Over the last four years association has been the most common form of cluster operation (Chart 15). In this year's benchmarking edition 18 of 35 clusters operate in such a form (in 2012: 16 of 5 clusters, in 2010: 20 of 47). When compared to 2010 first of all the number of entities operating in the form of a limited liability company increased.

**Chart 15. Form of business of clusters – comparison of the study results of 2010, 2012 and 2014**

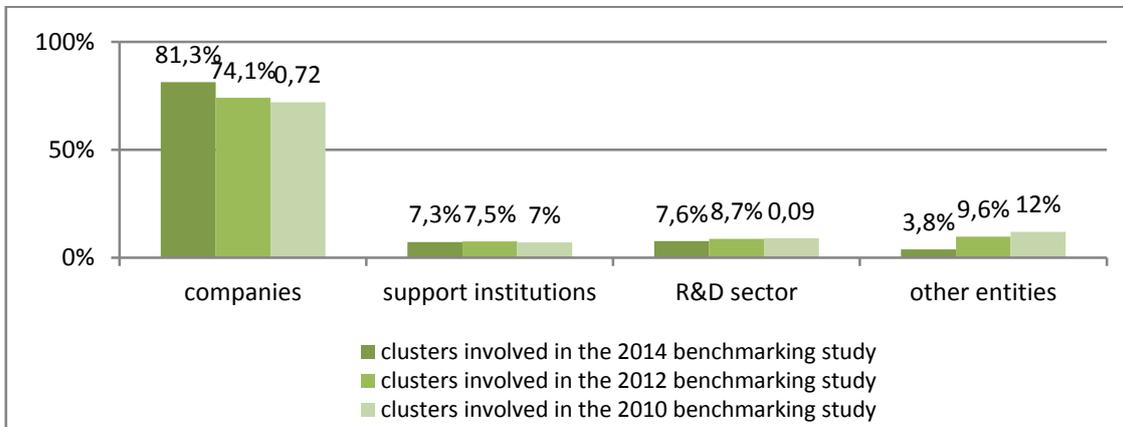


Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

The entity structure of clusters changed much more in the period from 2010 to 2014. First of all, the percentage share of enterprises in the total number of cluster members grew from 72.0% in 2010 to 81.3% in 2014. In 2012 companies made up 74.4% of the total number of cluster members (Chart 16). On the other hand, a pretty clear downward trend appeared in the percentage share of the R&D sector in the general population of analysed clusters in individual editions of the study. From 9% in 2010 the share of the R&D sector decreased to 8.7% in 2012 and then, in 2014, to 7.6%. The share of business environment institutions in the entity structure of investigated clusters in the analysed period was 7.5%. At the same time

the share of other entities in the analysed clusters in the entity structure decreased from 12% in 2010 to 9.6% in 2012 and fell to as little as 2.3% in 2014.

**Chart 16. Entity structure in clusters – comparison of the study results of 2010, 2012 and 2014**



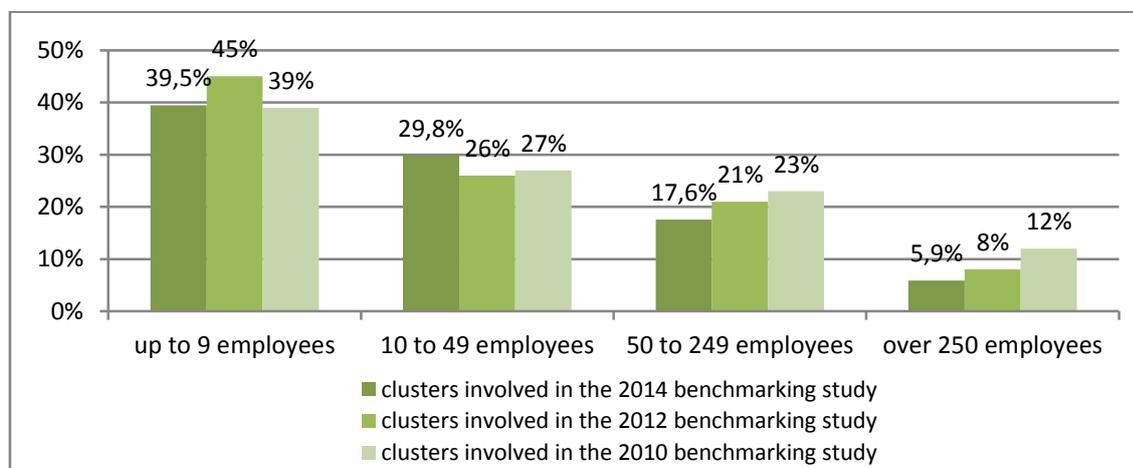
Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

When compared to 2010 the share of large enterprises in the structure of companies which are cluster members has been gradually decreasing. In 2010 large enterprises made up 12%, in 2012 – 8%, whilst at the moment there are 5.9% large enterprises in clusters (Chart 17). The downward trend applies also to medium-sized companies. Their percentage share fell from 23% in 2010 to 21% in 2012 and then in 2014 reached the level of 17.6%.

Progressive trend, on the other hand, applies to the number of small companies whose share in the total number of companies, after a small drop in 2012 from 27% (2010) to 26%, has now reached the level of nearly 30%.

Still, however, micro enterprises are the largest group. In 2010 the share of the smallest companies in the total number of enterprises was 39% and in 2012 it grew to 45%. At the moment they make up 39.5% of the analysed population.

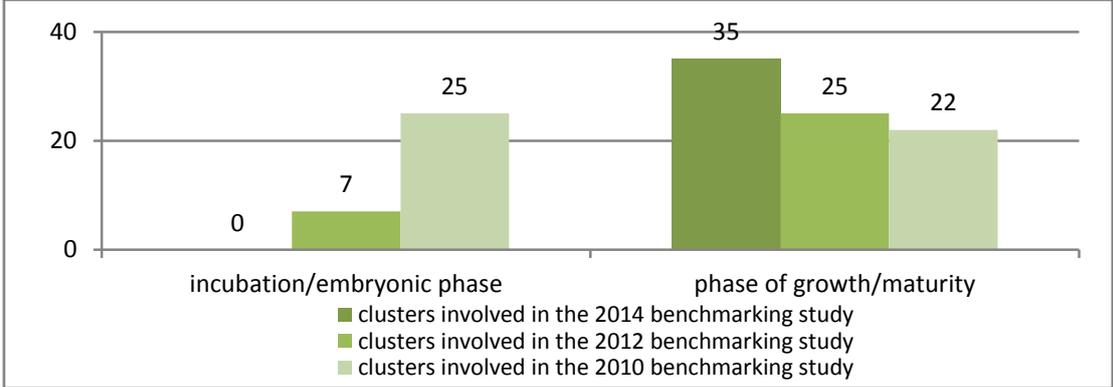
**Chart 17. Structure of enterprises in clusters broken down by employment level – comparison of the study results of 2010, 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

Over the last four years the structure of the analysed clusters stabilised as regards their phase of development. In 2010 the study involved 25 clusters in the embryonic phase and 22 in the growth and maturity phase. In the study carried out in 2012 the share of the former (incubation clusters) decreased to seven whilst the number of the growing and mature clusters increased to twenty eight (Chart 18).

**Chart 18. Phase of cluster development – comparison of the study results of 2010, 2014 and 2012**

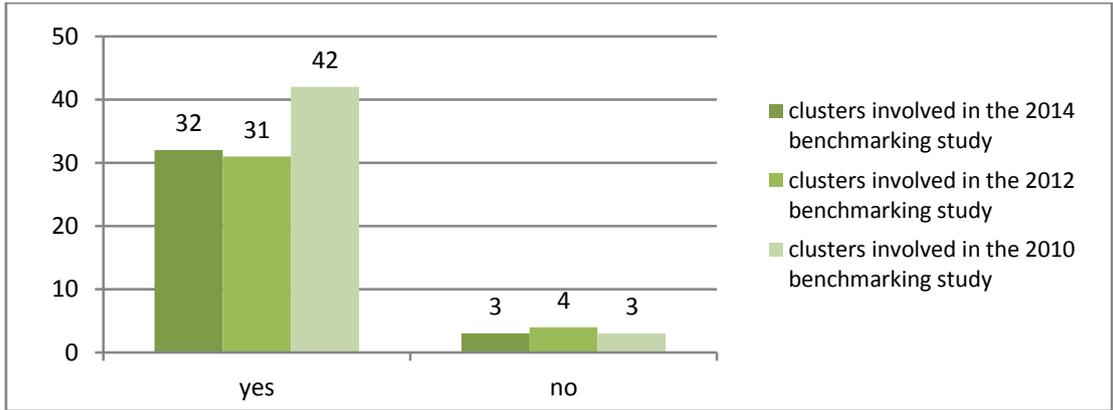


Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

In this edition of the benchmarking study the analysed population consisted only of clusters in the growth or maturity phase.

This year over 91% of the analysed clusters declared to have a cluster development strategy (32 of 35) (Chart 19). In 2012, on the other hand, there were 88.6% such clusters (31 of 35) whilst in 2010 – 89.4% (42 of 47).

**Chart 19. Cluster development strategy – comparison of the study results of 2010, 2012 and 2014**

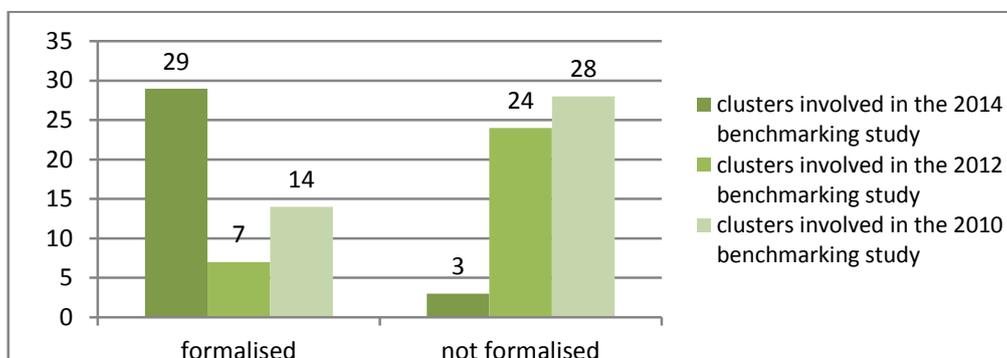


Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

The level of formalisation of cluster development strategies grew significantly in the last four years. In 2010 fifteen clusters had a cluster development strategy in the form of a formal document. It was exactly 30% of the clusters which in 2010 declared to have a strategy (Chart 20).

In 2012 22.6% of the clusters which had a strategy of any kind had it formalised. In 2014 this percentage rose to as much as 90.6%.

**Chart 20. Cluster development strategy – level of formalisation – comparison of the study results of 2010, 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

Comparative analysis of clusters' strategic goals over the last four years may be conducted to the full extent only for the period from 2012 to 2014 due to the fact that the construction of goals of the clusters analysed in 2010 was different from the goal construction in subsequent benchmarking editions.

**Table 2. Strategic goals of clusters broken down by the number of mentions in 2014 and 2012**

No.	Strategic goal	Position in the number of mentions ranking	
		Benchmarking – edition 2014	Benchmarking – edition 2012
1.	Common projects oriented at development of innovative solutions and new technologies	1	1
2.	Increasing the level of cluster internationalisation and its international competitiveness	2	6
3.	Possibility to obtain external funds for the cluster	2	2
4.	Increase of cluster position as a partner for the environment (e.g. for public authorities, market environment institutions)	4	4
5.	Increase of market importance of the brand of the cluster and brand of the region (promotion, PR)	5	3
6.	Improved flow of information and knowledge (including market information and knowledge)	6	5
7.	Development of competences of the people who are cluster members (trainings, courses, studies)	7	7
8.	Possibility to lobby in favour of cluster (industry) operation	8	8
9.	Increasing the bargaining power with respect to suppliers	9	9
10.	Coordination of the buyers' market	10	10
11.	Establishment of common technical standards	11	11

Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

As it follows from the data included in Table 2 the order of clusters' strategic goals established on the basis of the number of mentions has not really changed to any significant extent over the last two years.

The necessity to implement common projects oriented at the development of innovative solutions and new technologies still takes the first place. The importance of the goal which consists in increasing the level of cluster internationalisation and international competitiveness is still growing – it has been placed in the second position of cluster goals hierarchy based on the number of mentions, together with a possibility to obtain external financial means for a cluster. In the previous benchmarking edition the goal related to cluster internationalisation took only the sixth position.

Starting from the seventh goal listed in Table 2 there is total agreement between the groups of clusters studied in 2012 and 2014.

## 5. Cluster resources

Analysis of cluster resources was conducted in three sub-areas within every cluster:

- 1) **Human resources and cluster know-how** – total employment in cluster entities, cluster leaders, entities in the cluster, employment in the R&D sector;
- 2) **Financial resources** – share of own resources from self-financing (e.g. membership fees) in the total budget of the cluster, external financial means obtained for cluster projects over the last two years; budget of the cluster per member participating in financing of the cluster;
- 3) **Infrastructure resources** – availability of offices and conference halls for cluster needs; availability of laboratories to cluster members; level of use of ICT technologies in internal communication in the cluster (e.g. intranet).

The analysed population of clusters scores best in respect of its infrastructure. The *Infrastructure resources* sub-area has reached the highest values of the benchmark and arithmetic mean among the three sub-areas of *Cluster resources*. The benchmark value amounted to 9.67, whereas the average value in the sub-area reached the level of 6.05. Availability of *Human resources and cluster know-how* in clusters is slightly worse. The benchmark amounted to 6.75 with a relatively low arithmetic mean amounting to 2.00. The benchmarking results indicate that the clusters involved in the study achieved the poorest results in the area of financial resources. The benchmark for *Financial resources* sub-area was 6.67, whereas the mean value reached as little as 1.25.

The above indicates that analysed clusters are relatively well equipped with infrastructure but have much poorer human and financial resources.

The greatest stratification of the analysed cluster population (the difference between the benchmark – the leader's result – and the mean of all clusters which may be referred to as an average cluster) occurs in the case of the *Financial resources* sub-area and amounts to 5.42. A relatively significant stratification of the analysed group may be noticed in the *cluster human resources and know-how* area (4.75). The smallest difference between the best cluster and the average one has been identified in the *Infrastructure resources* sub-area and it amounts to 3.62.

It may be assumed that clusters' situation has somewhat deteriorated as regards their *Financial resources* and *Human resources and cluster know-how*. We should not, however, draw any rash conclusions on the basis of such aggregated data. First of all it is necessary to take into account the fact that there has been a certain change in the structure of analysed clusters, since, as it has been indicated in the methodological part of the *Report*, three new clusters have been included in this year's edition of the study which may result in a change of the results regardless of any other factors. Secondly, point values of the benchmarks achieved by individual clusters and, as a result, their mean results depend on the distance to the clusters with best scores in respect of specific indicators. Therefore, the average benchmarking result for the *Financial resources* or *Human resources and cluster know-how* area may be the effect of not only an absolute reduction of cluster assets to which specific indicators apply but also from a growing distance to the leader, also due to clear improvement of its situation. In the latter case reduction of mean results cannot be interpreted as manifestation of an objective deterioration of situation. Taking the above into account it would be advisable to conduct a detailed analysis of the situation of clusters from the point of view of individual sub-areas and indicators.

The mean of cluster benchmarking values in the *Cluster resources* area has decreased slightly when compared to the previous benchmarking study of 2012. In this year's edition of the study the benchmarking mean from all sub-areas of *Cluster resources* was 7.69, whilst in

2012 the indicator amounted to 7.75 (decrease of somewhat less than 1%) (Table 3). The mean of average values, on the other hand, decreased by 23.1% – it dropped from the level of 3.99 in 2012 to 3.10 in 2014.

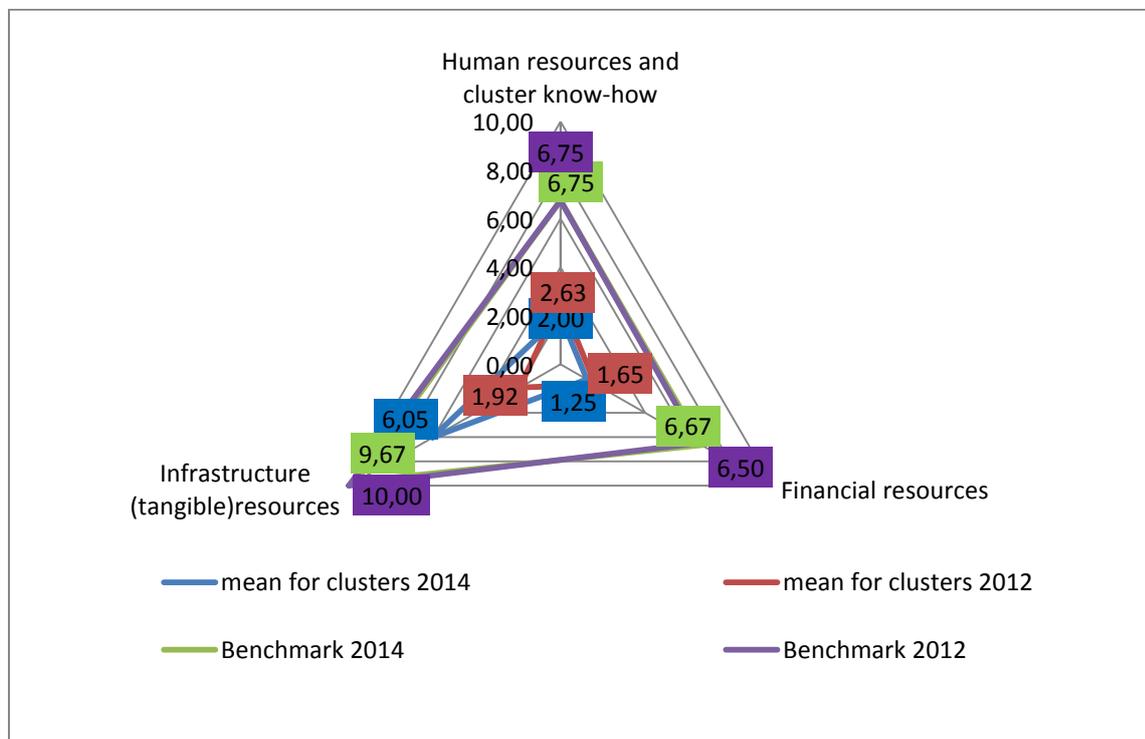
**Table 3. Mean of benchmarks and of average values of all cluster resources sub-areas**

Mean of the <u>benchmark values</u> from all sub-areas <i>Cluster resources 2014</i>	Mean of the <u>benchmark values</u> from all sub-areas <i>Cluster resources 2012</i>
<b>7.69</b>	<b>7.75</b>
Mean of the <u>mean values</u> from all sub-areas <i>Cluster resources 2014</i>	Mean of the <u>mean values</u> from all sub-areas <i>Cluster resources 2012</i>
<b>3.10</b>	<b>3.99</b>

Source: Own analysis based on the research results in 2012 and 2014.

Taking into consideration the benchmark value in individual sub-areas it should be stated that in the case of leaders (benchmark value) in the analysed group of clusters the situation in the sub-areas of *Human resources and cluster know-how* and *Infrastructure resources* has remained practically unchanged, whereas the leader's situation in the *Financial resources* sub-area has improved slightly. The benchmark grew to the level of 6.67, whilst in 2012 it was 6.50. This gives a nearly three percentage point increase of the benchmark value over the last two years (Chart 21).

**Chart 21. Mean values and benchmark values for the Cluster resources area**

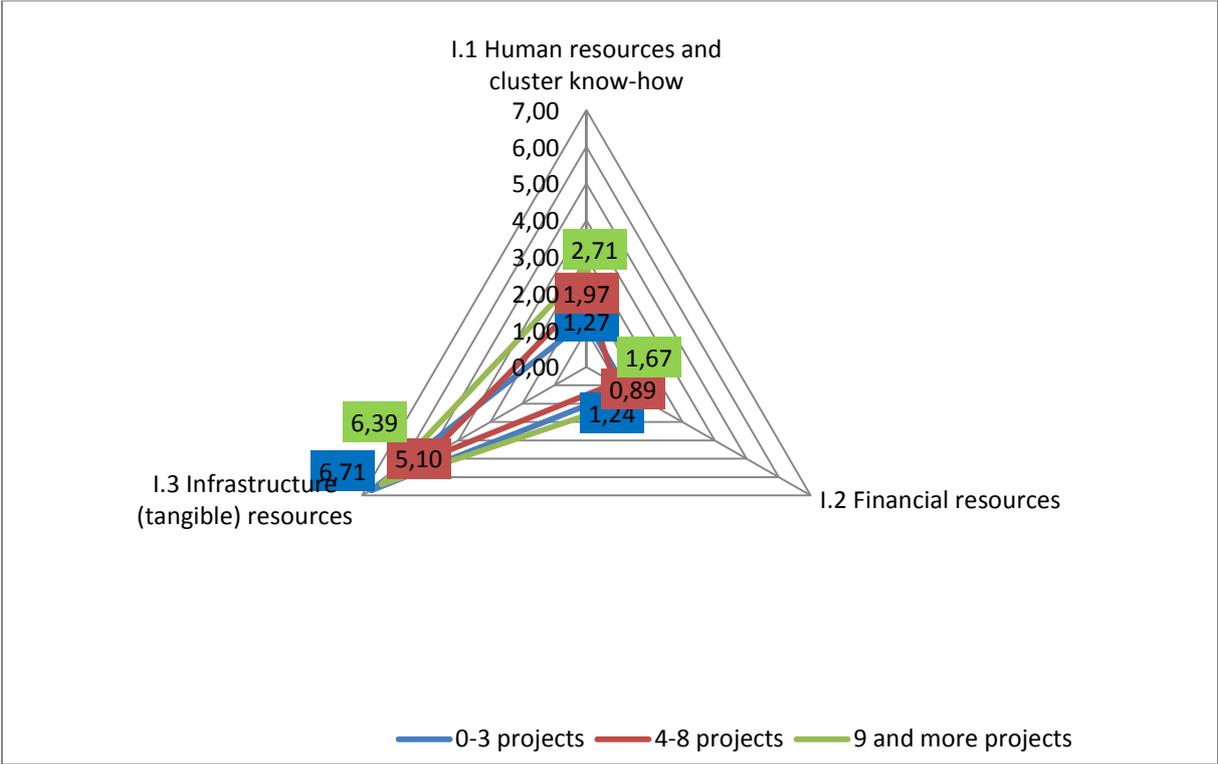


Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 i 2014.

Also the situation of average clusters with respect to their *infrastructure resources* has improved. Clusters' mean value of the *Infrastructure resources* sub-area in 2014 was 6.05, whereas in 2012 it amounted to 1.92. At the same time comparing the clusters' average results of 2014 with average results of 2012 indicates that when it comes to financial resources as well as human resources and know-how clusters' position has deteriorated. A drop in *Financial resources*, where the mean fell from 2.18 in 2012 to 1.25 in 2014, is particularly visible. Deterioration of situation related to financial resources seems to be the main negative occurrence identified in the *Cluster resources* area in this edition of the Cluster benchmarking study.

When looking for the causes of changes occurring in the entire *Cluster resources* area with respect to mean benchmarking values it may be assumed that these changes resulted, to a certain extent, from the projects which have been implemented by clusters together. It seems justified inasmuch as the fact of holding specific resources often results from the previously taken actions. The analysis of mean values in individual sub-areas that takes into account the number of projects implemented together by clusters indicates that the clusters implementing nine or more projects (the most active ones) had greater *Human resources and cluster know-how* and *Financial resources* (Chart 22).

**Chart 22. Mean values for the *Cluster resources* area depending on the number of projects implemented by clusters**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

The *human resources and know-how* of the least active clusters was approx. 50% lower than in the case of clusters with high or average level of activity. It may be concluded that the greatest impact on this sub-area has been exerted by implemented projects. At the same time no positive impact of a higher number of implemented projects on the improvement of situation in the field of financial and infrastructure resources has been observed.

In the *Cluster financial resources* sub-area the most active clusters had relatively poorer financial resources than the least active ones and only slightly better than the clusters with

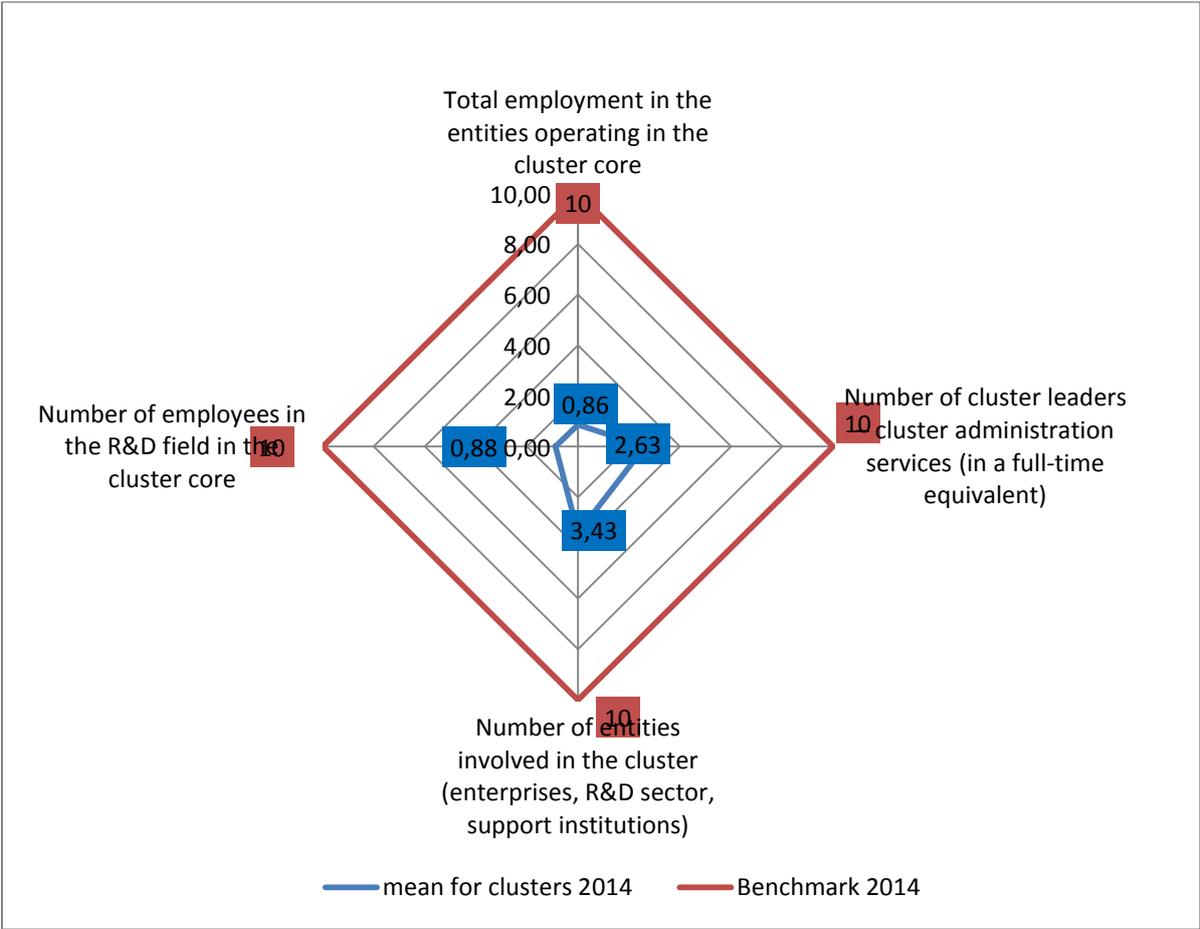
average level of activity. The level of activity did not have any significant impact on the benchmark average in the *cluster infrastructure resources* sub-area. Differences between average values in this sub-area are least significant for the said cluster groups in respect of the number of implemented projects. It finds its confirmation for example in the fact that the least active clusters declared, through their coordinators, the highest level of *cluster infrastructure resources*.

It is a good idea to interpret the results presented above from the perspective of optimum planning of future cluster financial support. The projects oriented at cluster development and consisting in increasing the number of participants and employees, including the number of employees in the field of R&D but also cluster leaders (sub-area indicators) turn out to be effective. On the other hand it can be noticed that there are too few projects that considerably improved clusters' infrastructure resources and financial standing.

**5.1. Human resources and know-how**

When analysing the benchmark values of all four indicators for the *human resources and know-how* sub-area it must be said that the best clusters were able to achieve maximum values in the case of all indicators. The benchmark value was 10 (Chart 23).

**Chart 23. Average values and benchmark values in the *Human resources and cluster know-how* sub-area**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

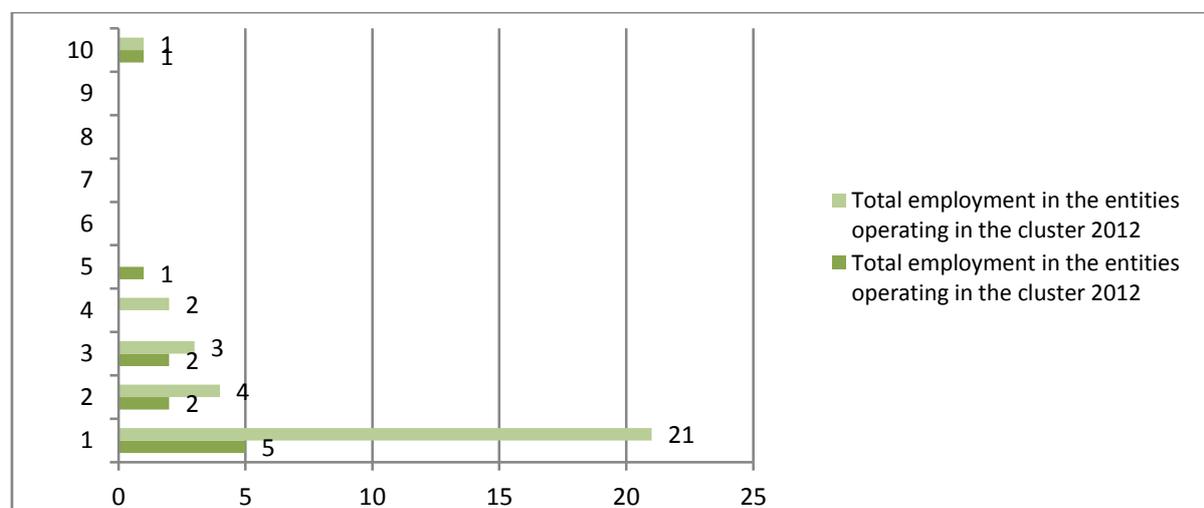
Mean values, on the other hand, which, as it has been assumed, represent the situation of average clusters, indicate significant differences in the situation of clusters in Poland in

respect of individual indicators included in the analysed sub-area. The average value for the *number of entities involved in a cluster* indicator amounted to 3.43, whereas for the *number of cluster leaders* indicator – 2.63. The level of values achieved in the case of the remaining two indicators turned out to be significantly lower. Average value of the *total employment in the entities operating in the cluster core* indicator amounted to 0.86, whereas in the case of the *number of employees in the R&D field in the cluster core* – 0.88.

In the *Human resources and cluster know-how* sub-area in the analysed population of clusters there are very large disproportions between the leader and its resources and the average values reached by clusters. This applies in particular to the *Total employment in the entities operating in the cluster core* and to the *Number of employees in the R&D field in the cluster core*. In both cases an average cluster has more than ten times poorer resources than the leader. The smallest variance in the analysed population can be observed in the case of the *Number of entities involved in the cluster* indicator.

It is a good idea to take a closer look at detailed values of the indicators defining the analysed sub-area. The average value of *Total employment in the entities operating in the cluster core* is low (Chart 24<sup>5</sup>.) Only one cluster scored more than 5 on the 10 point scale of scores, thus taking the leader position with the 10 score. The situation was similar in 2012. The average result in 2014 decreased a little since as many as twenty four clusters scored 0. Five clusters got a very low score – 1. The scores of the next four clusters were below the mean value, that is from 2 to 4. Only one cluster reached the average level of the indicator, that is 5.

**Chart 24. Evaluation of the indicator for *Total employment in the entities operating in clusters* – comparison of the results of 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

Decrease of mean values of the indicator may be attributed, to a large extent, to increased employment at the leader's. It is worth mentioning that the highest level of total employment in the entities operating in the cluster core was 23,782 people (benchmark). The average level of employment in the entire population was 2,840 people, whereas the lowest total employment in the entities operating in the cluster core declared by the coordinator was 36 people. The above-mentioned number of twenty four clusters with 0 score means that the total

<sup>5</sup> The vertical axis indicates the score value whilst the horizontal one – the number of clusters which got the given score

number of employees in the said number of people employed in cluster's entities does not exceed 2,378. There are enormous differences among clusters as regards their economic potential measured on the basis of the number of people employed in the cluster core.

Due to the fact that disproportions in employment in clusters are so great, a very low result of the benchmarking analysis for most clusters whose employment in the core is a long distance away from the leader is not surprising. Analysis of this key indicator from the point of view of evaluation of clusters' importance for economy should take into account not only benchmarking results but also the relation of the general share of employment in clusters to the total level of employment in Poland. The total number of people employed in analysed clusters was 96,540.

Taking into account the fact that according to CSO<sup>6</sup> data approx. 8.5 million people are employed in the national economy in the enterprise sector, the analysed clusters employ slightly more than 1% of those employed in the national economy. On the one hand this rough estimate shows that the group of clusters involved in the study has begun to play noticeable role in the entire Polish economy. On the other hand it indicates that there is still a lot of room for cluster development in Poland, even despite the fact that the study involved only a small, from the point of view of its number (though significant from the point of view of the stage of development), representation of clusters.

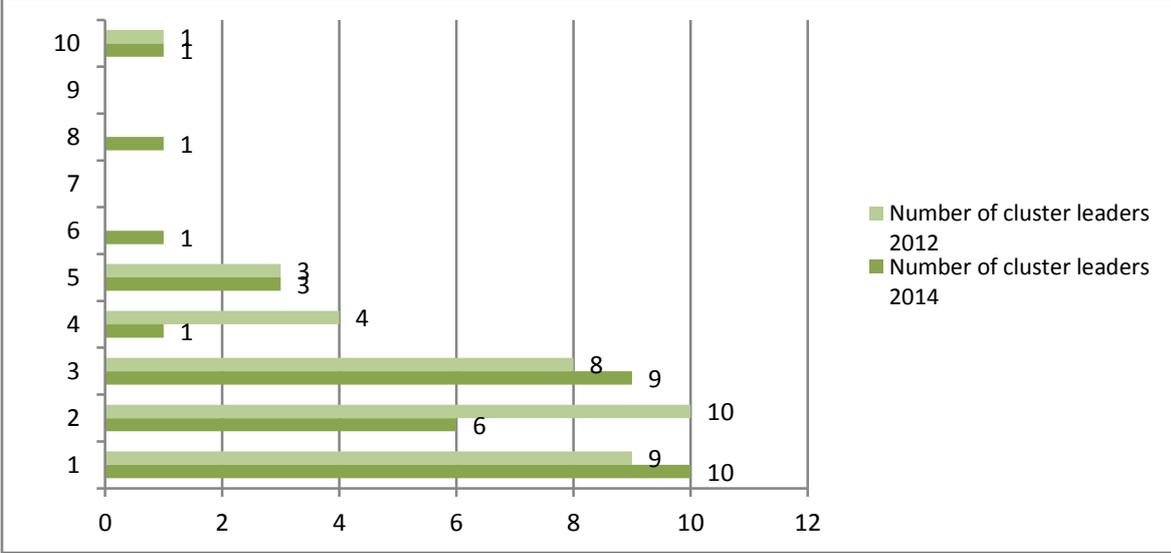
The *Number of cluster leaders* indicator has undergone minor but positive changes with respect to 2012. Just as in the previous edition of the study only one cluster got the highest score, that is 10. The next cluster scored 8 (Chart 25). Further four clusters got 5 and 6 (in 2012 there were three such clusters). In 2014 the score below the average value but above 0 was achieved by twenty six clusters (in 2012 thirty two clusters achieved such a result). In this year's edition of benchmarking three out of 35 clusters declared that they did not have any people responsible for coordination of the operations pursued within the cluster.

The highest number of employees responsible for cluster operations coordination was 9 and the lowest – 0. The average for the analysed clusters amounted to 2.63 of full-time equivalent. It is worth noting that in absolute dimension the total number of coordinators/full-time employees engaged in the clusters involved in the study amounted to 93.4. It might be assumed that it is an already significant number of personnel experienced in stimulating cluster cooperation. On the one hand the experience gained in managing clusters in Poland should be used for developing competence in less developed cluster structures, especially those in embryonic form. On the other hand, the approximately 100 people involved in coordination of leading clusters in Poland should be treated as a target group of educational activities oriented at raising their abilities to stimulate clusters' development up to the world-class level with the use of international cooperation (trainings, study tours, etc.).

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<sup>6</sup> The Central Statistical Office: *Pracujący w gospodarce narodowej* ogółem 8561,3 tys. II kwartał 2014 <http://stat.gov.pl/wskazniki-makroekonomiczne>

**Chart 25. Evaluation of the *Number of cluster leaders* indicator – comparison of the results of 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

When analysing the indicators related to the changes in the number of cluster leaders a gradual institutionalisation of cluster structures can be noticed. A slightly higher number of leaders may suggest a higher level of coordination of cooperation among structure members. Such an interpretation is particularly justified from the point of view of a reduction of the external source of cluster financing in 2014 when compared to 2012. From this perspective the increase in the number of coordinators may be seen as something positive since it is financed, to a large extent, from private funds which are undoubtedly spent only after the effectiveness of such expenditures has been weighted. Therefore the increase in the number of cluster leaders may be interpreted also as a certain measure of increase in cluster activity.

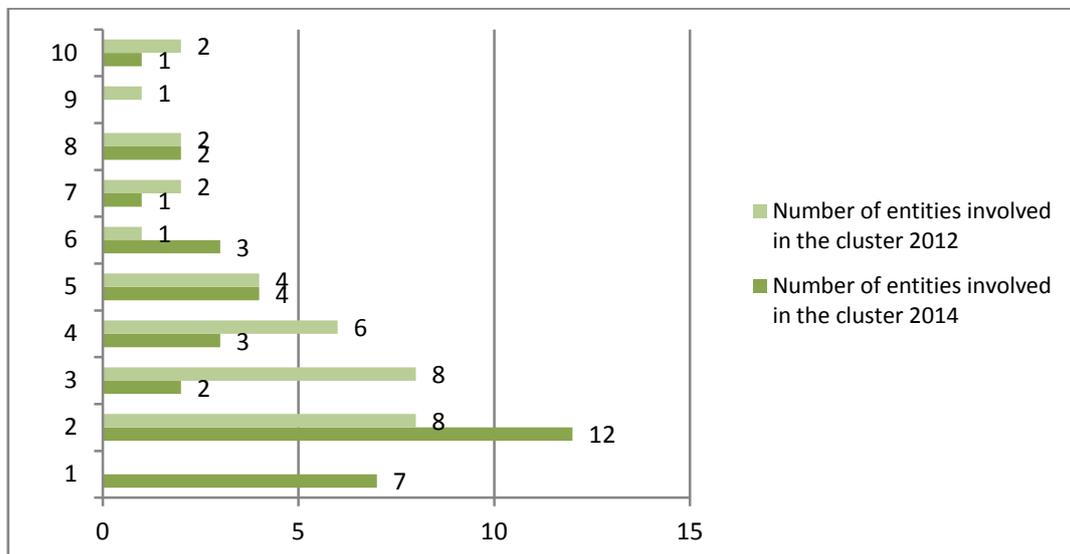
Similarly as with the indicators discussed above, also in the case of the *number of entities involved in a cluster* only 1 out of 35 clusters got the highest possible score – 10. To compare, in 2012 this level was achieved by two clusters (Chart 26). The value above the average, that is between 9 and 6 points, was scored by 7 clusters, whilst in 2012 by 4.

Just as in the previous edition of the study average values of the said indicator have been reached by 4 clusters. The values below the average but above zero were recorded in the case of 23 clusters (22 clusters in 2012). It should be noted here than in 2014 the indicator of the number of entities involved in a cluster as at the lowest level (score 1 and 2) in the case of a much greater number of clusters.

Drops in the scores for many clusters, similarly as in the case of the indicator related to the number of employees, may result from a relative strengthening of leaders' position and the related diversification of the group of analysed clusters and they do not necessarily mean an absolute reduction of the number of entities. The results may also be affected, as it has been already suggested above, by a certain change of the group of the analysed clusters. What proves their high diversity as regards the number of entities belonging to analysed clusters is the fact that the smallest number of entities was 15 whereas the largest number was more than ten times higher, that is 154 entities (benchmark result). In total, the analysed clusters consist of 1,917 entities. These data are confirmed by the conclusions presented above and referring

to a high diversity of economic potential of the analysed group of clusters on the one hand and their relatively great economic power, in this case measured on the basis of the number of members, on the other one.

**Chart 26. Evaluation of the *Number of entities involved in the cluster* indicator – comparison of the results of 2012 and 2014**



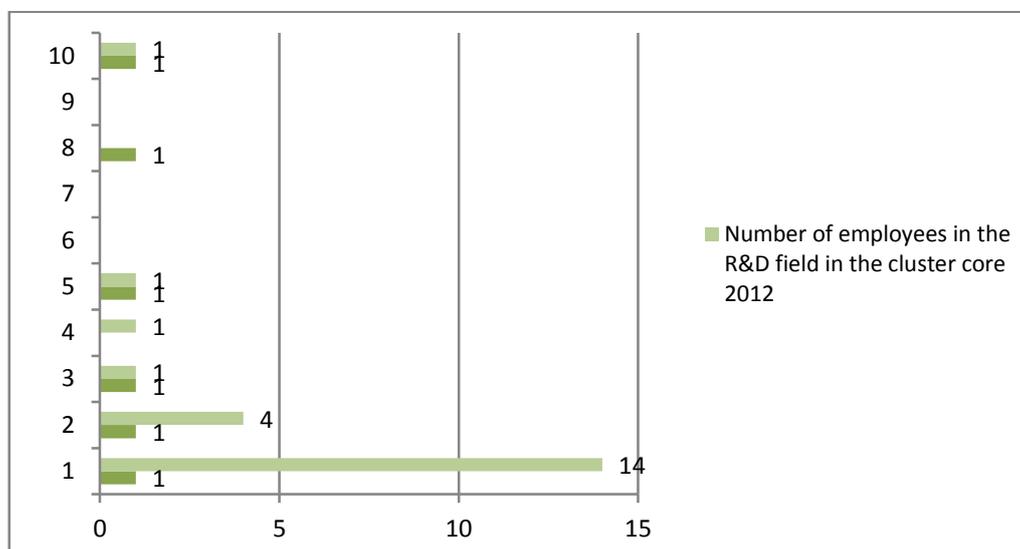
Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014

It is a good idea, however, to look at the potential of analysed clusters also from the perspective of their role in economy in general. The number of entities belonging to analysed clusters indicates, just as earlier the number of employees, that the clusters representing specific industries do not cover and do not represent a large part of such industries both on the national level and on the level of individual regions. If clusters were to play a role of an organiser of cooperation on the level of leading industries or of a representative of those industries, the scale of these industries, measured also on the basis of the number of employees, should substantially increase. In this context, however, a dilemma arises whether the model of cluster development in Poland should determine such industry tasks for clusters or whether individual clusters should focus on organising cooperation within the group its entities without taking responsibility for the functioning, at least on the regional level, of particular industries. It seems that this dilemma should be resolved by individual clusters and their strategies should include such a resolution. At the same time, however, from the point of view of cluster development policy or even more so from the point of view of regional development policy, the clusters with a large number of members which indeed represent a given industry should be treated differently than those representing only a certain part of specific industries. In the latter case an intervention whose task is to support a specific cluster might disrupt the market conditions for the companies not belonging to such a cluster.

Now, moving forward to the benchmark-based analysis of the *Number of employees in the R&D field in the cluster core* indicator you can notice a significant regression of clusters with respect to 2012. The benchmark value was higher than 0 in the case of only 6 out of 35 clusters and in as few as 2 cases the indicator was higher than the average: 10 – scored by the leader in the group and another cluster which scored 8 (Chart 27). The remaining scores of individual clusters are 5, 3, 2 and 1. In the study conducted in 2012 the total number of

clusters with a score above 0 was 23, whilst the score of three of those clusters was on the level of the average or higher.

**Chart 27. Evaluation of the *Number of employees in the R&D field in the cluster core* indicator – comparison of the results of 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

The indicators presented above must be analysed with due caution since their values are influenced both by the absolute number of employees and by the relation of the number of R&D employees in individual clusters to the leader. In the case of the *Number of employees in the R&D field in the cluster core* indicator the leader of 2014 employed 7,221 people (actual benchmark value), whereas the total number of people employed in R&D in analysed clusters amounted to 25,937. These results suggest that the data related to the number of people employed in the R&D field in the cluster core require an extended comment. The category of R&D employees included both the employees dealing with R&D in companies as well as the employees of that sector's entities belonging to the given cluster. These entities were most usually higher education institutions in which it is difficult to single out a group of employees involved in activities contributing to a given cluster. Due to this interpretation difficulty in most cases it was assumed that all employees of the department/institute which directly cooperates with a cluster should be included. Such a simplification not only inflates the number of R&D employees in the cluster core but also, due to the possibility of different interpretation in different clusters and in successive stages of the study, makes objective comparison of data more difficult.

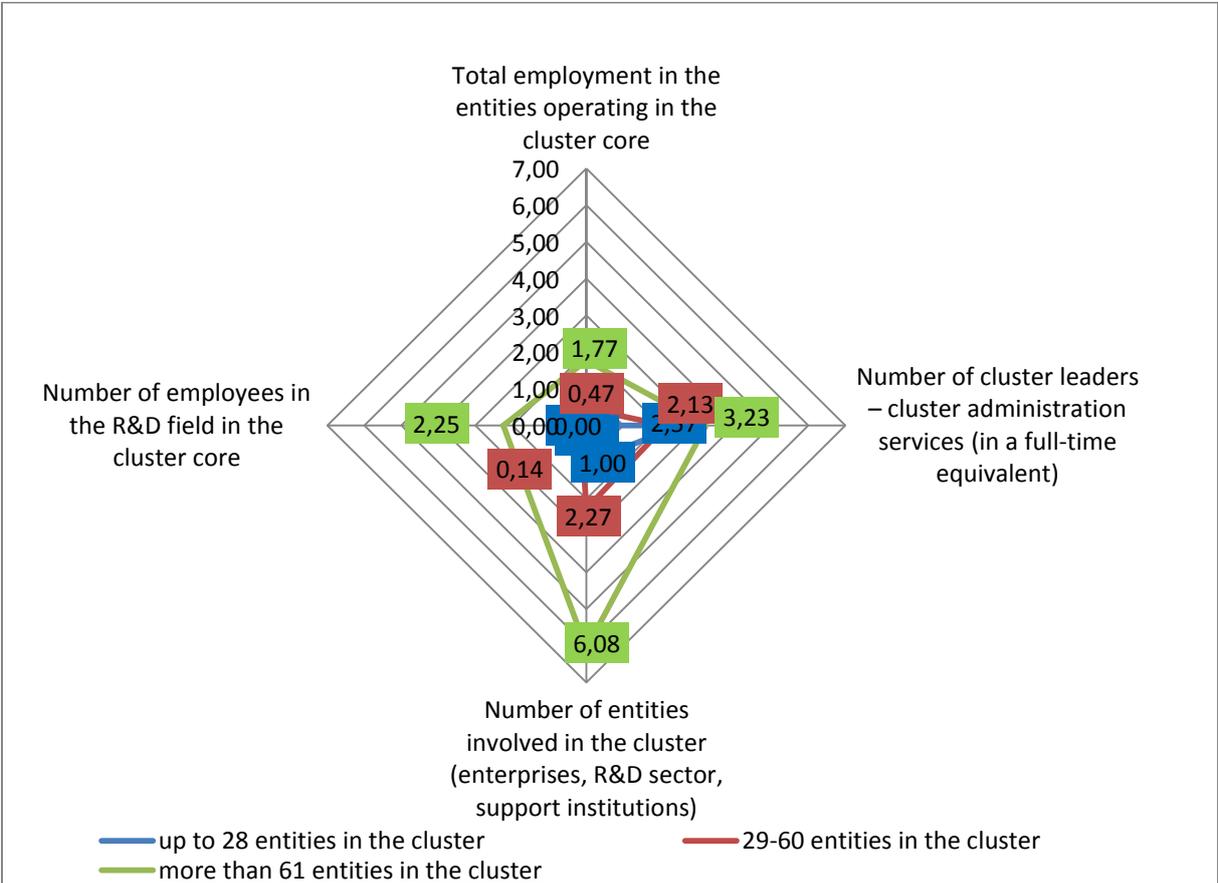
It is important, however, to state that in this study 29 clusters scored 0 in the case of this indicator, whereas on the basis of the data obtained during interviews it can be concluded that six clusters had no R&D employees at all. The study of 2012 identified fewer, that is twelve clusters with a 0 score. The 0 score achieved in other instances means that all core entities in a single cluster employ fewer than 722 people in the R&D field.

It might be interpreted as resulting not only from a reduced number of employees but also from a more conservative attempt to establish whether R&D units are the core of the cluster or rather people employed in such units provide their contribution to the cluster. Perhaps the actual experience of cooperation with R&D sector units has not turned out positive enough to treat a considerable number of their employees as real resources for specific clusters. There are no doubts, however, there is no confirmation of development in the R&D activity in

analysed clusters with respect to the study carried out in 2012. The lack of people employed in the R&D field or their very low number in majority of clusters shows that clusters assemble R&D sector entities and enterprises with R&D potential only to a limited extent.

The size-based analysis of clusters in the *Human resources and know-how* sub-area shows large differences in mean values of individual indicators between large, medium-sized and small clusters (Chart 28). In all categories large clusters are the dominant ones. It is worth noting that the indicator for the number of cluster leaders is in the case of large clusters only slightly higher than in the case of small ones which, on the other hand, exceeds just a little the result of medium-sized clusters. It should therefore be inferred that quantitative development of clusters does not bring about an increased involvement of coordinators. In this context it may be assumed that the expenditures for coordination display some scale effect which means that the costs of such operations grow slower than the scale of coordinated clusters.

**Chart 28. Mean values achieved by clusters in the *Human resources and cluster know-how* sub-area depending on the cluster size**



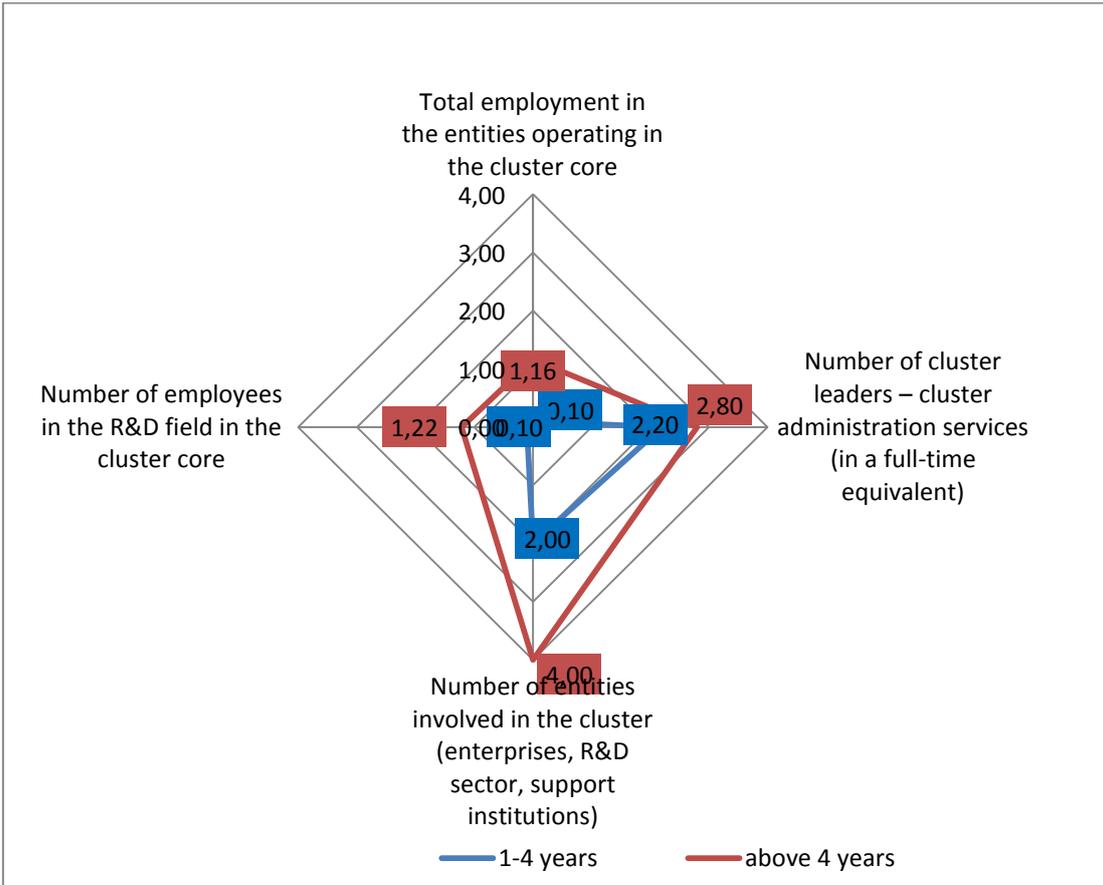
Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

Insofar as with respect to the total employment or the number of participating entities predominance of large clusters is obvious, the question of their predominance in the case of the *Number of employees in the R&D field in the cluster core* indicator is worth taking a closer look since it should be borne in mind that this indicator shows not the absolute number of the employed but the relation of the number of R&D employees to the total number of employees. Therefore, formally the structure of this indicator does not favour large clusters. Their predominance might rather be explained with the fact that large clusters more often include R&D sector units, and in particular higher education institutions. Furthermore,

most probably enterprises with high potential, including those with their own R&D base, are more willing to participate in large clusters. Such innovation-oriented companies find potential partners in large clusters comprising academic institutions. **Large clusters create better conditions for the development of R&D activity.**

In the breakdown of clusters based on their age, younger clusters scored lower than older ones in the case of every indicator for the *Human resources and know-how* sub-area. The difference between older clusters and younger ones is smallest in the case of the number of cluster leaders (Chart 29).

**Chart 29. Mean values achieved by clusters in the *Human resources and cluster know-how* sub-area depending on the cluster age**



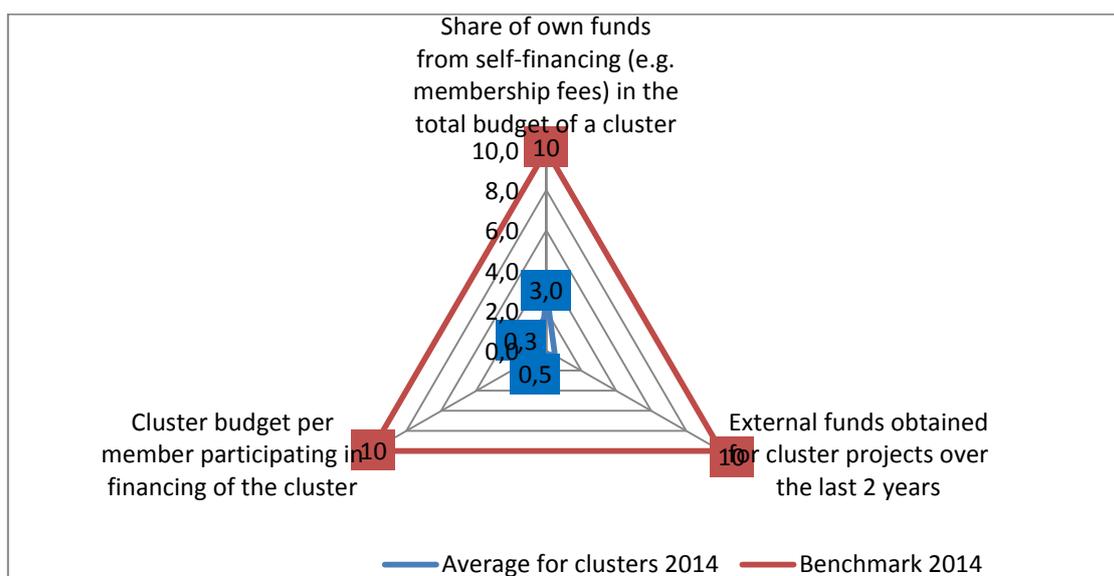
Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

In other cases older clusters have much greater resources. This indicates a certain logical regularity: the older the cluster the greater human and know-how resources it has. This, however, should be interpreted also in such a way that Polish clusters are still developing, the number of their members as well as employment in these clusters, as it has been already indicated above, increases. The aspect which must be mentioned here is the development of the companies belonging to clusters which due to their longer presence in the cluster have a potential for faster development and thus for increasing general employment, including in the field of R&D. Probably in many cases longer operation also has positive effects in the form of involvement in the cluster of academic institutions. These two aspects explain the significant predominance of older clusters in respect of employment in the R&D field in the cluster core. **The duration of cluster functioning has a positive impact on human resources and know-how of the cluster.**

## 5.2. Cluster financial resources

Benchmark values of all three detailed categories of the *cluster financial resources* sub-area achieved the maximum level, that is 10. At the same time it should be emphasised that with respect to the *Share of own resources from self-financing* indicator in which the scores were the best average clusters (treated as an average for the purpose of the indicator) did not exceed the value of 3.0 (Chart 30). In the case of this indicator the difference between the leading cluster and the average ones is the smallest. In the case of the indicators of *External financial means obtained for cluster projects over the last two years* and *cluster budget per member participating in financing of the cluster* the average value was only 0.5 and 0.3, respectively. It should be assumed, therefore, that there is a large variance among clusters as regards the level of their financial resources. This variance seems to arise from large differences between clusters in respect of their ability to obtain external financing for their operation, especially from public funds. On the one hand such a situation might be interpreted as resulting from correct diversification of external support depending on the identified importance and needs of individual clusters. Such an interpretation would be justified only if all clusters had a chance to be assessed in accordance with identical principles.

**Chart 30. Average values and benchmark values with respect to the *Financial resources* sub-area**



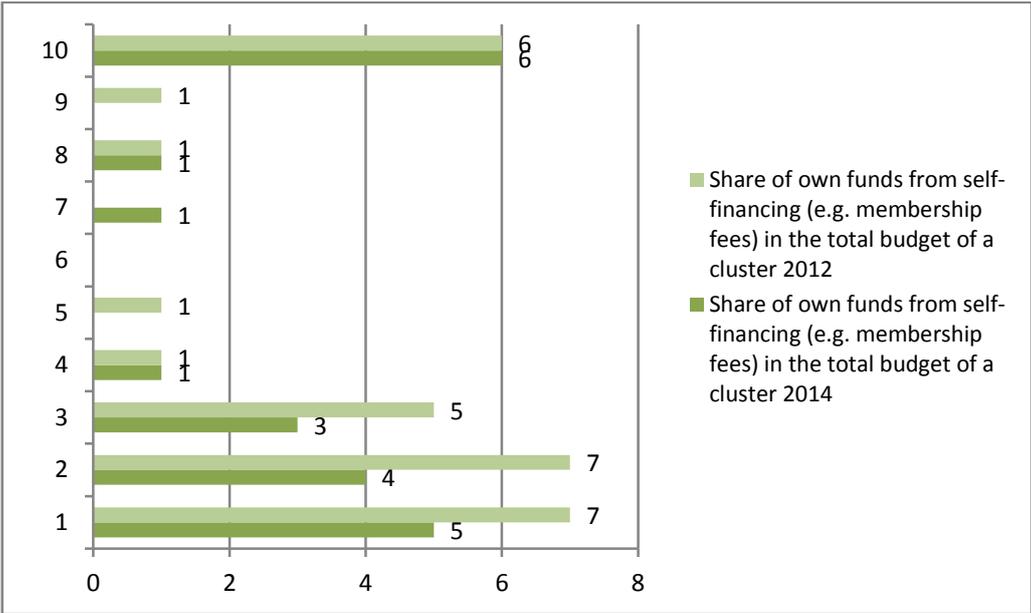
Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

Still, however, there is no system and criteria of cluster assessment that might be used for controlling support processes in Poland, neither on the regional nor on central level. Therefore, significant diversification in respect of access to public funds should be assessed rather negatively. A positive conclusion, particularly in this context, is that Polish clusters are much less diversified in respect of obtaining own funds (*Share of own resources from self-financing*).

Analysis of the *Share of own resources from self-financing in the total budget of a cluster* in 2014 compared with the same in 2012 indicates that it has slightly decreased (Chart 31). Just as in the previous edition maximum benchmark values (10) were scored by 6 clusters. In 2014 the benchmark value in the discussed indicator meant 100% share of own resources in the financing of cluster activity. At the same time the mean value for the entire population of analysed clusters amounted to 39.1% of the share of own resources in the total budget of clusters. In 2014, just as in 2012, there were two such clusters, excluding the leaders indicated

above, which achieved the average or higher level. The share of own resources in financing of cluster operation was below the average in the next 13 clusters. In 2012 there were 20 such clusters. In fourteen clusters the level of self-financing was so low that the indicator amounted to 0. To compare, in 2012 there were only 6 such clusters. According to coordinators' data participants of the seven clusters with the 0 score do not participate in the cluster budget, whilst in the case of the next seven clusters the share of participation in the cluster budget was lower than 10%.

**Chart 31. Analysis of the share of own funds from self-financing in the total budget of the cluster – comparison of cluster data in 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

The data presented above and relating to scores indicate that cluster members are less willing to participate in cluster operation costs. This phenomenon should be recognised as negative. Limitation or even elimination of self-financing in the case of eight clusters when compared to the study of 2012 may mean that participants do not value very highly the services provided to them by the cluster due to the fact that they are unwilling to bring in any financial contribution. According to another interpretation clusters have obtained external sources of financing and therefore self-financing is no longer necessary. Assuming, however, that the amount of external financing from public funds for clusters in 2014 did not increase with respect to 2012 (which will be discussed below) it should be assumed that the more probable cause of such situation is the fact that the range of services provided by the clusters which try to induce members to any financial involvement is decreasing. It might be explained to a certain extent by the fact that the projects which were implemented with the highest intensity in 2012 often required their members' own contribution. It may be presumed that after such projects were completed part of clusters failed to find such activities for participants which would be sufficiently attractive to make them willing to cover the costs of cluster financing and the services provided by it. Therefore, increased participation of the clusters in which self-financing is only marginal (the indicator reaches the level of 0) is worrying not only due to limited financial resources of such clusters but also because of an insufficiently attractive offer available to their members. The need to increase the share of

own funds in cluster budget financing makes using innovative solutions developed for example by Life Science Cluster Kraków worthwhile.

### **Good Practice 1. Developing the range of services offered to cluster members and ensuring the source of income for the cluster**



Klaster  
LifeScience  
Kraków

Life Science Cluster Kraków

#### **Goal: Developing the range of services offered to cluster members and ensuring the source of income for the cluster.**

The cluster offers its members a wide range of services for remuneration (or for a membership fee or fees independent of the membership fee). Klaster Life Science offers the following services:

- Tools for internet marketing and communication – members of the cluster can use Klaster's WWW services as their own internet marketing and communication tools,
- Tools for Internet cooperation – the offer of tools for cooperation through the Internet includes cluster's Internet services developed to support the operation of cluster's Partners and in particular to support cooperation and facilitate access to useful information.
- Klaster's conferences, trainings, workshops and seminars – open workshops, trainings, seminars and other events dedicated to innovation and entrepreneurship, organised as part of cluster's operation and offered mainly (but not only) to the employees of cluster's Partners – companies and institutions.
- Project marketing, i.e. using the cluster as a partner in implementation of projects as well as platforms for promoting their results,
- Marketing of products and services, i.e. using the cluster as a platform for promoting cluster members' commercial offer; as a common marketing platform the cluster may be used to sell and promote market products and services,
- International cooperation platforms – cooperation with the cluster gives cluster members access to information and gives them an opportunity to promote their activity in the world.

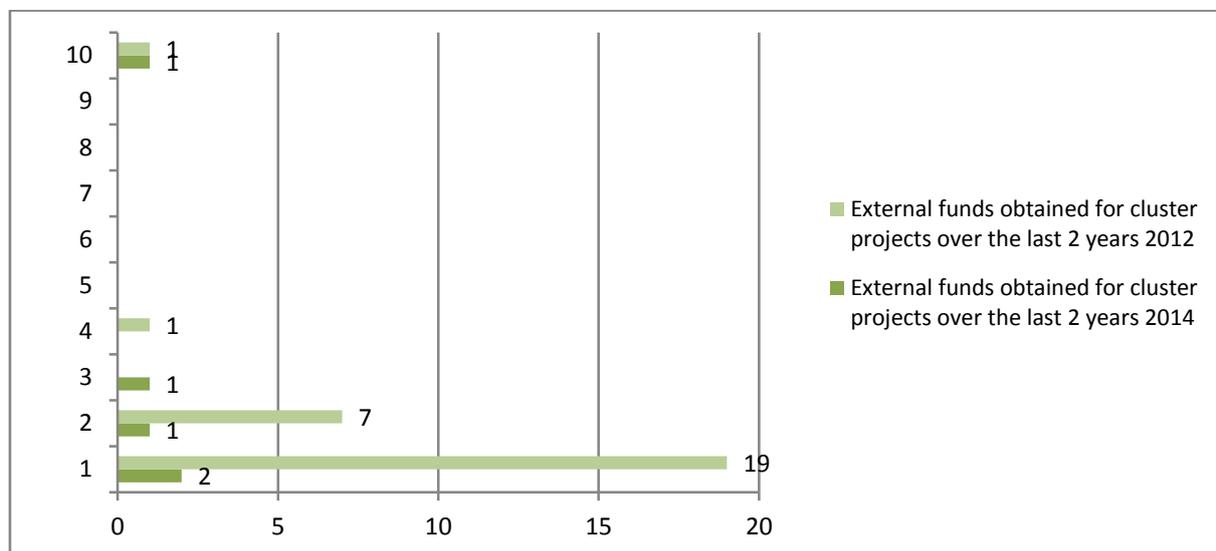
The fee for individual services depends on the membership package bought by a member of Klaster Life Science. The cluster offers 3 packages: standard, silver and gold. The narrowest scope of services is offered under the standard package and the annual payment for the package is PLN 100. The gold package, on the other hand, offers the widest scope of services and in this case the annual fee may amount even up to several thousand PLN (it depends on the size of the company). Holders of the gold package are also entitled to the biggest discounts on services. For example, the discount for advertising on the Internet is 33% (25% for owners of the silver package, 10% in the case of the standard one).

#### **Result: Adaptation of the membership fee and cluster's offer to members' needs, ensuring a source of commercial income for the cluster, supporting cluster members in their operations, especially in the projects they implement.**

We can clearly see a decrease in the amount of public funds obtained over the last two years (Chart 32.). In accordance with the benchmarking principles it was established that in

2014 only five clusters (scores from 0 to 10) obtained a considerable amount of public funds, including the leader in the analysed group (benchmark). To compare, in 2012 28 out of 35 clusters got the score between 1 and 10.

**Chart 32. Evaluation of the *External (public) funds obtained for cluster projects over the last two years* – comparison of cluster data in 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

Therefore it should be concluded that the ability of the clusters involved in the study to get public funds for cluster projects has diminished. In order for the above statement to sound more objective it is necessary to bear in mind that the offer of European funds for supporting clusters in the years 2012-2014 was much poorer<sup>7</sup> than in the period between 2010 and 2012. It should be emphasised, however, that the public funds obtained for cluster projects by the leader (benchmark) amounted to PLN 18,399,000. One cluster has not obtained any external funds in the course of the last two years. The lowest declared amount of the funds obtained for a cluster was PLN 20,000. The zero score of 35 analysed clusters means that the amount of the funds obtained did not exceed PLN 183,990, whereas the total amount of public funds received by analysed clusters in the years 2012-2014 was PLN 139,435,811.

If the value of this subsidy was analysed in the categories of a support for the functioning of cluster structures it might be considered relatively high. Yet part of the support would be used for very costly pro-development projects which makes it more difficult to establish whether the value of support for cluster development processes was sufficient. The reported data, however, undoubtedly confirm the earlier conclusion about a very large variance in the level of public financing provided to analysed clusters.

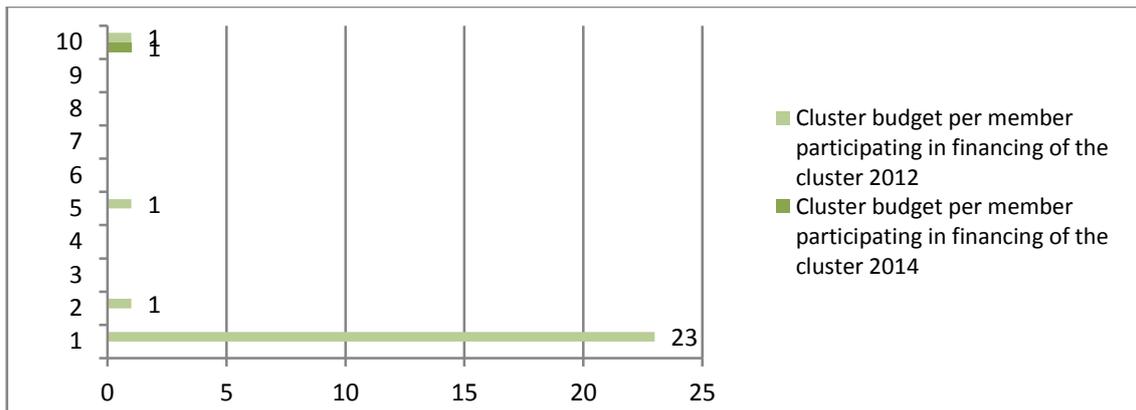
The *Cluster budget per member participating in financing of the cluster* has been evaluated in this edition of the benchmarking study also to the disadvantage of the present situation. Only one cluster from the analysed group received the score higher than 0 and it got the highest score – benchmark: PLN 5,000,000 (Chart 33). For 2012 the benchmark value applied

<sup>7</sup> For example, the last competition under Measure 5.1 *Support for the development of supra-regional cooperative relations* of the Innovative Economy Operational Programme was held in January 2012, <http://poig.parp.gov.pl/index/more/31602>: the last competition as part of Measure 1.4 “Promotion and cooperation” – *Cooperation, creation and development of clusters* component of the Operational Programme Development of Eastern Poland was held in April 2011. <http://porpw.parp.gov.pl/index/index/1153>

to one cluster whilst subsequent, individual clusters scored 5 and 1, respectively. Further nineteen clusters scored 1.

Analysis of the data collected from coordinators showed that in six cases the budget was set at the level of PLN 0.00. In the remaining 28 cases the 0 score means cluster's budget per member participating in financing of the cluster, not exceeding PLN 500,000, whereas the total budget in all analysed clusters amounted to PLN 7,729,154.

**Chart 33. Evaluation of the Cluster budget per member participating in financing of the cluster – comparison of the data of 2012 and 2014**

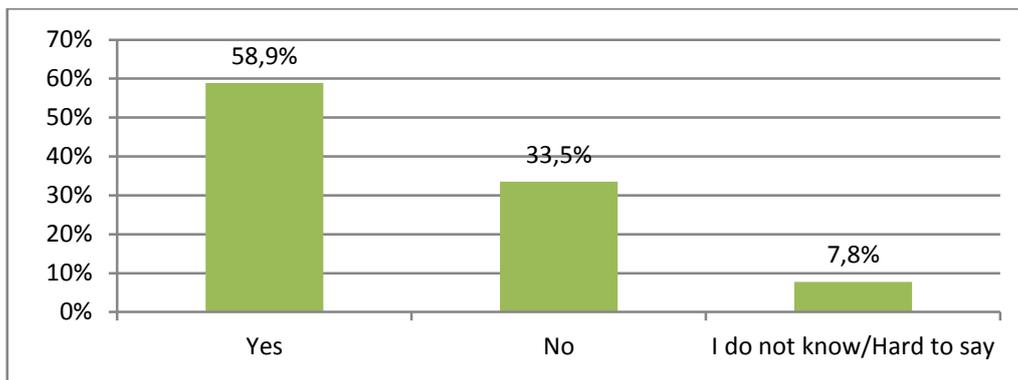


Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

Clear worsening of the condition of clusters' budget seems to result from the reported reduction of public funds available for cluster development. What is more, in the light of earlier reflections on deterioration in respect of the share of own funds in cluster financing a negative trend can be noticed consisting in an inability to replace public funds with cluster members' own funds. It seems that majority of clusters are not mature enough to effectively and really actively finance their operation without external funds, including public funds. In respect of budget shaping we can observe reduction of both public funds and those obtained from self-financing. At the same time it must be admitted that the dynamics of the public funds decrease is much greater which suggests that clusters do make efforts to mobilise own funds which, in turn, proves their willingness to continue their operation.

The information obtained from cluster coordinators which was used for calculating benchmarks may be confronted, to a certain extent, with the opinions of participants of 35 analysed clusters gathered in the course of CATI/CAWI. For example, relatively good results in the case of the indicator related to the share of own funds in the total budget of a cluster find their confirmation in the opinions of members of analysed clusters. Paying cluster membership fees was declared by nearly 59% of entities participating in the study (Chart 34/question no. 7). Certainly it should be assumed that participation of the members making financial contributions to cluster operation costs should grow since more than one third of members do not participate in the financing of clusters.

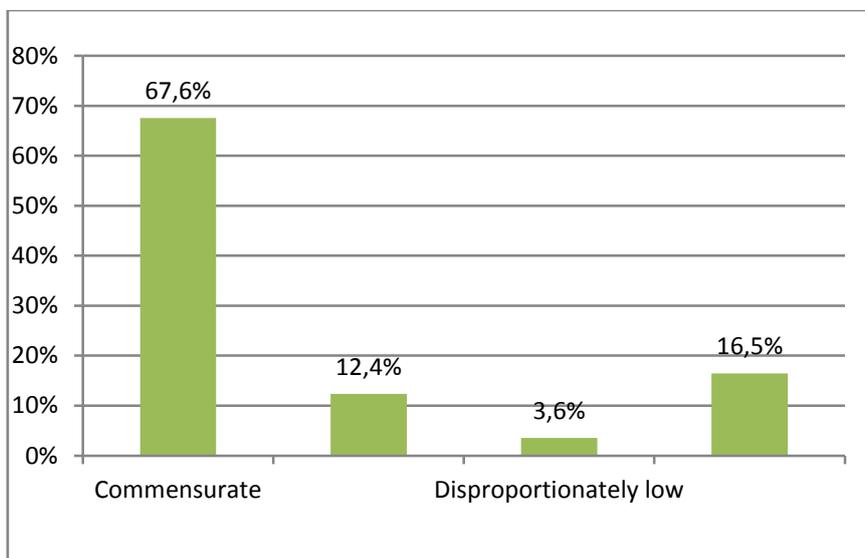
**Chart 34. Payment of cluster membership fees**



Source: Own study based on CAWI/CATI surveys carried out among members of 35 clusters; (N=618).

Additionally, the members paying membership fees contributing to cluster operation were asked to assess the amount of fees in relation to the benefits they receive. As much as 67.6% of regular membership fee payers claim that the fees are commensurate with the benefits they get in the cluster (Chart 35/ question no. 8). Only 12.4% of the entities which pay membership fees are dissatisfied and indicate that membership fees are incommensurate with benefits. It might be concluded that increasing the number of membership fee payers must involve provision of sufficiently valuable services. Increasing the number of members participating in maintenance of clusters should be coupled with the offer of services commensurate with fees.

**Chart 35. Assessment of the amount of fees in relation to received benefits**



Source: Own study based on CAWI/CATI surveys carried out among members of 35 clusters (N=618).

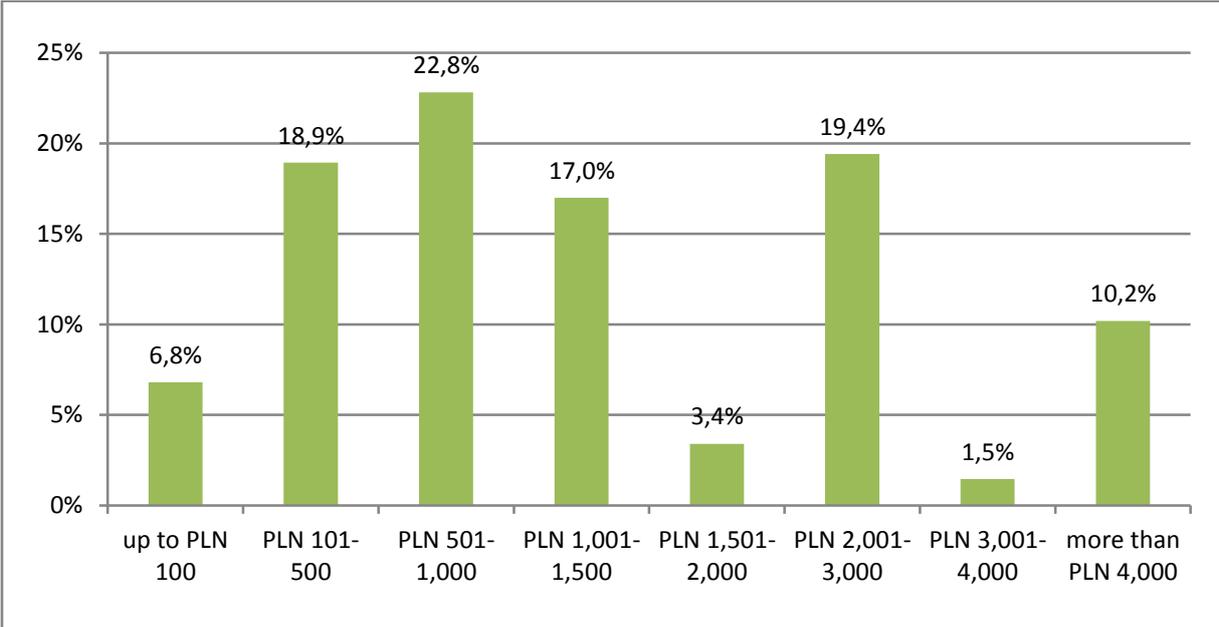
As it follows from declarations of members of analysed clusters there are great differences in the amount of contributions. Taking the year 2013 as the point of reference 6.8% entities paid the annual membership fee in the amount not exceeding PLN 100. The amount between PLN 101-500 was paid by nearly 19% of respondents. The number of members of the clusters involved in the study paid a membership fee between PLN 501 and PLN 1,000 (22.8%) (Chart 36/question no. 9). The next 17% of respondents made a contribution falling within the range of PLN 1,001-1,500. Membership fees in the amount of PLN 1,501-2,000 were paid by 3.4% entities, PLN 2,001-3,000 – by 19.4% and PLN 3,001-4,000 – by 1.5% of members.

The membership fee paid by more than 10% members of the clusters involved in the study was higher than PLN 4,000.

However, taking into consideration the said members' satisfaction at the amount of fees it should be concluded that there are also big differences between clusters as regards the value of services provided to their members.

Current differences in the amounts of fixed contributions to clusters suggest that in the case of the clusters where fees are low there is a possibility of increasing both the fees and clusters' ability to self-finance their operation on the condition, however, that membership fee payers receive services commensurate with the payments they make.

**Chart 36. Amount of annual membership fees**



Source: Own study based on CAWI/CATI surveys carried out among members of 35 clusters (N=618).

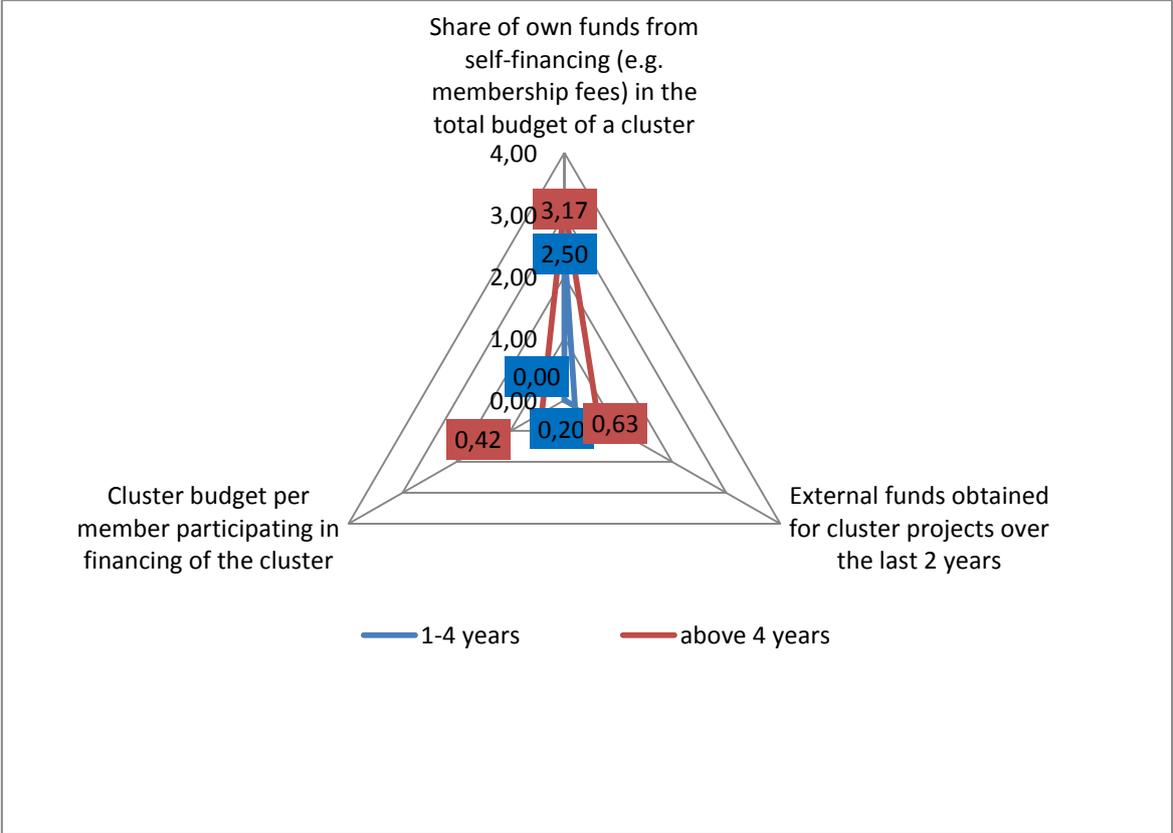
In looking for the factors conditioning clusters' ability to ensure self-financing, the indicators for the *financial resources* sub-area were analysed taking into consideration the age of individual clusters. It should be noted that older clusters ensure their own self-financing in the form of membership fees to a greater extent than younger clusters. The average for the group of older clusters was 3.17, whereas for the younger one – 2.50 (Chart 37). Such a result indicates that together with maturing of clusters the awareness of the necessity for participation in a cluster budget and thus the ability to make the budget independent of external support are growing.

At the same time older clusters are much more effective in obtaining external funds for cluster operation. The average for younger clusters was 0.20 whilst in the case of older ones – 0.63.

The average value of cluster budget per member participating in financing of the cluster was 0 in the case of younger clusters whilst in the case of older ones – 0.42.

Undoubtedly, clusters' financial standing is improving with their age, in particular as regards clusters' self-financing ability. This puts in a good light their development as well as the role in increasing their members' awareness in respect of increasing the costs of economic cooperation.

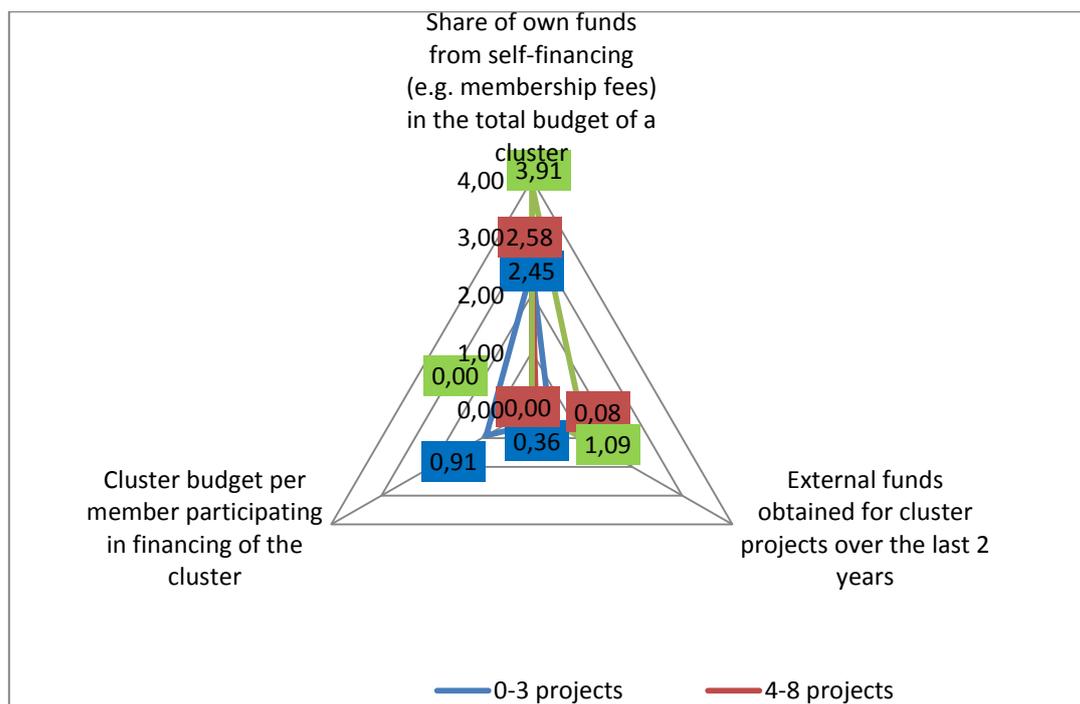
**Chart 37. Mean values achieved by clusters in the *Financial resources* sub-area depending on cluster age**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

It seems that financial standing of clusters may be considerably impacted by implemented projects – therefore this section of the analysis has also been taken into account. In the *Financial resources* sub-area the most active clusters do not really have the largest budget per member participating in financing of the cluster. The average for this group of clusters as well as for active clusters was 0. This results from the fact that in the group of the least active clusters there was a cluster whose benchmark in respect of the budget per single cluster member reached the maximum value (PLN 5,000,000) thus drastically lowering the values for other clusters to 0. Additionally, at the time of the study the least active clusters had the smallest share of own funds from self-financing in their total budget (average at the level of 2.45) (Chart 38).

**Chart 38. Mean values achieved by clusters in the *Financial resources* sub-area depending on the number of implemented projects**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

It is not surprising that the most active clusters achieved the highest score in respect of the level of obtained external funds (average 1.09). Probably this can be explained by an observation that implementation of projects mobilises members to increase their participation in financing the cluster budget from their own funds. Regardless of any doubts that may arise it seems that very active involvement in implementation of projects may have a strong impact on the value of cluster's budget per member, probably due to the inflow of external financing on the one hand and due to increasing the share of self-financing of common activities by members on the other hand.

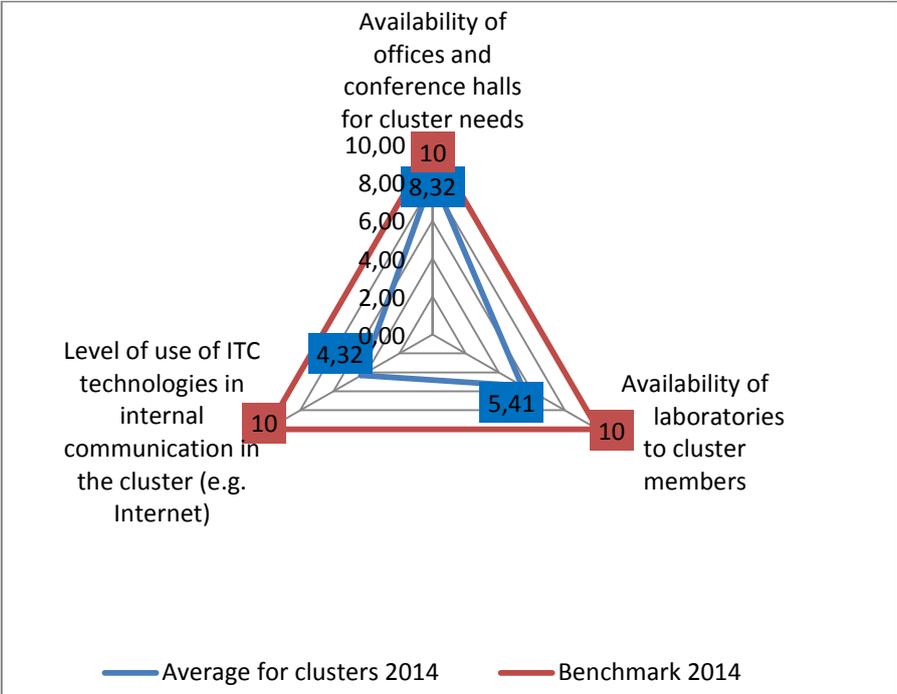
### 5.3. Infrastructure resources

Evaluation of the infrastructure resources of clusters had to a large extent a qualitative character which had an impact on achievement of the maximum benchmark level with respect to all three detailed indicators. Analysis of the data presented in Chart 39 indicates that average clusters (mean value) are closest to the leader of the analysed group (benchmark value) as regards *Availability of offices and conference halls for cluster needs*. In the case of this indicator the average score achieved by clusters was 8.32 whilst the benchmark was 10.

There is a much greater variance in the case of the indicator of *Availability of laboratories to cluster members*. The average value in the case of average clusters was 5.41 whilst the benchmark value in the best cluster reached the level of 10. In the analysed population there are also considerable disproportions in respect of the *Level of use of ICT technologies in internal communication in the cluster (e.g. intranet)*. An average cluster in the population covered by the study scored 4.32 whilst the leader's benchmark was at the maximum level, i.e. 10. Thus the greatest differences in the analysed group of clusters can be observed in the sub-area of *Level of use of ICT technologies in internal communication in the cluster (e.g. intranet)*, whilst the smallest – in the case of *Availability of offices and conference halls for cluster needs*. The results presented above show that the clusters involved in the study have

already dealt to a large extent with the basic infrastructural problems connected with the operation of the cluster. It might be said that generally availability of offices or conference halls for cluster needs is not a major problem anymore.

**Chart 39. Average values and benchmark values with respect to the *Infrastructure resources* sub-area**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

At the moment development of more advanced infrastructure resources is the challenge. This means a necessity for the clusters to focus in the first place on modernising their internal channels of communication. Besides, due to the fact that there are still equally large differences between clusters in respect of *Availability of laboratories to cluster members* it is necessary to implement projects oriented at increasing laboratory resources in order to make them more available to cluster members.

Analysis of the data included in Chart 40 shows that coordinators' opinion about access to the basic cluster infrastructure for direct business communication between members of a cluster has become less optimistic. When compared to the year 2012 when 22 clusters got the highest score in this respect, in 2014 there were only 16 such clusters. The values above the average, that is between 6 and 9 points, were scored by 14 clusters, whilst in 2012 by 11, whereas the average and lower values were achieved by 5 clusters in 2014 and 2 in 2012. Due to the fact that the evaluation had a qualitative character the presented results do not necessarily mean an absolute worsening of access to infrastructure but may be a manifestation of a more critical mindset of coordinators resulting for example from growing requirements and needs.

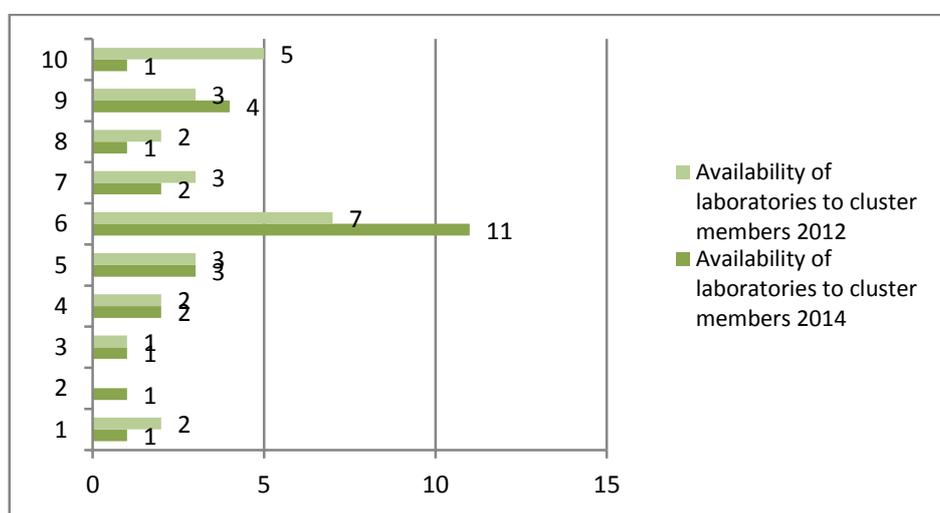
**Chart 40. Evaluation of the Availability of offices and conference halls used for cluster needs – comparison of study results of 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

In comparing the availability of laboratories to cluster members in 2014 and 2012 it should be concluded that this indicator has remained relatively unchanged. First of all the number of clusters whose coordinators claimed that availability of laboratories had improved, increased with respect to the average value (6) from 7 to 11. At the same time the number of clusters with the highest score in respect of availability of laboratories decreased by 4 (Chart 41).

**Chart 41. Evaluation of the Availability of laboratories to cluster members – comparison of the study results of 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

Therefore, there is an increase in the number of clusters with average access to laboratories but on the other hand, unfortunately, a decreasing number of those with perfect laboratories can be observed. The said drop, however, may to a certain extent result both from a change in the structure of analysed clusters and from a more rigorous assessment given by coordinators. It should be borne in mind that in this year's edition of the study there was a requirement that the score of 10 was assigned only to the laboratories which are at least "Unique in the Central

or Central and Eastern Europe”. If clusters are to be an important factor supporting the R&D and innovative activity in the Polish economy, their laboratory resources need to be considerably improved.

The foregoing means a necessity for continuous inspection of equipment and availability of laboratories, in particular due to the growing number of cluster members and the needs reported by innovative members of clusters which change with cluster development and, first of all, with changing market trends.

One of the key problems arising from the use of a shared laboratory infrastructure even, if a cluster does have such an infrastructure, is the difficulty to establish the costs to be incurred by its individual users. Good practices applied by the Subcarpathian Cooperative Connection – Light and Ultra-light Aviation Cluster are very interesting in this respect.

### **Good Practice 2. Streamlining the process of determining the costs of use of shared cluster resources to be incurred by individual members**



**Goal: streamlining the process of determining the costs of use of shared cluster resources to be incurred by individual members.**

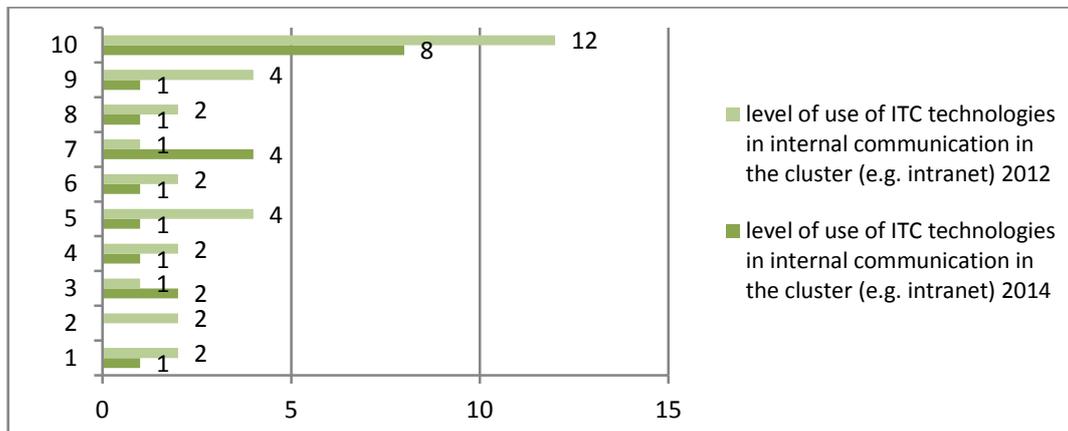
Coordination of operation of the said cluster requires great care and precision in administrative work, in keeping relevant documents, in settlements and accounting. Bearing in mind the necessity to automate these processes, a dedicated IT system has been developed and introduced for remote accounting for individual costs of use of e.g. machines and equipment located in the klaster's research and production hall. The system is based on an electronic records of the duration of operation of, and quantity of power consumed by, the equipment and machines used by individual members of the Klaster. The system allows a significant automation of a complex cost calculation process by automatically generating relevant documents in the accounting system and auxiliary documents related e.g. to the *de minimis* aid records. The system cooperates with a resource access booking system and with an accounting module of the ERP system, thus greatly facilitating and speeding up the work and administrative processes.

**Result: a possibility of significant acceleration of the accounting process, objectivity and precision in accounting for shared resources in the cluster, a possibility to analyse the level of consumption of such resources.**

From the point of view of coordinators' opinions about the level of utilisation of state-of-the-art technologies in communication processes presented in Chart 42 it might be concluded that when compared to 2012 a considerable regression has been recorded in analysed clusters in this respect. The number of clusters with the maximum score for the use of modern technological solutions decreased (from 12 to 8), just as the number of clusters which assessed the said aspect above the average did (scores from 6 to 9). It should be noted that for as many as 15 clusters the evaluation of the level of use of ITC technologies in internal communication in clusters was more critical and the score they got was 0. To compare, in 2012 only 3 clusters scored 0. The present scores were influenced by the percentage of cluster members using the shared internal network. Such a precisely defined evaluation criterion

revealed, in this edition of the study, a large room for improvement in the area of management consisting in increasing the use of ITC technologies in internal communication. It should be emphasised that in 15 cases coordinators claimed that such a form of communication was not used at all.

**Chart 42. Evaluation of the *Level use of ITC technologies in internal communication in the cluster* – comparison of the results of 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2012 and 2014.

On the basis of the foregoing it is clear that there is a pressing need for modernisation of communication channels in clusters that will guarantee increased speed and effectiveness of passing on information and knowledge and thus will increase the number of interactions and reduce the time that passes from producing an idea for a cluster project to its implementation. It might be concluded that clusters need support in this respect, also consisting in developing and making available to clusters a universal IT communication platform. It is a good idea to implement good practices like for example those of Life Science Cluster Kraków which uses intranet for internal communication.

### Good Practice 3. Ensuring efficient communication in a cluster



Klaster  
LifeScience  
Kraków

Life Science Cluster Kraków

**Goal: Ensuring efficient communication in a cluster**

In Klaster Life Science intranet is the basic communication tool. It uses a Podio platform available to enterprises. Intranet offers a wide range of functions which facilitate Klaster management and exchange of information among cluster's members. The basic functions include: an events calendar, project management module, meeting notes, everyday update of information e.g. about possible sources of financing the undertakings of Klaster and its members (the information is downloaded directly from the websites of support institutions e.g. the National Science Centre, the National Centre for Research and Development, European Commission; Klaster members may use the platform to inform other entities belonging to Klaster about their interest in a given recruitment and intention to form a consortium), a catalogue of cooperation offers (Klaster members may publish their offer on

the intranet; for example you can find there the offer of services of the Department of Magnetic Resonance Imaging of the Institute of Nuclear Physics).

At the moment Klaster is working on launching group buying through the platform. The offer of Klaster Poligraficzny with which the Life Science cluster has started to cooperate will be published on the platform. Klaster members will have a chance to place orders for printing products and services through the platform. Klaster will collect a small provision for providing the possibility of collective buying.

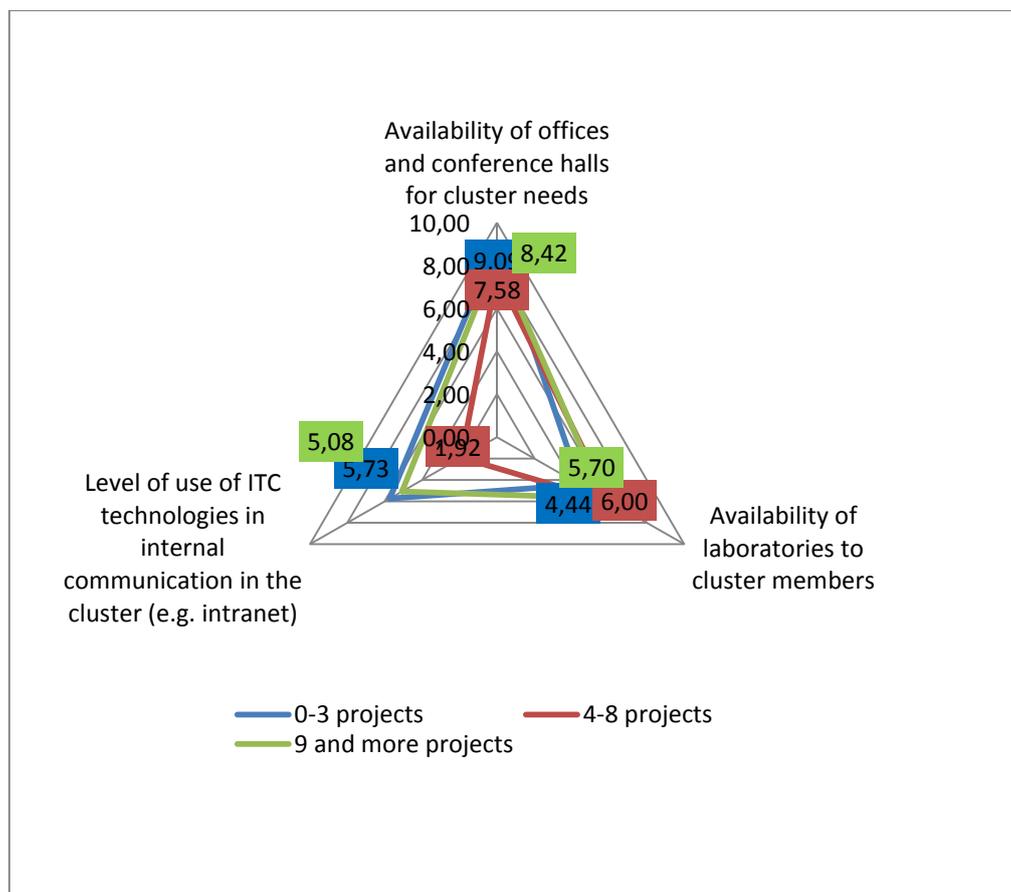
Intranet has been used in the Klaster for a year now. It was financed from Klaster's own funds.

**Result: continuous access of cluster members to the information, e.g. about the initiatives taken by the cluster, available sources of financing, efficient flow of information, stimulation of cooperation among cluster members.**

A relatively low level of access to infrastructure resources in the clusters involved in the study finds its confirmation in the results of the survey conducted among cluster members. To the question whether the entity represented by them has used the cluster's material resources made available to its members 74.1% of respondents answered that they had not used any fixed assets which were at cluster's disposal (question no. 22). 9.22% entities declared that they used offices of the cluster, whereas 4.37% of respondents used test equipment. Clusters still provide their members with a very limited support in the form of access to material infrastructure resources. At the same time such a form of support for companies gives clusters great development opportunities, in particular as regards common use of the R&D infrastructure.

The analysis of average benchmark values in the *Infrastructure resources* sub-area in a breakdown of clusters based on the number of implemented projects gives very interesting results. It turns out that in the case of less active clusters the availability and utilisation of cluster infrastructure is on an average level when compared with the two remaining groups of clusters, that is clusters of little or average activity (Chart 43). The average score in respect of *availability of offices and conference halls for cluster needs* in the most active clusters was 8.42 whilst the average value in the case of the least active clusters was 9.09 and those with average activity – 7.58.

**Chart 43. Mean values achieved by clusters in the *Infrastructure resources* sub-area depending on the number of implemented projects**



Source: Own analysis based on the results of the research carried out among coordinators of 35 clusters.

The foregoing applies also to the access to the latest forms of communication. The average score in the case of the *Level of use of ITC technologies in internal communication in the cluster (e.g. intranet)* was 5.08 in the case of the most active clusters, 1.92 in the case of clusters with average activity and 5.73 for the least active clusters. The reported results may be in a way surprising since the number of implemented projects should theoretically go hand in hand with increased availability of infrastructure elements. This interrelation, however, does not occur in the analysed clusters. Hence a conclusion can be drawn that a substantial part of the projects implemented by analysed clusters was not expected to create a material infrastructure for cluster members' needs. The projects implemented so far have probably been more oriented at networking, marketing or creation of intangible value. Without disqualifying the value of such projects it may be concluded that maturing of clusters should be coupled with the increase of importance of the projects which provide a lasting infrastructural support for competitiveness of enterprises belonging to clusters. R&D facilities are what must be kept in mind in the first place.

#### **5.4. Summary of the *Cluster resources* area in 2014**

Analysis of the *Human resources and cluster know-how* sub-area has indicated that there are great differences in analysed clusters in respect of their economic potential measured by the number of people employed in the core of the cluster. The total number of employees in analysed clusters was 96,540. The existence of large differences finds its confirmation in the

data related to the number of entities that belong to clusters. The smallest cluster consisted of 15 entities whilst the largest one nearly ten times more, that is 154 entities. In total, the analysed clusters consist of 1,917 entities. Analyses revealed significant variance but also a serious economic potential of the group of clusters involved in the study.

In the analysis of the indicators related to changes in the number of cluster leaders a certain gradual institutionalisation of cluster structures can be noticed. At the same time it might be inferred that quantitative development of clusters does not bring about an increased involvement of coordinators. In this context it may be assumed that expenditures for coordination display some scale effect which means that the costs of such operations grow slower than the scale of coordinated clusters.

The lack of people employed in the R&D field or their very low number in majority of clusters shows that clusters assemble R&D sector entities and enterprises with R&D potential to a too limited extent.

The projects implemented by clusters so far resulted in strengthening of the *Human resources and cluster know-how* sub-area. Sectional analyses have shown that large clusters create better conditions for the development of R&D activity. The duration of cluster functioning has a positive impact on all aspects of cluster human resources and know-how.

There is a large variance among clusters as regards the level of their financial resources. It seems to be the effect of very large differences in clusters' capability to obtain public funds to finance their operation. Deterioration has been noticed in respect of financial resources which seems to be the main negative phenomenon identified in the *Cluster resources* area.

Certain unfavourable trends can be noticed in self-financing of cluster budgets. There is an increased participation of the clusters in which self-financing is only marginal (the indicator reaches the level of 0) which is worrying not only due to limited financial resources of such clusters but also because of an insufficiently attractive offer they have for their members. From the point of view of the high level of satisfaction of the members who pay very diverse fees it can be gathered that between clusters there are also big differences as regards the value of services provided to their members.

An unfavourable trend can be noticed which consists in an inability of cluster members to replace public funds with their own funds. It seems that most clusters are not mature enough to effectively and really actively finance their operation without external funds. It should be admitted, however, that the share of external funds in clusters' budgets has been decreasing much faster which suggests that clusters do make some efforts to mobilise own funds of their members.

At the same time no positive impact of a larger number of implemented projects on the improvement of situation in the entire sub-area of financial resources has been observed.

It has become apparent that the projects implemented by clusters which would significantly improve clusters' infrastructure resources are insufficient. Hence a conclusion can be drawn that a substantial part of the projects implemented by analysed clusters was not expected to create any infrastructure.

In spite of all clusters have become stronger in respect of their material resources. The clusters involved in the study have already dealt to a large extent with the basic infrastructural problems connected with operation of a cluster itself. It might be said that availability of offices or conference halls for cluster needs is not a major problem anymore. At the moment development of a more advanced infrastructure resources is the challenge. If clusters are to be an important factor supporting the R&D and innovative activity in the Polish economy, their laboratory resources require a considerable improvement in order for clusters to become ready for developing innovation on a European level.

A weakness which has been reported in the study is the little use of ITC technologies in internal communication in clusters.

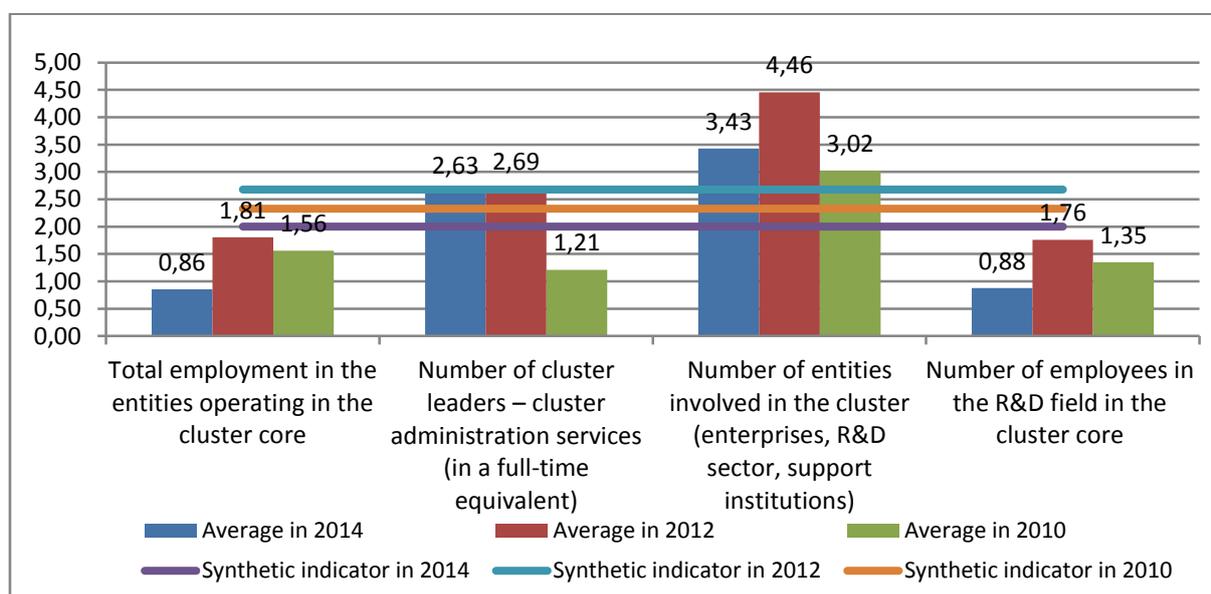
## 5.5. Changing trends in the *Cluster resources* area in 2010-2014

The third edition of the cluster benchmarking study allows to point out certain changes which have occurred over the last four years in individual areas, sub-areas and in indicators characterising the said areas and sub-areas in more detail.

In the *Human resources and cluster know-how* sub-area the situation of the clusters involved in the study has undergone a substantial diversification in the discussed period, especially when compared to 2012. This finds its confirmation in the value of a synthetic factor for the entire sub-area which in 2014 amounted to 2.00. To compare, the value of a synthetic indicator in 2012 amounted to 2.63 whilst in 2010 – to 2.33. As it has been indicated above the lower value of the synthetic indicator does not necessarily mean an absolute decrease in human resources and know-how of the clusters involved in the study, but most probably it is a manifestation of changes in the structure and of uneven pace of individual clusters' development.

Such an assessment results first of all from a drop of the benchmark related to the number of people employed in the R&D field in the core of a cluster. The average for the group of clusters studied in 2014 was only 0.88 whilst it was 1.76 in 2012 and 1.35 in 2010 (Chart 44). Lowering of benchmarking indicators observed in many clusters can be explained by an intense increase in the case of the leader, as reported above. The ensuing situation indicates, however, that cluster development is in this respect uneven and in many cases the shortage of human resources in the R&D field may create an important barrier to the growth of cluster innovation in the nearest future.

**Chart 44. Comparison of cluster scores in the *Human resources and cluster know-how* sub-area in the years 2010-2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

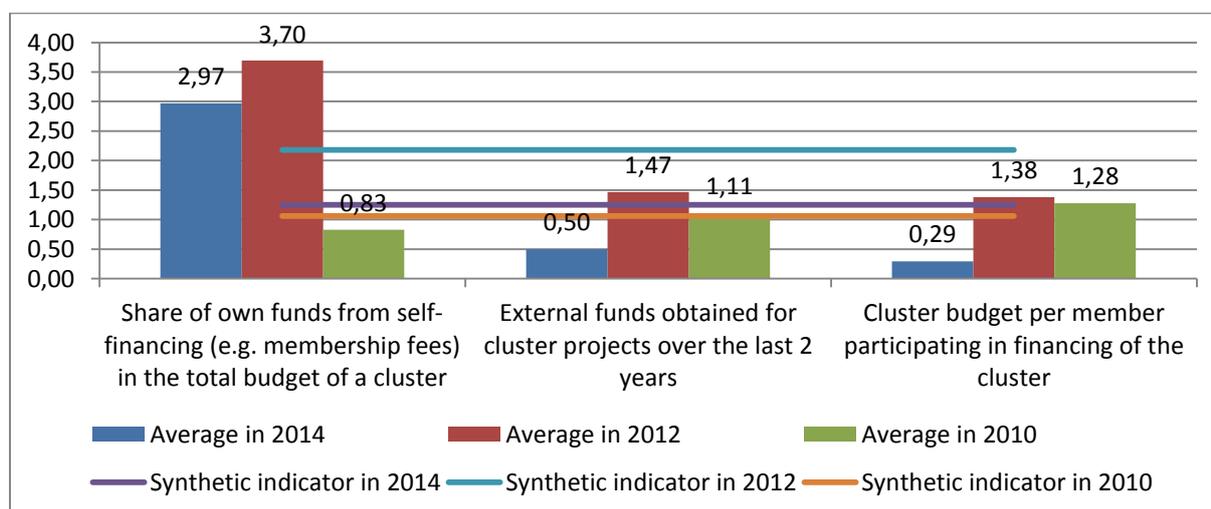
Similarly, a tendency towards deepening of cluster stratification can be noticed in the case of the *Total employment in the entities operating in the cluster core* indicator. In the years 2010-2014 the average for this sub-area fell from 1.56 in 2010 to 0.86 in 2014 after undergoing an increase in 2012 up to the level of 1.81.

Tendencies towards a growing diversification of clusters are also confirmed by the changes in benchmarking indicators related to the number of entities. The average benchmark of the *Total number of entities involved in clusters* fell in the last two years from 4.46 to 3.43.

In the case of the *Number of cluster leaders* indicator the average, after the increase in 2012, stabilised in 2012 and 2014 at the level of approx. 2.65. This proves a relatively stable situation in cluster management. It also confirms the conclusion presented earlier that the increase in part of the clusters involved in the study does not carry with it a proportionate increase of involvement of cluster leaders.

Comparative analysis of the *Financial resources* in the period of 2010-2014 shows rather negative trends in clusters. Although the synthetic indicator in the area being discussed grew from 1.06 in 2010 to 2.08 in 2012, in 2014 it decreased to the level of 1.25 (Chart 45). The fact that the value of the synthetic indicator did not fall to or below the level of 2012 was determined by a relatively minor decline of the average value of the indicator for the *Share of own funds from self-financing in the total budget of the cluster* from 3.70 in 2012 to 2.97 in 2014. New clusters, on the other hand, achieved radically lower results in this edition of the benchmarking study, both in respect of the value of external public funds obtained for cluster projects and in respect of cluster budget per one member actively participating in its financing. In this case, in the light of the data presented above and relating to the financial standing of clusters, lowering of benchmarking indicators is caused not only by a change of the structure of entities or a considerable improvement of leaders' situation, but by an objective decrease of available external public funds and, as a result, also the value of budgets. The share of self-financing in cluster budgets is maintained on a relatively high level but it is insufficient to ensure functioning of clusters on the earlier level of activity from the perspective of budget value.

**Chart 45. Comparison of cluster results in the *Financial resources* sub-area in the years 2010, 2012 and 2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

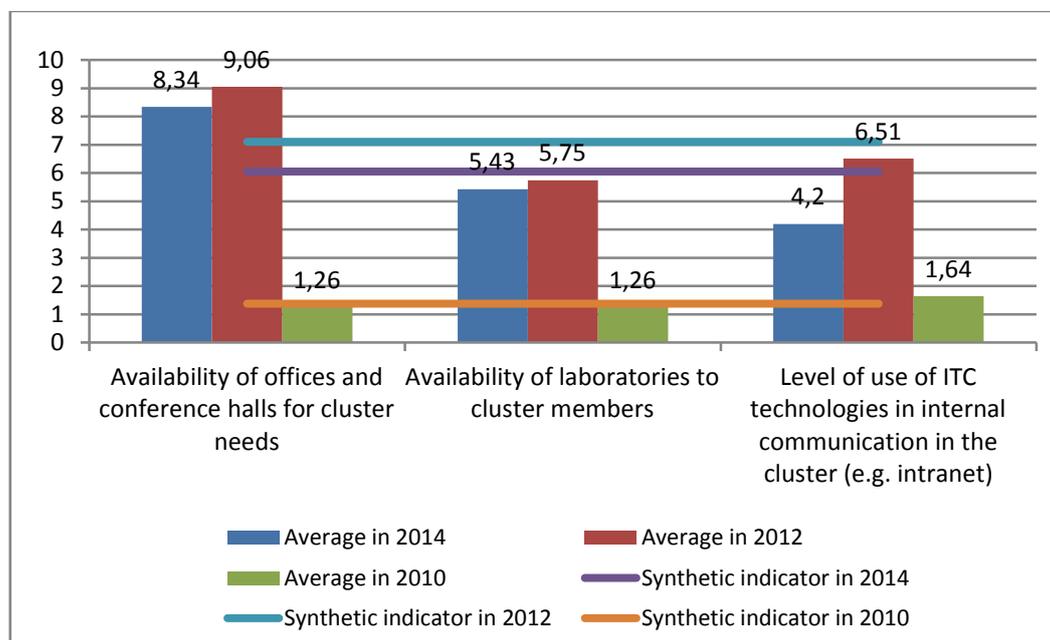
What should be noticed is a deteriorating financial standing of clusters, which has been observed in particular over the last two years. To a large extent this deterioration is caused by a decreased effectiveness in obtaining external public funds for implementation of cluster projects as well as by a slightly lower tendency for members to participate in the financing of cluster operation.

In response to the ensuing trends in the *Financial resources* sub-area, management processes in clusters should be reinforced in order to increase the effectiveness of looking for external sources of financing and of obtaining them. Furthermore, a conviction about a necessity for increasing financial participation of members in pro-development projects should be strengthened among cluster members.

Chart 46 shows a comparison of cluster results in the *Infrastructure resources* sub-area in the years 2010-2014. Analysis of this sub-area demonstrate that regressive trends among clusters involved in the study are much less worrying than in the case of the *Human resources and know-how* and the *Financial resources*. After a violent increase in the assessment of the level of cluster infrastructure resources in the years 2010-2012, in 2014 a minor decrease in the said level occurred with respect to 2012. The values of the synthetic indicator in individual editions of the benchmarking study in this sub-area were the following: 6.05 in 2014, 7.11 in 2012 and 1.38 in 2010. Such results were determined in the first place by the qualitative assessment made by coordinators who evaluated cluster infrastructure on the basis of just a couple of standardised suggestions. Such a method of analysing this sub-area eliminated the impact of an intense improvement in leaders' situation on the results of other clusters.

The greatest progress in the last four years has been reported in the level at which clusters are equipped with places used for establishing business relations and cooperation. The average in respect of *Availability of offices and conference halls for cluster needs* in 2012 increased to the level of 9.06 from as little as 1.26 in 2010. Eventually, after a minor drop in 2014 it established at the level of 8.34.

**Chart 46. Comparison of cluster results in the *Infrastructure resources* sub-area in the years 2010-2014**



Source: Own analysis based on the results of the research carried out among cluster coordinators in 2010, 2012 and 2014.

Changes in the *Availability of laboratories to cluster members* had a similar character but they were less far-reaching. In fact, in the years 2012-2014 the said availability remained on a similar level (value of the average in 2012 – 5.75, in 2014 – 5.43). In the period 2010-2012 the improvement was considerable (the average in 2010 was 1.26).

Negative trends, on the other hand, can be observed in the case of the last indicator, i.e. the *Level of use of ITC technologies in internal communication in the cluster*. After increasing in 2012 to the level of 6.51 from 1.64 in 2010, in this edition of the benchmarking study the value of the average dropped to 4.20. There are no doubts that such a trend is negative and requires improvement. The use of ICT technologies for internal communication will not only facilitate information flow and improve the quality of management but it also provides an important plane for horizontal relations of cooperation within a cluster.

Undoubtedly, emphasis must be placed on the necessity to improve clusters' equipment with modern communication solutions both inside and outside of the cluster which will facilitate management processes and increase their effectiveness. Furthermore, availability of cluster laboratories is still insufficient which will significantly limit the growth of innovation of clusters and its individual members. The necessity to maintain and strengthen clusters' basic infrastructure used for business relations inside and outside of the cluster should not be forgotten.

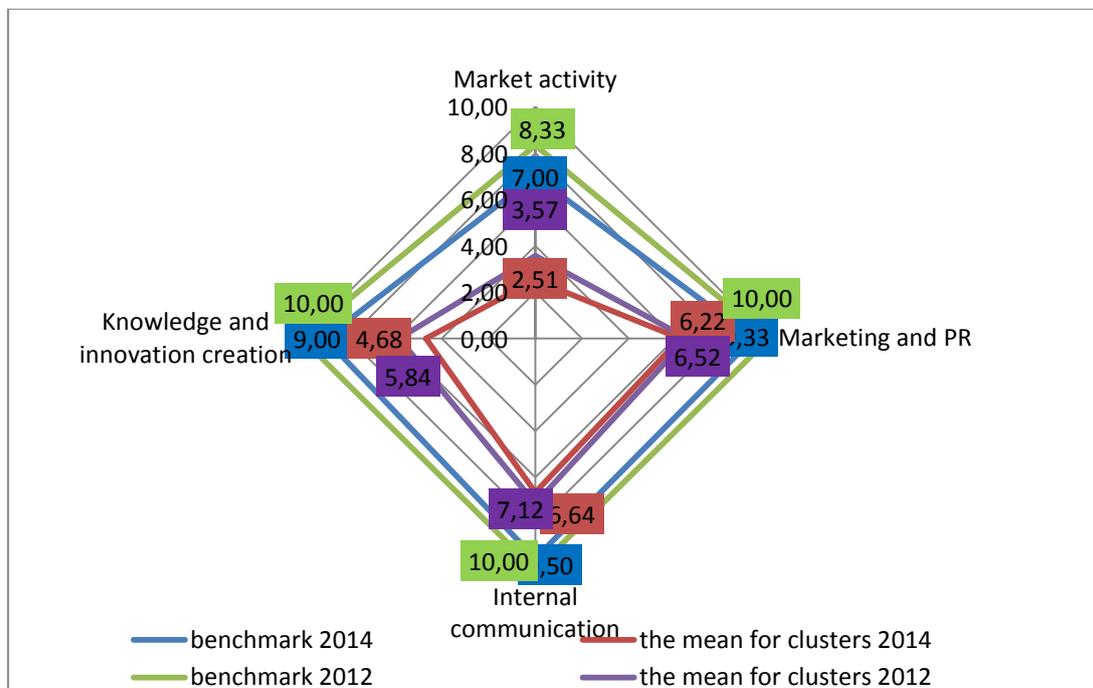
## 6. Processes in a cluster

The study of processes in clusters covered four sub-areas which were subject to evaluation in every cluster:

- 1) **Market activity** - joint procurement - joint orders; joint distribution channels; joint market offer prepared by the cluster for external recipients;
- 2) **Marketing and PR** - joint activities in terms of cluster promotion (leaflets, folders, advertising in the media; joint trade show and exhibition activity of the cluster; a common system of cluster visual identification, among others, a common logo, colours, letterhead)
- 3) **Internal communication** - regular meetings of entities in the cluster, including bonding events; diversity of tools, techniques and forms of communication; effectiveness and efficiency of the exchange of information and knowledge; level of informal exchange of knowledge and information among members of the cluster;
- 4) **Creation of knowledge and innovation** - joint work on innovative products and technologies; joint work on organizational and marketing innovations; joint trainings, workshops, conferences and study visits (education of employees).

Out of all four sub-areas of the *Processes in cluster* area the examined cluster population has shown the best results in the sub-area of *Internal communication*. The benchmark value and the mean value in the discussed sub-area have reached the highest levels. The benchmark reached the value of 9.50, whereas the value for average clusters (the mean value) was 6.64. A comparably good picture is depicted by clusters in the sub-area *Marketing and PR*, where the value for the leader in the studied group (benchmark) has reached the value of 9.33, and the mean of 6.22 (Chart 47).

**Chart 47. Mean and benchmark values for the *Processes in cluster* area**



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

The analysis of benchmarking results in 2014 also in the sub-area of *Creation of knowledge and innovation* indicates a high level of created knowledge and innovation in the group's leader. The benchmark value was 9.00. The situation in the discussed scope has proved to be much worse in many of the other clusters, since the mean benchmark value for all clusters was merely 4.68.

Against this background we can observe clusters achieving worse results in the sub-area *Market activity*. The benchmark value (7.00) proved to be lower by more than 23% on average than the benchmark in the remaining three sub-areas. However, the mean value of 2.52 for cluster activity is nearly half lower than the mean value in the sub-area *Creation of knowledge and innovation* and constitutes slightly more than 40% of the mean values for the sub-area *Internal communication*, as well as *Marketing and PR*.

The largest differences among the examined cluster populations (difference between the benchmark value - leader's result and the mean for all clusters - result of average cluster/clusters) can be seen in the sub-area *Market activity* and it amounts to 4.49. The lowest distance between the best cluster's result and an average cluster's result is in the sub-area *Internal communication*, and it stands at 2.86.

Over the last two years mean benchmark values for clusters in the area *Processes in cluster* have decreased by 9.08%. The mean of benchmarks from all *Processes in clusters* sub-areas in the current edition of the study has reached the score of 8.71 with the same indicator from in 2012 at 9.58 (Table 4). The mean of all mean values, however, dropped by 13.1% from 5.76 in 2012 to 5.01 in 2014.

**Table 4. Mean of the benchmark value and mean of mean values from all sub-areas under the *Processes in cluster***

<b>The mean of <u>benchmark values</u> from all sub-areas <i>Processes in clusters 2014</i></b>	<b>The mean of <u>benchmark values</u> from all sub-areas <i>Processes in clusters 2012</i></b>
<b>8.71</b>	<b>9.58</b>
<b>The mean of <u>mean values</u> from all sub-areas <i>Processes in clusters 2014</i></b>	<b>The mean of <u>mean values</u> from all sub-areas <i>Processes in clusters 2012</i></b>
<b>5.01</b>	<b>5.76</b>

Source: Own study based on the study results in 2012 and 2014.

An analysis of benchmark results from the current edition in comparison to the 2012 edition presented on Chart 47 allows to draw a conclusion that the general situation of clusters in the sub-area *Processes in cluster* has deteriorated to a certain extent over the last two years. This refers not only to the leaders in the examined group, but also to average clusters. Such a conclusion has been shown by comparison of benchmarks and mean values in sub-areas, respectively.

The benchmark values in the sub-area *Market activity* in 2014 have decreased in relation to the benchmark value from 2012 from 8.33 to 7.00. The activity of average clusters fell to a slightly lower extent. The mean value in the current edition of the benchmark has reached 2.51 points compared to the mean from 2012 of 3.57.

The analysis of the *Marketing and PR* sub-area also indicates a deteriorated situation in clusters compared to the previous benchmarking edition. Nevertheless, the decline in the

benchmark values and the mean value is much lower than in the case of *Market activity*. The benchmark of 2014 in the analysed sub-area was 9.33 with the maximum value of 10 in 2012. The mean value, however, has decreased from 6.52 to 6.22.

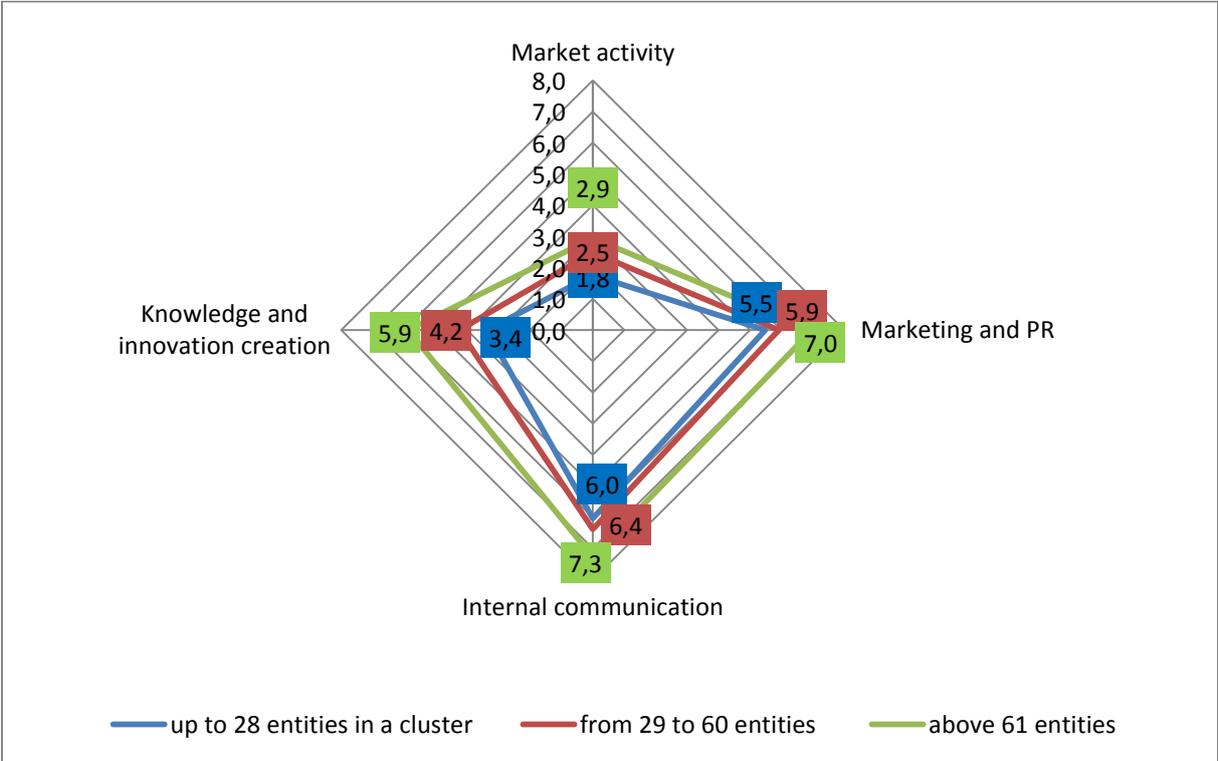
The clusters have achieved much weaker results in comparison to the previous benchmarking edition in the sub-area *Internal communication*. The benchmark value fell to 9.50 in 2014 from 10 in 2012, whereas the mean value has been reduced to 6.64, while in 2014 it reached the value of 7.12.

The most noticeable regress in the situation of clusters in *Processes in cluster* took place in the sub-area *Creation of knowledge and innovation*. The leader for the examined group of clusters in the sub-area in 2014 achieved the result of 9.0 (benchmark), compared to the leader’s result in 2012 of maximum 10. The mean value from 2012, however, of 5.84 has been reduced to 4.68 during the current study.

Given the importance of innovation in contemporary competitive processes, as well as the special potential role of clusters in stimulating those processes, it should be concluded that the disadvantageous situation and the changes taking place in the sub-area *Creation of knowledge and innovation* within the *Processes in clusters* section constitutes the biggest threat to proper development of clusters in Poland. The second sub-area, in which disadvantageous tendencies have become the most evident is the sub-area of *Market activity*. It is necessary to take a closer look at those changes at the level of indicators for those sub-areas, however, some initial conclusions may be drawn also on the basis of an analysis of the results for the area across different types of clusters.

It turns out that in the scope of *Creation of Knowledge and innovation* large clusters have a significant advantage with the benchmark mean of 5.9 over medium-sized clusters, where the benchmark mean is 4 and over small clusters (with the mean of 3.4) (Chart 48).

**Chart 48. Mean values achieved by clusters in the area *Processes in cluster* depending on the number of entities in a cluster**



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

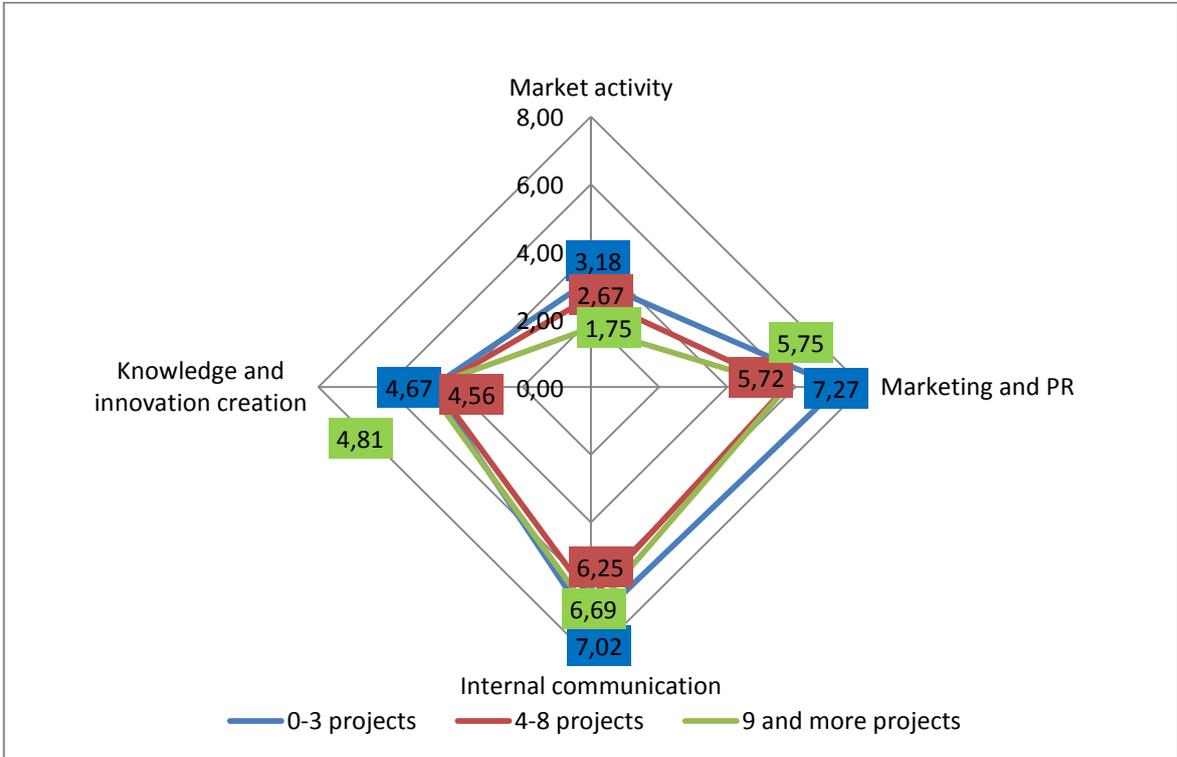
The activity in the scope of knowledge and innovation creation is correlated with the sizes of clusters. Bigger clusters create better conditions for undertaking innovation-related activities. Similar relation, although of much smaller impact, exists in the scope of *Market activity*. In this case also the results of large clusters are low (2.9), however, they are higher than those of medium-sized clusters (2.5) and small clusters (1.8).

Relatively small problems in communication processes in a cluster, perhaps contrary to some expectations, are also experienced by larger clusters. The mean for large clusters in the sub-area *Internal communication* was 7.0 with the mean for medium-sized clusters of 6.4 and small clusters of 6.0. We may assume that large clusters are able to better organize various communication tools, but they are also not significantly worse than smaller clusters in terms of the number of meetings and other interactions between members. It should be noted that large clusters can handle all indicators in the sub-areas of *Processes in cluster* better. They also stand out from medium-sized and small clusters in the sub-area *Marketing and PR*, where the mean for medium-sized clusters was 5.7 and for small cluster - 5.5.

Interestingly, the age of a cluster does not have a significant impact on the status of processes in clusters. The differences between the mean values of both groups of clusters: younger and older in individual sub-areas did not exceed 0.2. Only in the case of *Market activity* the difference between younger and older clusters was 0.4 to the advantage of older clusters.

The analysis of mean values achieved by the clusters within the sub-area *Processes in cluster* taking into account the number of projects implemented by clusters shows that the number of projects implemented by a cluster, which to some extent can be surprising, does not have a big influence on the status of the processes (Chart 49).

**Chart 49. Mean values obtained by clusters within the *Processes in cluster* area depending on the number of projects implemented in a cluster**



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

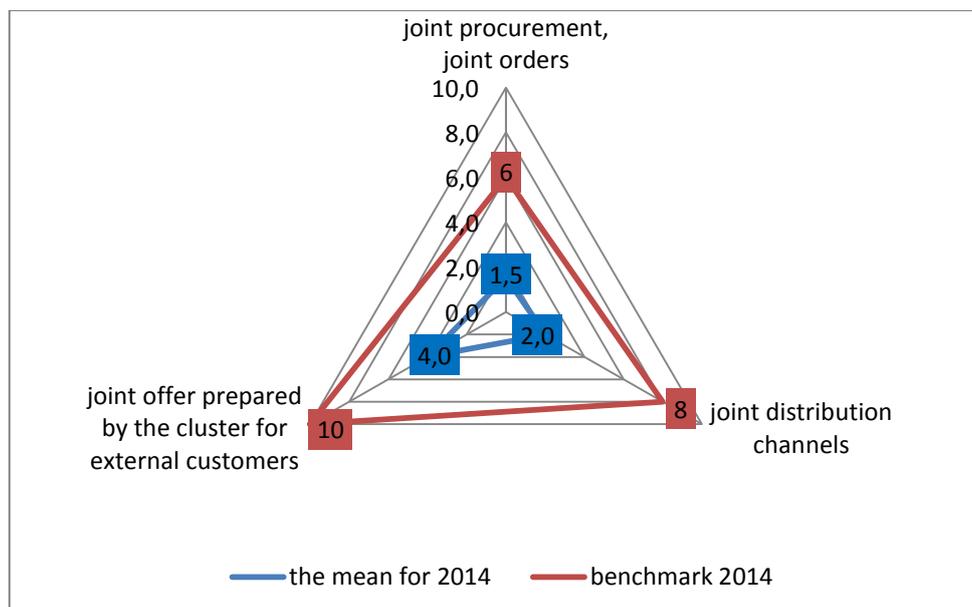
The mean values for less active, active and the most active clusters are similar, especially in the sub-area *Creation of knowledge and innovation* and *Internal Communication*. Moreover, there is an inverse relationship in terms of market activity. The least active clusters in the sub-area *Market activity* and *Marketing and PR* achieved higher mean values from the active and the most active clusters. On that basis it was possible to unequivocally draw a conclusion that projects implemented by clusters to a small extent are oriented towards market activity. Before that a positive correlation between the number of projects implemented by clusters and development of human resources was indicated, including increase in the number of members and employment in clusters, It turns out that the projects implemented at that time do not bring the appropriate effects in terms of market expansion and innovation. We can draw a cautious conclusion that the implemented projects were to a large extent focused on development of cluster structures and not on their market power measured by innovation and market activity. Presumably such orientation of a significant number of projects was justified before by an early stage of cluster development in Poland. Currently, however, taking, in particular, into account the already relatively high degree of development of the examined group of clusters, further concentration of those projects on the so-called networking actions is not justified. Reorientation of both the projects co-financed from external funds and the projects funded by clusters themselves on actions increasing innovation of companies and market expansion of those companies is indispensable.

### **6.1. Market activity**

The highest benchmark value - 10 - in the sub-area *Market activity* was achieved by the studied clusters in the category *Joint offer prepared by a cluster for external clients* (Chart 50). This means that in the best cluster a considerable majority of entities participated in preparation of the cluster offer: close to or equal 100%. Also in this indicator the examined clusters received the highest mean value of 4.0. This means that in an average cluster in the examined group 60% fewer entities were engaged in preparation of a joint offer for external entities than in the case of entities of the leader in the discussed scope. It can also be understood in the way that in an average cluster around 40% of cluster members participated or delivered a ready-to-use “input” of their products and services to the cluster offer in the process of creating a joint offer. This result can be considered as relatively positive, although it simultaneously indicates the proper area of market activity enhancement by including in this process an increasingly higher number of participants.

Lower activity was shown by the examined clusters in the *Joint distribution channels*. The benchmark in this indicator has reached the value of 8.0, whereas the mean for the examined clusters was only 2.0. Such relatively low mean value was the result of small differences between joint distribution channel forms used by the clusters, which include, for example: wholesale channels; joint supply to the strategic retail or wholesale networks; joint stands e.g. at fairs; joint tenders in tendering proceedings; joint points of sale; joint online sales or joint rental of an agent, exporter on international markets. The second source of the low mean value was the relatively small percentage of cluster member entities participating in this process.

**Chart 50. The mean value and benchmark value in the sub-area *Market activity in a cluster***



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

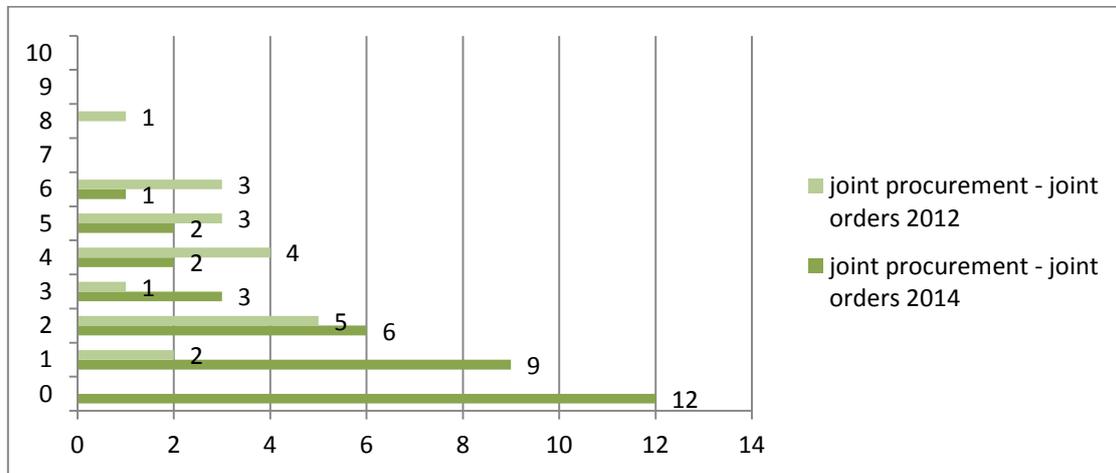
The examined clusters achieve the least satisfactory results in the case of the analysis of their joint procurement and joint orders. As far as the indicator *Joint procurement, joint orders* is concerned, the benchmark achieved the value of only 6.0 and the mean of 1.5. Thus, the clusters have the biggest difficulty in creating a numerous group of members, which would, for example, purchase raw materials, telephone services or consumables together.

The low benchmark and mean values are the consequence of both the limited diversity of applied joint orders, which could, for example, regard: mobile telephone services, power plant, etc.; purchases of mass raw materials; purchases of other materials for production; purchases of consumables, e.g. office materials or purchase of expert, training or advisory services. On the other hand, participation of entities engaged in the process of joint procurement proved to be low. Processes of joint procurement are probably not the key factor increasing competitiveness of contemporary companies; however, they create an area, in which relatively simple actions within clusters can bring quantifiable economic benefits for participants. The area of potential joint actions is still used by the examined clusters in a very limited scope. The problems with organization of joint procurement seem to be suitable for basically the entire examined sample of clusters. In this scope they are characterized both by a low benchmark level and the lowest stratification. The distance between the leader and the mean score is 4.5. In the other two sub-areas the difference between the best cluster and average clusters in the examined group was 6.0.

The analysis of results of joint procurement and order processes evaluation in the examined group of clusters (Chart 51) indicates a specific stabilization of situation in clusters in terms of joint orders and procurement over the last two years. On the one hand, a bigger number of clusters, i.e. 23, received a score above 0, whereas in 2012 such there were fewer of such clusters - 19. On the other hand, currently clusters more often received lower results. The best single cluster received the level of benchmark in 2012 of 6.0. Average level was achieved by 2 clusters. For comparison, in 2012 the best cluster in the discussed scope achieved the benchmark value of 8 and the next 6 clusters achieved the benchmark value

equal or higher than the mean (5-9). Values below the mean (range 1-4) in 2014 were achieved by 20 clusters against 11 clusters in 2012.

**Chart 51. Evaluation of joint procurement and order processes - comparison of study results from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators un 2012 and 2014.

The continuously present and relatively low level of use of such a simple instrument as a joint order requires application of good practice Info, which alerts that actions in this scope do not require a special effort and bring quantifiable benefits.

**Good Practice 4. Reduction of costs borne by cluster members**



Cluster.Info

**Aim: reduction of costs borne by cluster members**

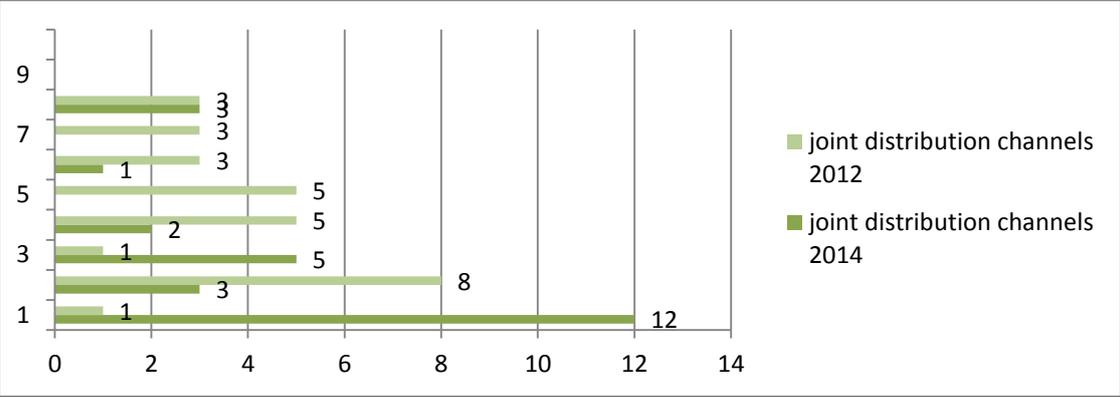
The cluster is one of few examined clusters that uses the mechanism of joint procurement. Currently this mechanism covered a purchase of fixed telecommunications and banking services. The cluster has managed to negotiate a beneficial offer in one of the biggest Polish banks, thanks to which the majority of banking services for the members of a cluster is free. The condition for concluding an agreement with a bank on exemption from fees or their reduction was a transfer by a part of cluster members of their financial deposits to that bank. The currently preferable conditions apply to three members of the cluster, however entities newly entering the cluster also have an option to use the offer.

**Effect: Cluster members bear much lower corporate banking service fees.**

A positive direction of changes can hardly be seen in the examined clusters within the framework of the indicator *Joint distribution channels*. Benchmark in the compared period 2012-2014 achieved the level of 8 points. (Chart 52). The number of clusters which obtained this result was identical. However, in the present study a lower number of clusters achieved values equal or higher than the mean in comparison to year 2012 (in 2014 - 4 clusters, 2012 - 13 clusters). In 2012 6 clusters were beyond the scale compared to 8 clusters in 2014.

Therefore the changes in creating joint distribution channels are not dynamic. Although slightly more clusters have, in the current edition of the study, received scores above 0, nevertheless the level or scale of using joint distribution channels in some clusters slightly fell.

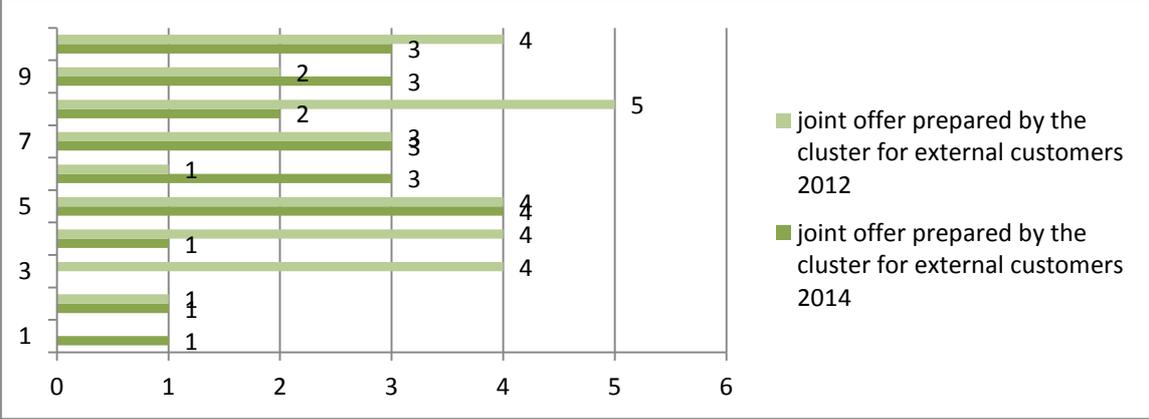
**Chart 52. Evaluation of the *Joint distribution channels* - comparison of study results from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

The smallest changes in the examined clusters in 2014 under indicators of the analysed sub-area in the period 2012-2014 existed in the *Joint offer prepared by the cluster for external clients*. Benchmark in both analysed editions achieved the highest level of 10 points. (Chart 53).

**Chart 53. Evaluation of the *Joint offer prepared by a cluster for external clients* - comparison of study results from 2012 and 2014.**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

Clusters which achieved this level have been using a high number of distribution channels and engaged the majority of cluster entities in it. In 2014 it was recorded in 3 clusters and in 2012 in 4 clusters. At the same time, total results equal to the mean and above (5-10 points) were achieved by 18 clusters in 2014 compared to 19 in 2012. This means that in both editions more than a half of clusters successfully executes joint orders, engaging more than a half of its members. It should, however, be emphasised that in 2014 as many as 14 clusters did not obtain a single point for activity in the scope of joint orders. In 2012 only 6 clusters were beyond the scale. With reference to the majority of clusters we can speak of maintaining

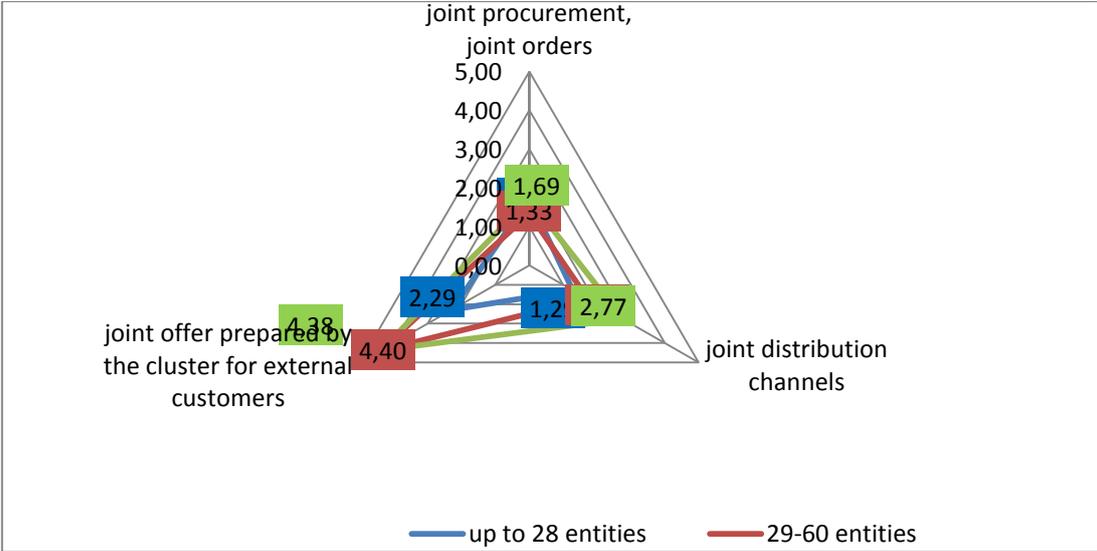
actions within the scope of a joint offer prepared by a cluster on a constant and relatively high level. The only worrying thing is that the number of clusters beyond the grading scale increased from six to fourteen, which indicates lack or marginal scale of actions taken in this scope. It can further be interpreted as progressive diversification of clusters in their market activity. A distinctive group is a group which maintains a relatively high activity in this scope, constituting 2/3 of the examined population and a group of clusters which resigns from intensive activity in the scope in creating a joint market offer. Perhaps this is caused by certain failures of some of the clusters connected to the aforementioned reluctance. More justifiable seems therefore referring to a good practice of the Eastern Construction Cluster from Białystok.

### Good Practice 5. Creation of a joint offer at the cluster level

 <p>Wschodni Klaster Budowlany Wiarygodność Rzetelność Innowacyjność</p>	Eastern Construction Cluster
<p><b>Aim: creation of a joint offer at the cluster level</b></p> <p>Based on the potential of its members the Cluster created a joint sales offer - comprehensive construction consulting services. Due to the fact that the Cluster entrepreneurs offer complementary products and services in the construction industry, the Cluster is able to provide support in implementation of almost every construction order in the entire added value chain. In order to create such a joint offer, entrepreneurs - members of the Cluster underwent an audit and presented their potential (product portfolio, resources), which enabled development of a business model together with assignment of task areas to individual entities from the Cluster. The comprehensive construction consulting is currently in the stage of market application.</p> <p><b>Effect: Building and promotion of a joint cluster brand. Increase of the reputation and trust in the market, both from the perspective of the cluster and cluster enterprises. Strengthening of cooperation within a cluster.</b></p>	

It is worth to look at the scope of actions from the sub-area market activity through the examined clusters from the perspective of the situation of clusters of various sized. An analysis in this scope has been presented in the Chart 54. It turns out that the biggest clusters do not show a significant advantage over medium-sized and small clusters, neither in the scope of joint procurement and orders nor in the scope of a jointly prepared market offer. Large clusters achieve only a small advantage in the indicator section *Joint distribution channels*, where they mean benchmark is 2.77 compared to 1.73 for medium-sized clusters and 1.29 for small clusters. As far as the indicator *Joint market offer* is concerned, the highest results are achieved by medium-sized clusters (4.40) with the minimal advantage over large clusters (4.38). The fact that in the scope of the *Joint procurement - joint orders* the highest result, 1.71, was achieved by small clusters with a minimum advantage over large clusters. When interpreting these results we cannot forget that the absolute mean value for the entire sub-area is low.

**Chart 54. Mean values obtained by clusters within the section *Processes in cluster* according to the size of a cluster**

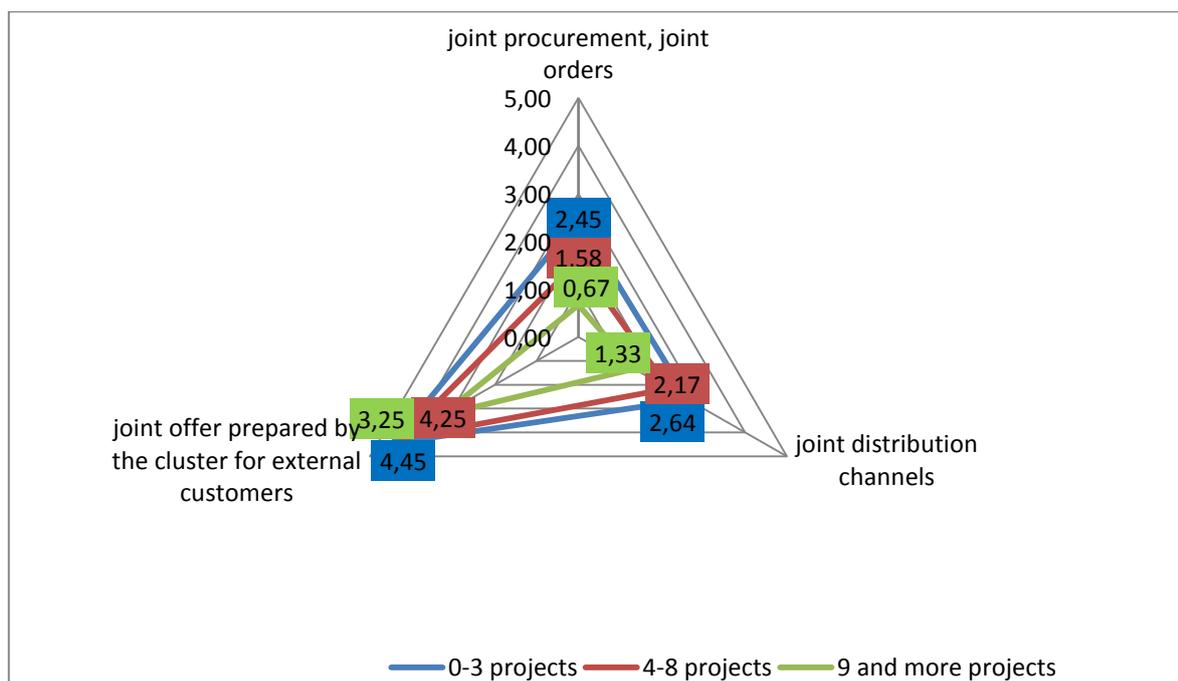


Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

At the same time lack of a clear advantage of large clusters in the scope of market activity with objectively higher market power and ability to adjust more diversified market instruments proves that the barrier limiting market activity of clusters are the difficulties in obtaining agreement in the scope of undertaking this type actions rather than a low tendering potential. This is best seen in the certain advantage of smaller clusters in the case of actions performed for the purposes of joint procurement. Since smaller clusters can achieve a certain position in this scope, it is even more available for larger clusters that dispose of a higher economic potential and ability to ensure beneficial conditions of procurement. Narrow use of market instruments must be attributed to imperfect management of clusters, but probably also to deficiencies in building mutual trust. However, the latter will presumably be solidified faster in the case of smaller clusters, which in a certain way explains their relatively good position in benchmarking in the case of joint procurement.

The analysis of the scope of using market activity instruments in the section of clusters of various levels of activity in the scope of implemented projects indicates surprising relations (Chart 55). Clusters which implemented the highest number of projects did not show the highest mean values in any of the three indicators of the examined sub-area. We can therefore observe a perhaps accidental regularity due to small differences between clusters, that clusters which implemented the lowest number of projects obtained the highest values of the mean in the case of all three indicators. Hence, in the case of the *Joint procurement, joint orders* the result of the least active clusters (2.45) has significantly outperformed the results of the most active clusters (0.67). Similarly, as far as the indicator *Joint distribution channels* is concerned, the least active clusters achieved the result of 2.46, whereas the most active clusters of only 1.33. An analogous situation exists in terms of the *Joint market offer*, where clusters which implemented up to three projects achieved the score of 4.45, whereas clusters implementing 9 or more projects achieved the result of 3.25.

**Chart 55. Mean values obtained by clusters within the sub-area *Market activity* according to the number of implemented projects**



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

The above presented analysis first of all confirms that the implemented projects were not, in a decisive majority, oriented towards improvement of market activity of clusters, and in particular, of the enterprises that belonged to them. We could also risk a hypothesis, which would require further verification, that clusters focusing on implementation of a high number of projects redirected their attention from market activities oriented at improvement of the situation of enterprises on specific markets. Given the fact that a cluster ultimately serves to improve competitiveness of enterprises and regions, any possible neglecting of market activities to implement projects directed at networking or marketing of the cluster itself (discussed later) must receive a negative evaluation as a sign of imperfect cluster management.

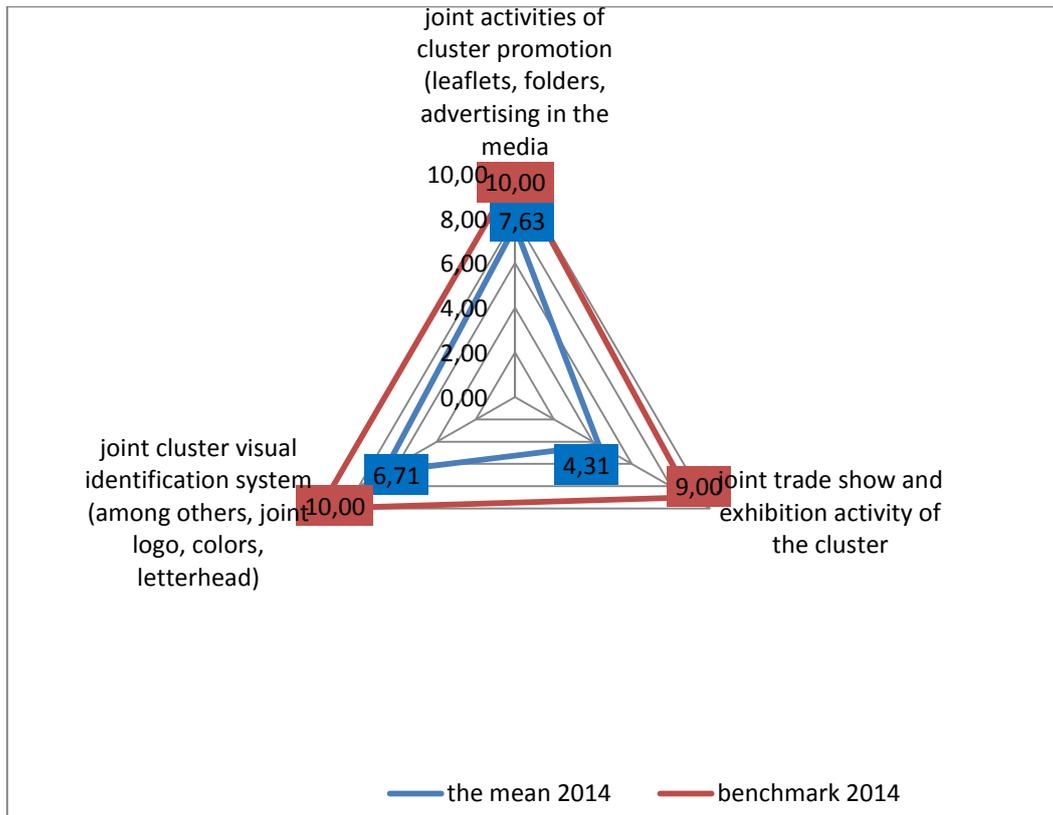
## 6.2. Marketing and PR

The analysis of the sub-area *Marketing and PR* was conducted on the basis of three indicators: *Joint activities in terms of cluster promotion (leaflets, folders, advertising in the media)*, *Joint trade show and exhibition activity of the cluster*; *Joint system of cluster visual identification (among others common logo, colours, letterhead)*.

The best study results were achieved in the section of *Joint activities in terms of cluster promotion*. With the benchmark value of the highest level (10 points) the mean value stood at 7.63 points. (Chart 56). Thus, there is a relatively small distance between the average clusters and the group's leader in the examined group. This means that there is a high number of promotion measures used both by the group's leader and the average clusters, as well as a high number of cluster members engaged in promotional actions. The cluster promotional activity is conducted at a high level and there are no as strong differences in this scope as in the case of many other indicators.

Only slightly worse results are displayed by clusters in the scope of the *Joint system of visual identification of a cluster*. With the maximum benchmark of 10 points, the mean for the examined clusters in the discussed indicator was 6.71.

**Chart 56. The mean value and the benchmark value in the *Marketing and PR* sub-area**

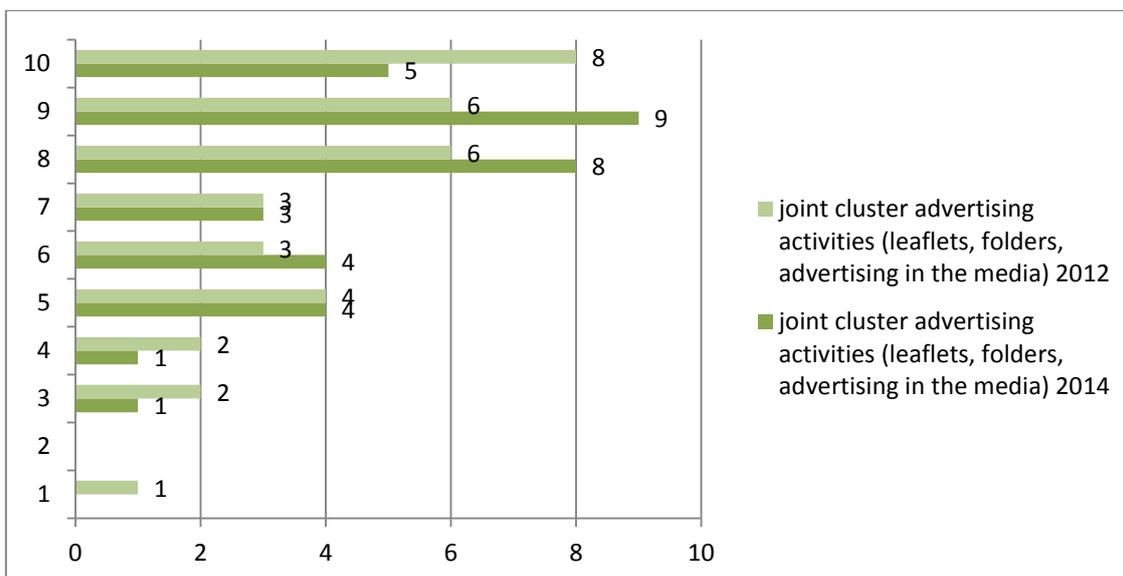


Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

The weakest results in the analysed sub-area are achieved by clusters in the scope of *Joint trade show and exhibition activity*. The leader in the examined group achieved 9 points for the conducted trade show and exhibition activity, whereas the mean for the group of clusters was merely 4.31. The highest stratification of the examined group in the trade show and exhibition activity of clusters was observed in the sub-area of *Marketing and PR*, and at the same time the results in this scope are the lowest in the sub-area.

The analysis of the examined group of clusters in terms of joint cluster promotion activities (Chart 57) indicates a crucial increase in the number of promotional instruments used and the number of cluster members engaged in promotion. Although a lower number of clusters in 2014 (5) compared to the year 2012 (8) received maximum points for this type of activity (benchmark of 10 points), as many as 24 out of 35 clusters of the examined group in 2014 received a grade higher than the mean and lower than the maximum grade. In 2012, in turn, comparable results were achieved by 18 clusters.

**Chart 57. Evaluation of the *Joint cluster promotion activities (leaflets, folders, advertising in the media)* - comparison of results from the studies from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

Currently as many as 9 clusters received 9 points, which means that those clusters have been using 4-5 different promotional activities with at least 25% participation of cluster members in each of the activities. The level and tendencies of changes in terms of promotional activity can be evaluated as very positive. The currently increasing significance should be attributed not just to the promotion of a cluster itself, but cluster brands, with those actions directly resulting in expansion of enterprises into new markets. In this context it is worth to apply the good practice of the cluster called Leszno Flavours.

### Good Practice 6. Building of a strong cluster brand



## Leszno Flavours

**Aim: Building of a strong cluster brand**

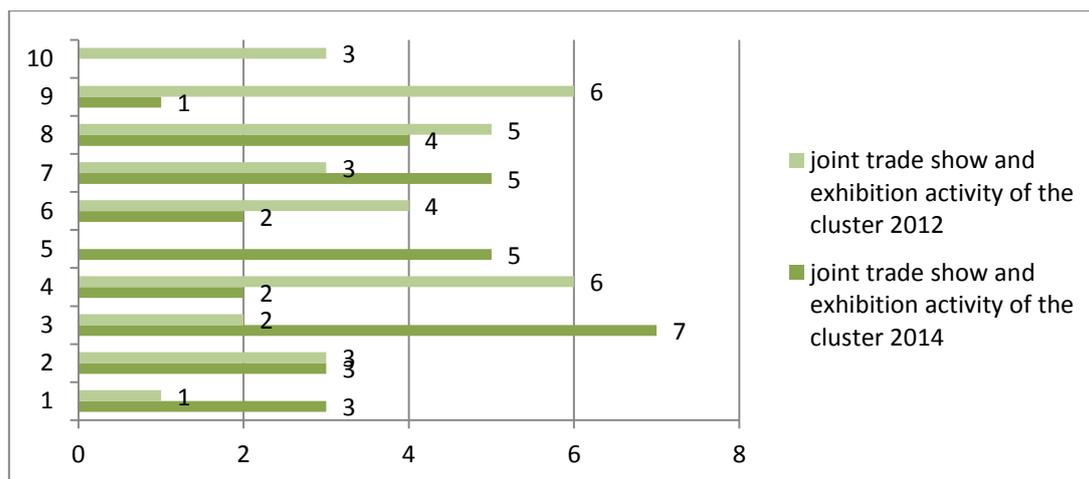
Since 2011 certain actions have been undertaken by the Cluster which aim at building of the brand and promoting the Cluster, among others, by organizing promotional campaigns. The target group of the currently implemented campaign includes companies from the food industry registered in the Leszczyński sub-region, which wish to raise their competitiveness and innovation, as well as local self-government, institutions from the business surrounding and scientific units, which wish to cooperate to develop companies from the same brand and the regional economy. The second target group embraces consumers from the Leszczyński sub-region, Poznań, Wrocław as well as the Lubin-Głogów Cooper Belt, who by consciously selecting products bearing the cluster brand of Leszczyńskie Smaki strengthen the competitiveness of the companies in the cluster. Apart from the standard forms of promotion (e.g. the *outdoor* campaign or production of promotional materials), the Cluster also conducts non-standard promotional activities and *field marketing* (product tasting in

selected places). The contextual form of advertising that emphasises not only the logo and the promotional slogan of the Cluster, but also its entire image among potential consumers is crucial.

**EFFECT: Previous experience shows that implementation of this type of activities has significantly contributed to increasing the level of brand awareness as well as the awareness of the cluster logo and the promoted slogan.**

In the scope of the *Joint trade show and exhibition activity*, cluster activity over the last two years has weakened. This is indicated by cluster evaluations in the period 2012-2014 presented in Chart 58. In the first instance, it should be noted that there is a lower participation scale of the group examined in both domestic and foreign trade shows and exhibitions. The benchmark from 10 points in 2012 fell in the year 2014 to 9 points. Additionally, the maximum benchmark values in 2012 were achieved by 3 clusters, whereas in 2014 only one cluster received the benchmark value reduced by 1 points. Furthermore 3 clusters in 2014 did not receive even one point for their trade show and exhibition activity in 3 clusters compared to 2 clusters in 2012.

**Chart 58. Evaluation of the *Joint trade show and exhibition activity of the cluster* - comparison of results from the studies from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

The evaluation of changes in the trade show and exhibition activity should surely take into account the reduced external public funds in the current period for financing of such a type of activity by clusters (which was discussed with financial resources). Therefore the reduced trade show and exhibition activity seems to be a simple consequence of public funding limitation. At the same time it should be noted that the clusters were not able to maintain their previous level of activity, to a large extent financing them with their own funds. Participation in trade shows and exhibitions is a crucial element of a number of enterprises. Implementation of those activities should bring financial benefits to companies, and perhaps also to the organizer who should be the cluster coordinator. Clusters should treat organization of the trade show and exhibition activities for clusters, not so much as an element of implemented projects, but more as a type of a crucial and valuable service, for which a fee could also be charged compensating its cost. One of the clusters' self-financing sources can be noticed here.

An interesting innovative example of exhibition activity was used by the Eastern ICT Cluster, which additionally establishes beneficial partnership relations with the public authorities.

## **Good Practice 7. Creation of a modern and innovative image of a cluster during local events addressed to mass recipients**



### **Eastern ICT Cluster**

#### **Aim: Creation of a modern and innovative image of a cluster during local events addressed to mass recipients**

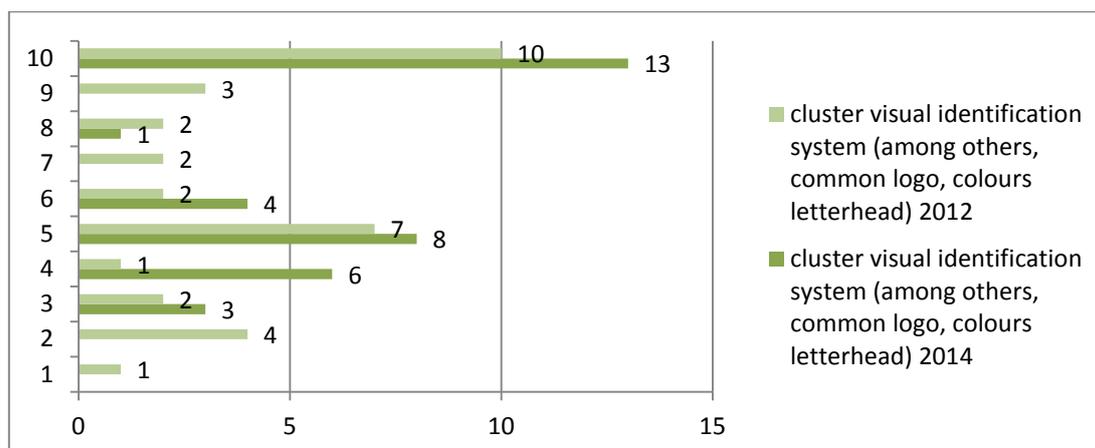
The Eastern ICT Cluster was a coordinator of promotion of companies, higher educational institutions and the self-government authorities of Lubelskie voivodeship, including its members during the fairs CeBIT 2013 (Poland was the main partner). On the initiative of Cluster members a promotional installation was set up, enabling a virtual walk in the 16th century Lublin in 3D technology. The installation allowed to play additional sound information on the city (virtual guide). On a large screen, in turn, a film presentation was shown (comic strips) showing the history of “The Magician of Lublin”. The programme partner cooperating in creation of installation was one of the key cultural institutions in Lublin - the Theatre NN Brama Grodzka.

“Time Capsule” was established during preparations for 700th anniversary of according municipal rights to Lublin. Since the economic slogan of Lublin is “Lublin inspires business” thus an interesting idea has been born in the minds of cluster members - “Since we have the technology and knowledge we can joint our efforts and together promote ourselves in an extraordinary way on one of the biggest IT events in the world”. In this way Lublin has literally inspired business. That is how the Time Capsule, which left for Hannover, was created. The action of constructing the capsule was joined by the Marshal’s Office in Lublin, which considered the capsule an innovative method of promoting Lubelskie voivodeship.

#### **Effect: combined promotion of the cluster and region, strengthening cooperation with the Marshal’s Office.**

The evaluation of the cluster visual identification system indicates that the examined clusters, compared to the study results in 2012, enhanced their cluster visual identification system assessed in terms of the number of visual identification carriers in promotional activities of a cluster as well as engagement of entities participating in this process/action. The maximum benchmark values in 2014 were achieved by as many as 13 clusters, compared to 10 clusters in 2012 (Chart 59).

**Chart 59. Evaluation of the *Cluster visual identification system* - comparison of results from the studies from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

Additionally, none of the clusters in the current edition of the study obtained 0 points for the cluster visual identification system, which happened in an individual case in 2012. Moreover, a majority of clusters in 2014 oscillated around the mean score. The level and tendencies of changes in terms of cluster visual identification system can be evaluated as very positive. It is worth to mention the good practice of Kielce Trade Fair Cluster, as part of which an innovative identification system combined with the promotional system was created.

**Good Practice 8. Increase in the customer market and profits by preparation of a joint card - promotional system.**



**Grono Targowe**  
Kielce

**Kielce Trade Fair Cluster**

**Aim: Increase in the customer market and profits by preparation of a joint card - promotional system**

The eFair Assistant aims at promoting the cultural and entertainment offer of the city of Kielce and the Świętokrzyski region, as well as development of a relevant system of discounts for guests participating in the fairs and other events organized in Fair Kielce. The system is fully automated - it collects and compiles information through a GSM network on users benefiting from the discounts offered by the program partners, among which there are cultural institutions and companies from the hotel, food and catering, transport, entertainment and tourist lines of business. The System was funded by EU grants and operated by Fair Kielce and Kielce Trade Fair Cluster. This innovative solution is a perfect tool promoting the offer of a number of Cluster members. The idea of creating the system and the card proves how easy creation of a joint offer of entities from numerous lines of business is.

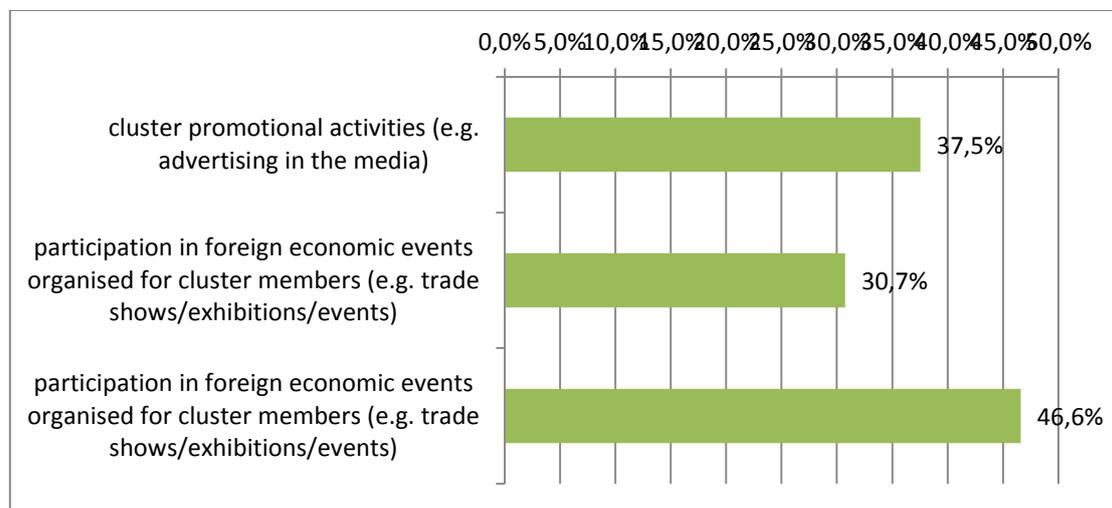
**Effect: Increased interest in the offer of cluster enterprises through development of a system of discounts for the guests.**

As far as evaluation of cluster activity in the sub-area *Marketing and PR* is concerned, the below section indicates, among others, the growing involvement of cluster entities in

promotional activities. Therefore it is worth to confront the evaluation made by cluster coordinators with opinions of those cluster members. Cluster members were asked, among others, to answer the question whether they participated in the joint undertaking implemented by cluster members, which consisted in participation in promotional activities of the cluster (e.g. advertising in the media) (question no. 14). 232 (37.5%) out of 618 examined cluster members, 232 provided a positive reply. This means that at least every third member of the examined clusters actively participated in the processes of promoting a given cluster.

At the same time, the members were asked to indicate whether they participated in domestic or foreign economic events organized for cluster members (trade shows/exhibitions). Participation in domestic trade shows and exhibitions was declared by nearly 47% of the examined entities (288 out of 618), whereas 30.7% of them (190 out of 618) participated in foreign trade shows and exhibitions (Chart 60/question no. 14).

**Chart 60. Involvement of cluster members in Marketing activities**



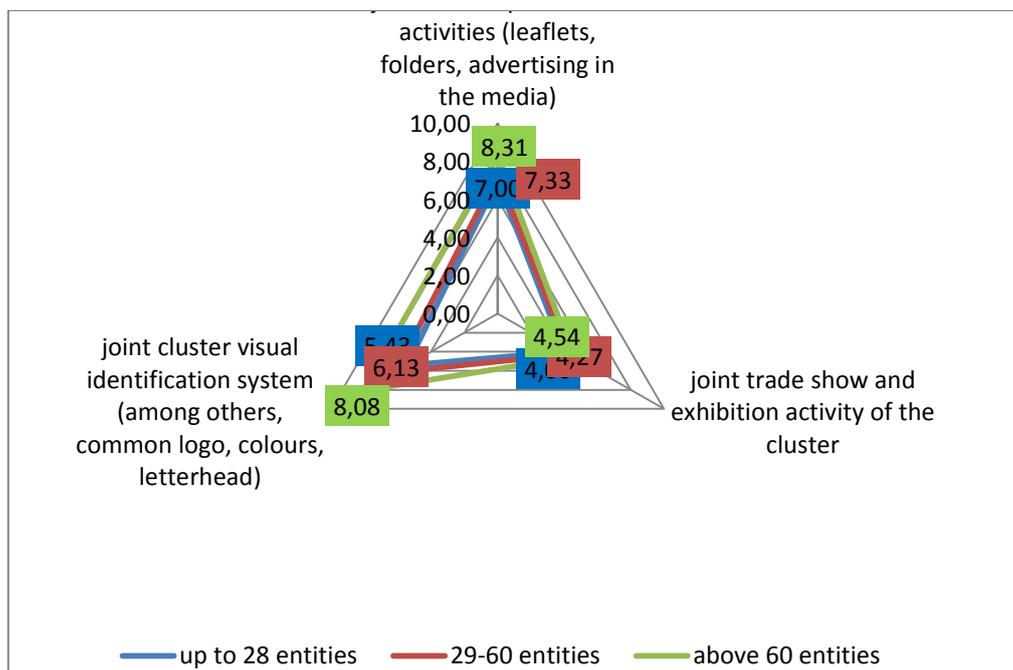
Source: Own study based on questionnaires CAWI/CATI with the members of 35 clusters; N=618.

What should be noted is the relatively high involvement of member clusters in promotion in the foreign markets, which will surely facilitate implementation in the nearest future of the cluster internationalization process for strategic cluster purposes.

The entirety of presented participant study on their involvement in promotional actions may be slightly disappointing. A particularly unimpressive result is participation of less than a half of cluster members in domestic economic events. Also the participation of only one-third of cluster members in the cluster promotional activities can be explained by the fact that their activities were not oriented to promoting the members as such, but expressly the very institution of the cluster. A significantly limited participation of cluster members in the activities of the sub-area *Marketing and PR* suggests that marketing strategies of individual clusters require reconsideration and reevaluation of marketing strategies of individual clusters with consideration of the need for promotion of not only a cluster as such, but at least the joint market offer of the cluster, market offer of individual members, and finally the very members, in particular enterprises with increase of its competitiveness being the objective of every cluster.

The analysis of the sub-area in the structure of clusters of various ages has showed no significant differences. Even young clusters effectively apply marketing instruments considered in individual indicators of the sub-area discussed above. However, a certain understandable regularity can be noticed in the scope of marketing activities that the most active clusters are those which are large (Chart 61).

**Chart 61. Mean values obtained by clusters within the *Marketing and PR* sub-area according to the size of a cluster**



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

The receive the highest number of points in all the indicator categories. The advantage of large clusters is the highest in terms of identification system, where having obtained the result 8.08 they are better than medium-sized clusters (6.13) which are second. Large clusters have a slightly lower advantage in the case of the *Joint promotional activities* (8.31 - large clusters; 7.33 - medium-sized clusters). The lowest advantage of large clusters over medium-sized clusters has been noted in terms of the *Joint trade show and exhibition activity*, where the difference is only 0.27 point. The advantage of large clusters' potential over smaller clusters could be revealed with regard to the latter type of activity. A higher number of entities contributes to the development of trade show and exhibition activities in a natural way. It turns out, however, that large clusters focused to a larger extent on simpler marketing tools more related to the cluster itself than promotion of companies that belong to it. It seems that larger clusters in particular can significantly activate their trade show and exhibition activity, which currently appears as a not very used potential.

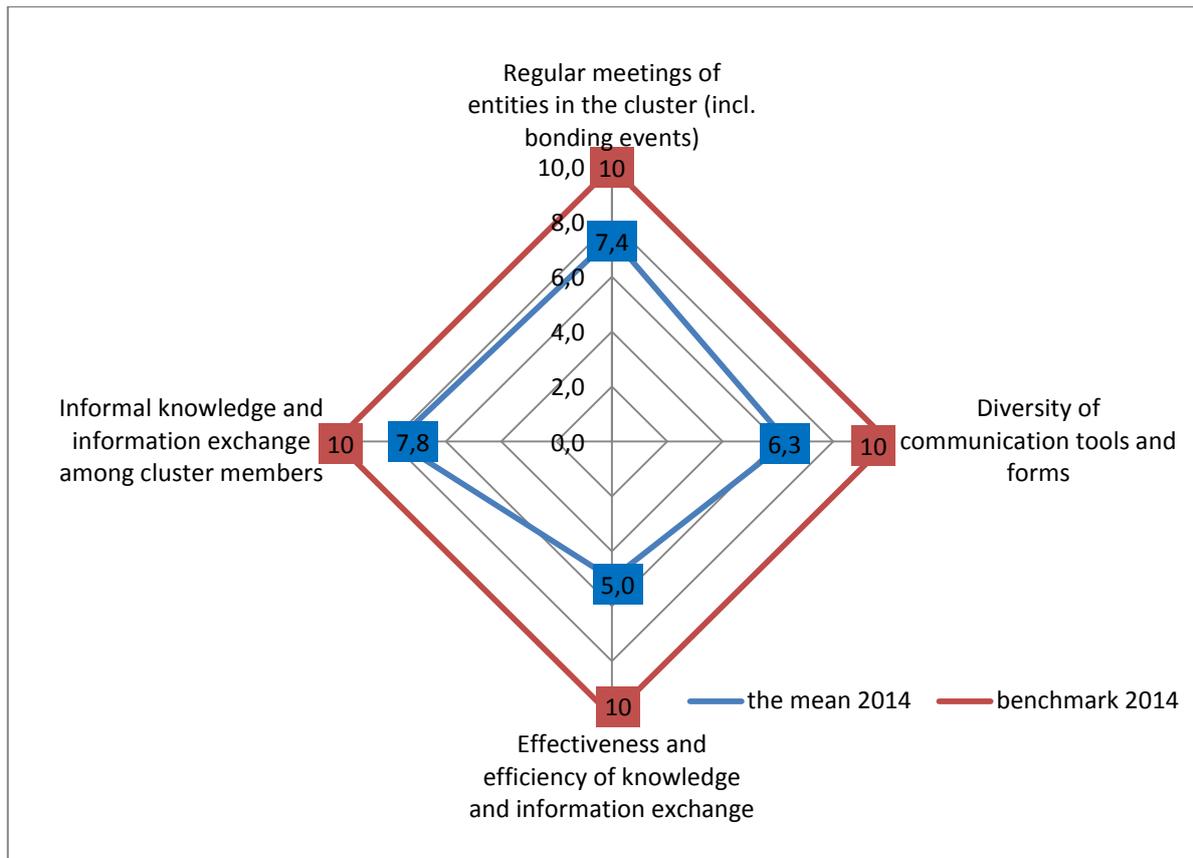
### 6.3. Internal communication

A proper course of communication in an organization in a number of cases conditions the dynamics of developmental processes. Therefore in the context of cluster processes it is worth to take a look at processes involved in communication within the examined clusters.

The *Internal communication* sub-area distinguishes a comparable situation at the level of all four partial indicators.

The relatively best situation in the examined group is evident in the context of *Informal knowledge and information between the members of the cluster* (Chart 62).

**Chart 62. The mean value and benchmark value in the sub-area *Internal communication***



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

The scale of cluster entities' participating/engaged in informal processed of knowledge and information exchange as well as methods/types of informal knowledge and information exchange among cluster members have been rated the highest in the group's leader (benchmark value of 10 points). The mean value for all of the clusters was 7.8 points.

There is an equally good situation in clusters, in terms of regularity of meetings within a cluster. The indicator *Regular meetings of entities within a cluster* has indicated a benchmark value equal the maximum value, whereas the mean value was 7.4 points.

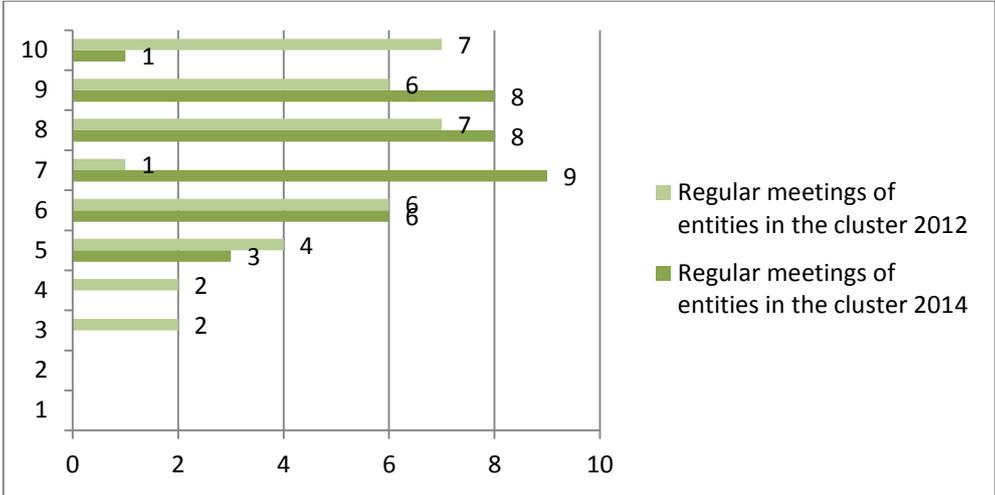
As far as the two other indicators are concerned: the *Diversity of communication tools and forms* as well as the *Effectiveness and efficiency of information and knowledge exchange* as the leader's results reached average vales for the entire group of clusters were lower. They were 6.3 and 5.0, respectively.

The lowest stratification of the examined population of clusters was recorded in the sub-area of *Internal communication* in terms of the *Informal knowledge and information between the members of the cluster*. The highest stratification of clusters refers to the *Effectiveness and efficiency of information and knowledge exchange*.

Chart 63 presents the evaluation of cluster meetings - comparison of results from the studies from 2012 and 2014. There is an evident increase in the frequency of cluster meetings and an increase in the attendance at the meetings in 2014 compared to 2012. Although the benchmark value, i.e. in total 5 and more meetings per year, with the attendance of at least 80% cluster members was achieved by only 1 cluster, compared to 7 clusters in 2012, the total number of clusters with the value above the mean and lower from the maximum value (point range 6-9: 2-4 meetings with the attendance of 40-79%). In total in 2013 there were 31

of those clusters, compared to 20 in the year 2012. Cluster coordinators inform of a high, and even growing regularity of cluster member meetings. It is undoubtedly a positive signal reflecting the cluster member’s willingness to develop cooperation and build trust, followed by exchange of knowledge. The reported frequency of meetings is very promising for the durability of clusters.

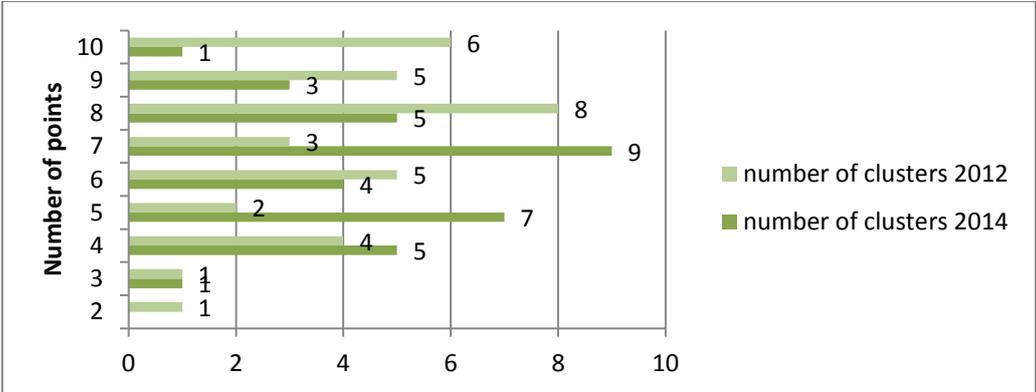
**Chart 63. Evaluation of the *Regular meetings within a cluster* - comparison of results from the studies from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

However clusters in the year 2014 compared to 2012 limited *Diversity of communication tools and forms*. The benchmark indicating the use of 10 and a higher number of communication tools and forms in 2014 was recorded only in 1 cluster (Chart 64). Such a number of communication forms and tools in 2012 was conducted by 6 clusters. The highest number of clusters over the last two years used from seven to eight communication tools. In the study in 2012 this diversity of tools fluctuated between eight and ten.

**Chart 64. Evaluation of the *Diversity of communication tools and forms* - comparison of the study results from 2012 and 2014**

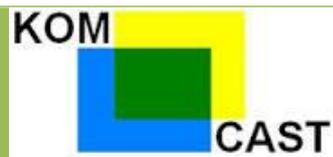


Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

It should be assumed that the reason for resigning on average from 2-3 communication tools was verification of efficiency and effectiveness of both the retained and rejected tools. The recorded slight limitation of diversity of communication forms used in clusters should not

receive a negative evaluation. On the contrary, it could be regarded as a sign of cluster management improvement, where the most effective forms of communication are retained. Such interpretation is a result of the still high diversity of communication forms used. It is worth for clusters to analyse not only efficiency, but also effectiveness of particular forms of communication and retain only those which from their point of view are optimal. Among the many interesting concepts of improving communication forms it is worth to mention the good practice of the Eastern Foundry Cluster KOM-CAST.

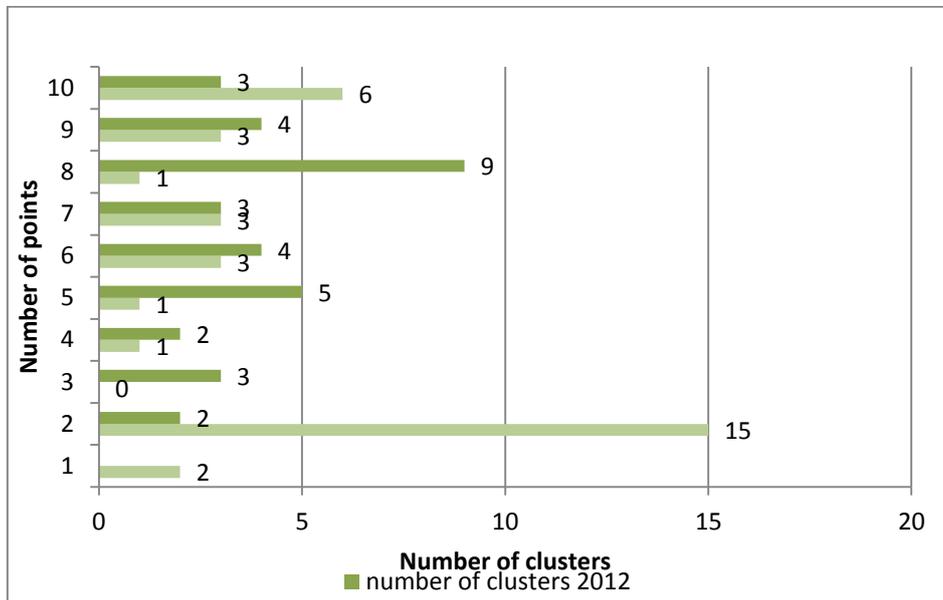
### **Good Practice 9. Creation of an internal information exchange system and communication in the cluster**

	<b>Eastern Foundry Cluster KOM-CAST</b>
<p><b>Aim: creation of an internal information exchange and communication system in the cluster.</b></p> <p>The Coordinator of the Eastern Foundry Cluster KOM-CAST initiated the establishment of the Virtual Scientific and Technical Information Centre for the Cluster members. A crucial aspect of the internal layer of this portal is access to current information regarding the line of business, including domestic and foreign articles, subscribed journals, information on results of R&amp;D of scientific centres. Additionally, the Virtual Scientific and Technical Information Centre has been equipped with Foundry Tech software enabling execution of engineering calculations. The casting technology aiding application (selection of optimal gating system and riser heads) contains the following modules: design of casting mould with a vertical and horizontal moulding lines, selection of the gating system type, selection of the pouring speed, selection of riser heads, feeders and their distribution, data base of casting alloys, calculation of mould forms, result reporting, etc. At the same time, as part of the project, technical and economic consulting services is offered (trade, marketing, intellectual and industrial property protection) for all Cluster members interested in this idea, provided in their seats. Over the entire period of project implementation, representatives of the member can meet experts whose task is to support them in the development management process. The adopted support formula, particularly important for companies from the SME sector, allows, among others, for free, systematic acquisition of supplementary knowledge and skills. Completion of project implementation is followed by evaluation of the impact of this type of activity on Cluster development. In the case of further demand for this type of support the coordinator plans its continuation.</p> <p><b>Effect: free flow of data among cluster members (e.g. cooperation offers, information on cooperating parties sought for execution of a particular order), increase in efficiency of casting technical documentation design and preparation as well as a possibility of updating technical and business knowledge.</b></p>	

The scores achieved in the section *Effectiveness and efficiency of information and knowledge exchange* in clusters dropped in 2014 compared to 2012 (Chart 65). The benchmark indicating most of all the use of communication platform in a cluster by more than 80% of members and creation of working groups, with participation of more than 80% of members, was achieved by six clusters, compared to three clusters in 2012. However, the

most numerous group, 15 out of 35 clusters, evaluated effectiveness and efficiency of information and knowledge exchange in clusters as very low (2 points).

**Chart 65. Evaluation of the *Effectiveness and efficiency of information and knowledge exchange* - comparison of results from the studies from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

This result should be interpreted as a sign of insufficient use of modern forms of communication in the form of a joint communication platform. At the same time dissemination of such communication platforms should be treated as an important direction of increasing effectiveness and efficiency of information and knowledge exchange in clusters. It is worth to use the good practice of the West Pomerania ICT Cluster from Szczecin related to creation of an IT platform for the purposes of the cluster.

**Good practice 10. Improvement of internal communication in a cluster with the use of IT tools**



West Pomerania ICT Cluster

**Aim: improvement of internal communication in the cluster with the use of IT tools**

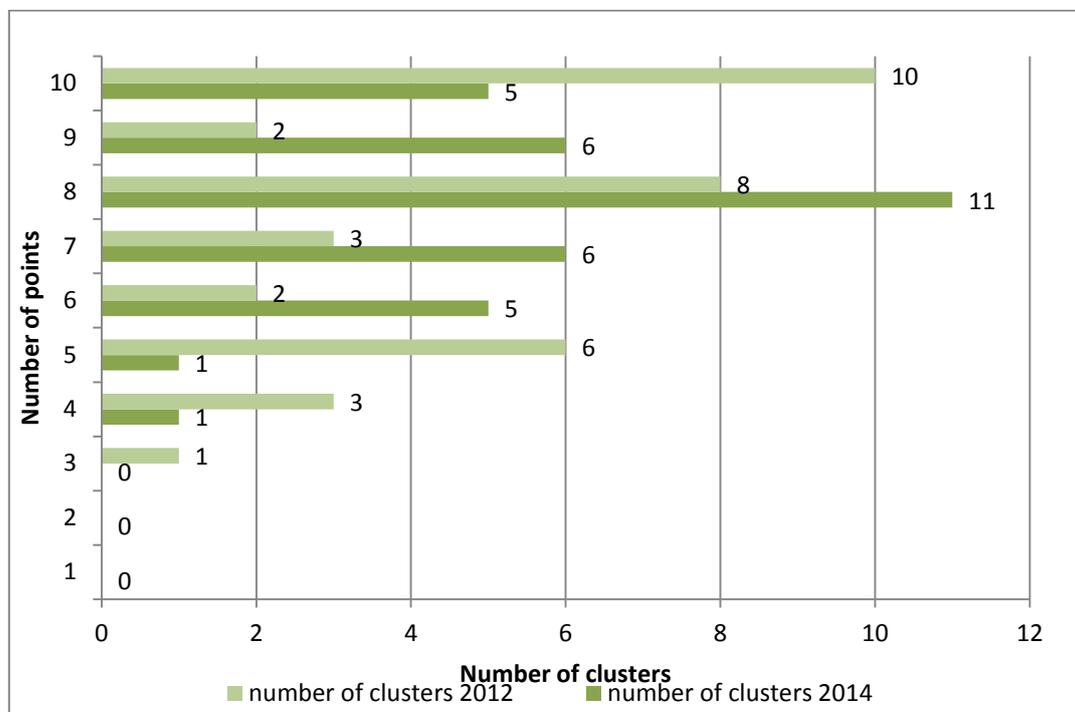
For the purposes of the Cluster, in order to facilitate communication and cooperation among members of the Cluster a platform was created (developed and implemented by cluster companies). The platform consists of two elements: RefCloud - intranet, used for detailed presentation of every company, together with the scope of activities and competences as well as C4C - common platforms based on Google solutions with services available to all members. Cluster members obtained access to knowledge repository, in which cluster documents and materials are gathered (Cluster strategy, action plan for a given term, reports, resolutions, graphic materials, special offers catalogue for Cluster companies as well as a data base of CVs sent to the Cluster - interns, employees, co-workers) and a calendar in

which information on internal and external events, training, trade conferences are stored (additionally, there is a system of notifications sent directly from the calendar). There is also a task module offered by the platform (with a mobile version) facilitating management of projects within the Cluster.

**Effect: creation of a platform for internal cooperation within the cluster, enabling a seamless flow of information (data, documents) within the cluster, and at the same time facilitating communication and cooperation among members of the Cluster.**

It should be noted that there has been improvement of situation in clusters as regards informal knowledge transfer (Chart 66). Although only half of the clusters in 2012 obtained the maximum value of benchmark, the number of the clusters which received 7-9 points increased. In 2012 there were 13 of them, whereas in 2014 - as many as 23.

**Chart 66. Evaluation of the *Informal knowledge exchange in the cluster* - comparison of the study results from 2012 and 2014**



Source: Own study based on the results of the research conducted among cluster coordinators in 2012 and 2014.

This means that clusters used on average 3-4 channels for the process of transferring informal knowledge (e.g. working groups, project groups; joint invitations of external experts or exchange of knowledge among companies - internal quasi-training activities, establishment of cooperation by a few members with R&D units or higher education institutions; purchase/ installation/ development of programs, tools for a few cluster members), with participation in each of the processes at least 25% of cluster members. Cluster coordinators report the proper processes of informal knowledge transfer. The situation in this scope improves in relation to the previous study, which seems as natural due to the growing, with the lifespan of clusters, mutual trust. It should, however, be noted that the diversity of informal contact forms and the level of member participation in them was subject to evaluation. These are undoubtedly, crucial symptoms of informal knowledge exchange. We cannot, however, only on this basis

evaluate how efficient the transfers of the so-called “tacit” or “informal” knowledge, whose flows are essential for effectiveness of clusters as economic structures particularly conducive to innovation, are. To a certain extent, efficiency of those processes can be concluded on the basis of an increase in innovation of enterprises belonging to clusters, which will be the subject of the further part of the Report. It is very difficult to stimulate flow of “tacit” knowledge; however, even in this scope good practices can be found for example Metal Cluster from Białystok.

### **Good practice 11. Exchange of technological competences between companies**



#### **Metal Cluster**

##### **Aim: exchange of technological competences among companies**

In the Cluster, as part of the project entitled “Clusters as a prerequisite for effective development of the Polish-Lithuanian borderland” a “*self-training*” system was initiated, consisting in sharing knowledge and experience between each other, especially in the field of technology (the so-called tacit knowledge, incredibly difficult to acquire in business activity) between cluster companies belonging to the “Advanced Cooperation Group” in the Cluster. The above-presented exchange of technological competences is fostered by content discussions with participation of experienced specialists in individual cluster companies, internship exchanges, technological training and the use of a mutual IT platform (access to knowledge in the log-in zone). It is a particularly valuable practice, given the fact that companies with a high technological development face big problems with finding the right training offer, which would satisfy their needs in the scope of specialist technological knowledge. Furthermore, a similar exchange of technological competences takes place at the Lithuanian partners, whereas bilateral cooperation (entrepreneurs from Poland and Lithuania) is planned in the future.

**Effect: tacit knowledge flow in the cluster, increase of cultural and social capital in the cluster - development of technology in cluster companies and increase of trust among Cluster members.**

### **Good Practice 12. Study visits in other enterprises belonging to the Cluster**



#### **Metal Cluster**

##### **Aim: study visits in other enterprises belonging to the Cluster**

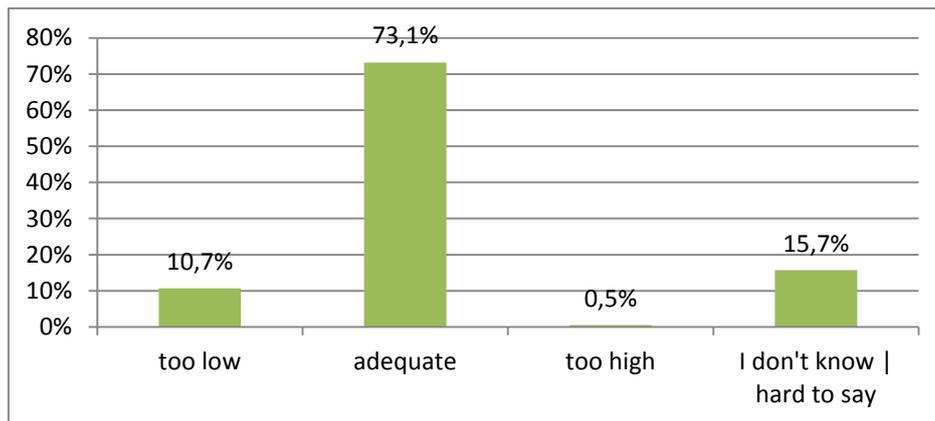
As part of every month’s meetings “Advanced Cooperation Group” study visits are practised in cluster enterprises. In this way, apart from discussion of issues related to the functioning of the Cluster, participants have a possibility to see the machinery stock in other cluster companies. The above-mentioned meetings last around 4 hours and are divided into three main thematic blocks: technological part (showing around the company’s production division), the cluster part (issues related to the current activity of the Cluster) and detailed themes brought up by the Coordinator or Cluster members.

**Effect: Tacit knowledge flow in a Cluster. Increase of trust between cluster members.**

Similarly, in the case of communication processes we can refer not only to information from cluster coordinators, which was used for calculation of benchmarks, but also opinions of the very participants expressed during the research, who were asked to evaluate the frequency of meetings in the cluster. More than 73% of members of the examined group (452 entities out of 618) evaluated the frequency of meetings as the right frequency (question no. 5). For 10.7% (66) members of clusters, the number of meetings throughout the year was too low and they count on increased frequency. Only for 0.5% (3) entities the cluster meetings were organized too often. At the same time, as many as 15.7% (97) of respondents could not evaluate the frequency of meetings in the cluster (Chart 67).

Information obtained from cluster members on the frequency of meetings fully confirms optimistic study results of coordinators in this scope and at the same time indicate strong willingness of cluster members to participate in meetings. Many cluster members would be ready to meet even more often, which suggests the need for flexibility of meeting organization, not always with full composition. The frequency of meetings should be adjusted to individual preferences and needs of particular members, creating appropriate working groups or other adequate meeting arrangements.

**Chart 67. Evaluation of the Frequency of meetings of cluster members**

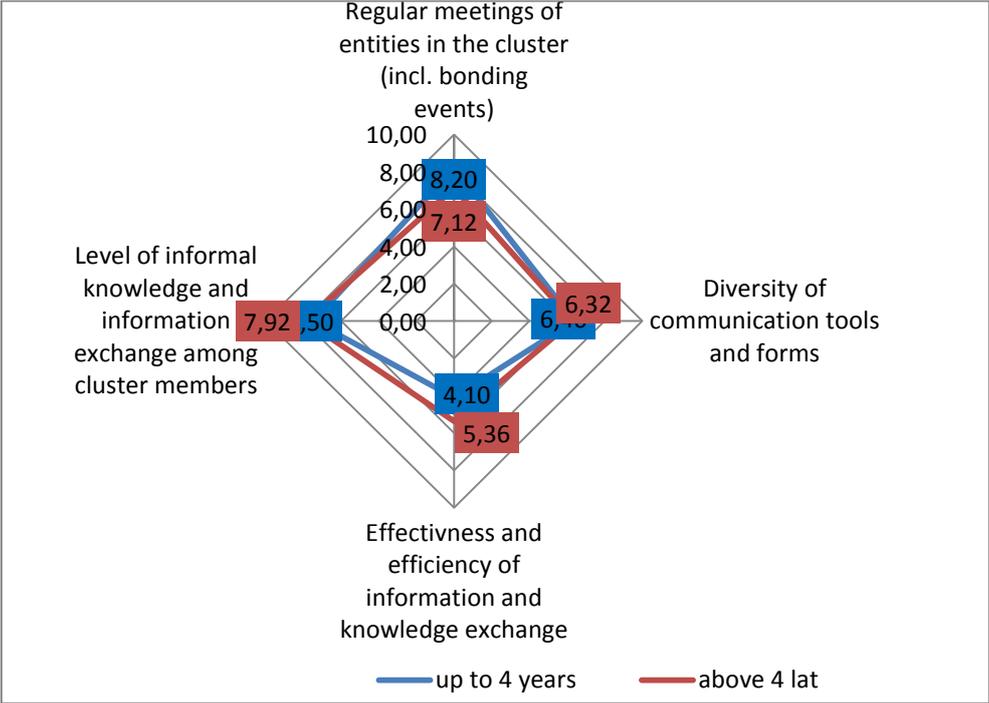


Source: Own study based on questionnaires CAWI/CATI with the members of 35 clusters; N=618.

Interestingly, although in essence, as predicted, conclusions as to the use of individual forms of communication in clusters can be drawn from their analysis with reference to clusters of various period of operation, i.e. young and older clusters. It seems that the *Regular meetings within a cluster (including bonding events)* are more important to younger clusters, achieving the benchmark value of 8.2 with 7.12 for older clusters (Chart 68). The minimal advantage is shown by younger clusters also in the scope of the *Diversity of communication tools and forms* (6.4 to 6.32). However, for the two remaining indicators of the analysed sub-area, results achieved by older cluster exceed the results of younger clusters. A higher difference exists in the scope of the *Effectiveness and efficiency of information exchange* (5.36 to 4.1) whereas in the *Level of informal knowledge exchange* the advantage is significantly lower, i.e. it is only 0.42 point. The presented scores of using different forms of communication by younger and older clusters seem to fall into a logical model of communication development in the cluster going through subsequent phases of development. It seems that in the initial stage a special role is played by regular meetings of entities in a cluster. In the next stage very diversified communication tools and techniques. However, in

slightly older clusters the frequency of meetings drops and communication tools and forms are selected to some extent. State-of-the-art tools are developed increasing the effectiveness and efficiency of information and knowledge exchange, which include the use of communication platforms. An important role also in older clusters is played by knowledge and information exchange among participants. This type of observed regularities of evolution of the optimal communication system within a cluster together with its maturing is worth to apply flexibly in practice of cluster management, including also in the aspect of supporting cluster development in its various stages.

**Chart 68. Mean values obtained by clusters within the *Internal communication* sub-area according to the age of a cluster**



Source: Own study based on the results of the research conducted among coordinators of 35 clusters.

The analysis of using various types of communication according to the four detailed indicators of the *Internal communication* sub-area across clusters of various sizes has shown that crucial differences exist fundamentally only in the case of the *Effectiveness and efficiency of information exchange* indicator, in which large clusters clearly outperformed the results of the other groups achieving the value of 6.69 compared to the others of around 4.0. Large clusters have also displayed a higher result in the scope of the *Diversity of communication tools and forms* where with the result of 7.31 they proved to be better than the average clusters. In the remaining sections of the *Internal communication* sub-area the differences between results of various cluster size groups proved to be minimal. Thus, the advantage of large clusters in terms of the already discussed use of modern forms, such as communication platforms, which increase effectiveness and efficiency of information exchange, has become very evident. The large sizes of clusters as such presumably suggest wider use of communication platforms, which facilitates communication especially in large groups of participating entities. It should be concluded, however, that such positive experience developed, most of all, in larger clusters should be used by all clusters, including the small ones. On the other hand, however, it should be noted that large clusters cannot neglect

traditional forms of communication characteristic for cluster structures, including regular meetings of entities in clusters as well as informal exchange of knowledge.

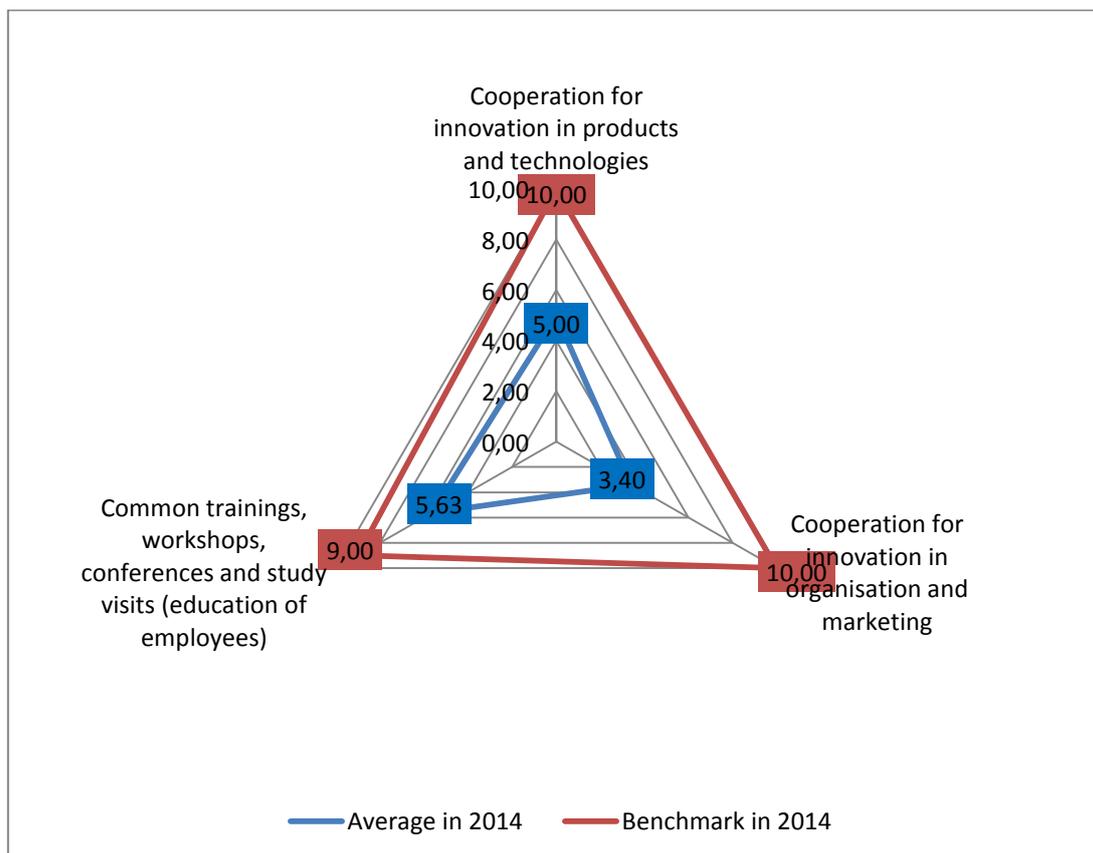
#### 6.4. Creation of knowledge and innovation

The sub-area *Creation of knowledge and innovation* performs badly within the scope of the *Cooperation for innovation in organisation and marketing*. Although the benchmark's maximum value reached 10, the average value for the clusters in general amounted only to 3.40.

In contrast, the analysed clusters achieve slightly better results within the scope of the *Cooperation for innovation in products and technologies* – the benchmark's value was calculated at the maximum level of 10.0 while the average value for the analysed clusters reached 5.0

The relatively best situation can be observed in the detailed index of the *Common trainings, conferences and study visits*, within which the benchmark amounted to 9.0. However, the average value in this case remains the highest among other analysed aspects since it amounted to 5.63 (Chart 69).

**Chart 69. Average and benchmark values in the *Creation of knowledge and innovation* sub-area**



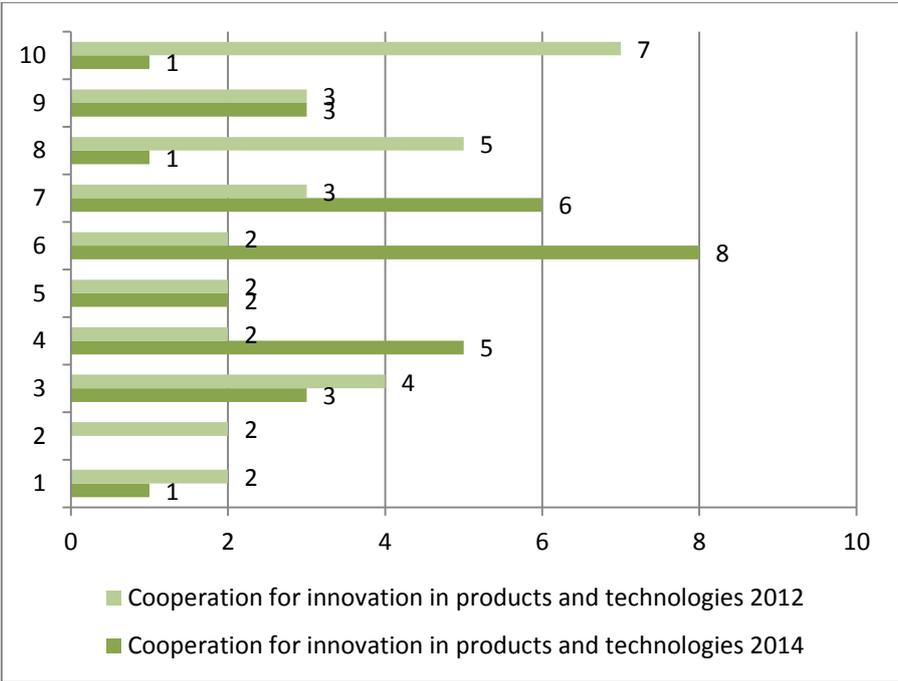
Source: Own work based on the results of a survey conducted among coordinators of 35 clusters.

The most considerable stratification in the analysed group of clusters is observable within the scope of the *Cooperation for innovation in products and technologies*, while the least considerable one within the aspect of the *Common trainings, conferences and study visits*. The situation in the *Creating knowledge and innovation* subfield is alarming if the average benchmarking results for the totality of analysed clusters are considered, in particular with the inclusion of the innovation's importance in the contemporary economy. The fact that there are

also high-potential and benchmark-reaching clusters within these aspects of innovation continues to drive optimism. Nevertheless, the concurrently conducted analysis showed particularly large stratification of clusters in terms of activities undertaken for the purpose of creating innovation in technology and even a larger one in case of innovation in organisation and marketing.

The analysis of the data included in Chart 70 reveals that the situation of clusters within the scope of the *Cooperation for innovation in products and technologies* in 2014 is slightly worse than in 2012. This means that in the analysed period of the last 24 months there have been (on average) less projects focused on the creation of innovation in products and technologies and/or such projects gathered smaller groups of participants.

**Chart 70. Assessment of the cooperation for the *Creating new products and technologies* – comparison of the 2012 and 2014 results**



Source: Own work based on the results of a survey conducted among the cluster coordinators in 2012 and 2014.

Only one cluster reached the maximum benchmark value, meaning that it completed at least five projects focused on the creation of new products or processes and that these projects attracted the involvement of at least 80% of cluster members. Such a result was achieved by seven clusters in 2012. Most of the currently analysed clusters completed 3–4 projects that engaged 40–79% of cluster members (grades 6–7). The identified issues concerning the number of measures being undertaken to develop new products and technologies should encourage the clusters to intensify their efforts within this aspect. The innovation audits, as in the best practice of the Bydgoszcz Industrial Cluster, might be a good starting point for the identification of the innovation needs.

### Good Practice 13. Identification and resolution of companies' issues through the cooperation with the science industry



**BYDGOSKI KLASTER PRZEMYSŁOWY**  
**BYDGOSZCZ INDUSTRIAL CLUSTER**

Bydgoszcz Industrial Cluster

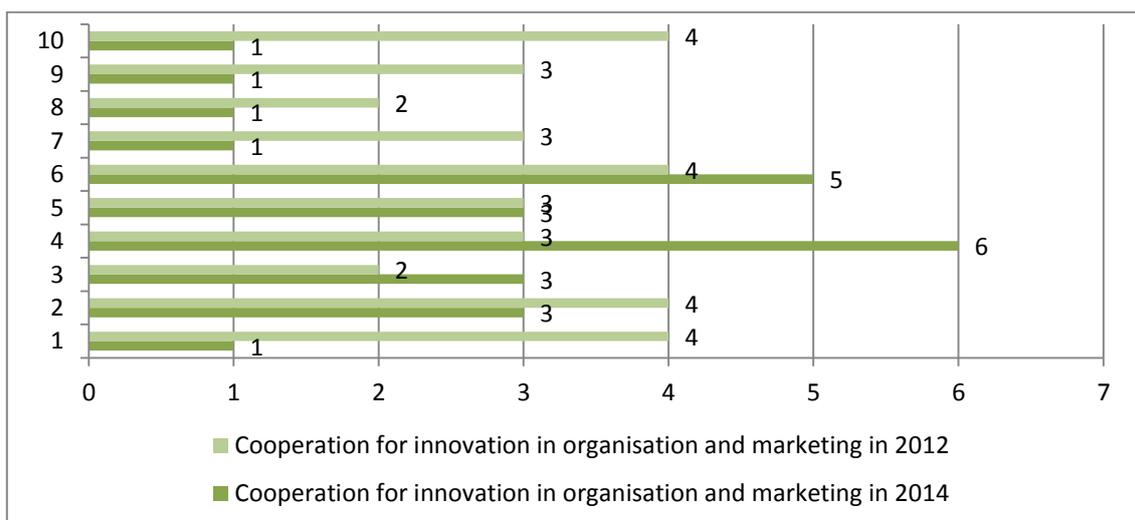
#### **Aim: Identification and resolution of companies' issues through the cooperation with the science industry**

The cluster undertakes measures that are focused on improving the level of innovation of its members and, in addition, contribute to the tightening of cooperation between the cluster and its science industry members. Such measures are exemplified by the innovation audits as well as theory and practical trainings carried out among the cluster members. These services are provided by the research workers from the entire country who are specialised in fields that correspond to the line of business of the given cluster member. Thanks to the audits and trainings, the cluster members improve their knowledge of the implementation of innovative solutions. What is important, the companies have the possibilities of implementing innovative solutions that have been identified. In the future, the cluster intends to obtain funds for the implementation of the changes recommended in audit reports.

#### **Result: Intensification of the cooperation between the companies from the cluster and the scientific industry, identification of issues/potential improvements to be implemented in the companies within the cluster.**

In the period between 2012 and 2014, a significantly larger regression of clusters was observed within the *Cooperation for innovation in organisation and marketing*. In 2014, only several clusters were assessed with grades between 7 and 10 – 4 clusters against the total of 12 clusters in 2012 (Chart 71).

**Chart 71. Cooperation for the *Innovation in organisation and marketing* – comparison of the 2012 and 2014 results**



Source: Own work based on the results of a survey conducted among the cluster coordinators in 2012 and 2014.

Thus, it can be interpreted as a decrease in the number of common projects, focused on developing innovative solutions in organisation and marketing, realised by the top rated

clusters within the discussed scope and/or a decrease in the number of cluster members involved in these processes. An interesting example of combining the innovation in organisation and marketing is a good practice of the Lower Silesian Renewable Energy Cluster.

#### **Good Practice 14. Measures/implementation of a good practice: Increase in sales of high-quality products offered by the entities in the cluster**



#### **Lower Silesian Renewable Energy Cluster**

##### **Aim of the measure/implementation of a good practice: Increase in sales of high-quality products offered by the entities in the cluster.**

Within the framework of the Lower Silesian Renewable Energy Cluster, a certification system for the products of the companies within the cluster was launched in 2014. It serves a purpose of increasing the sales of high-quality products. These certificates were developed chiefly to the benefit of cluster members but other non-member entities can also apply for the certification in order to obtain such a recommendation or take advantage of the cluster's brand. Rather than entire companies, single products are certified (e.g. a system of pre-isolated piping for solar energy collectors).

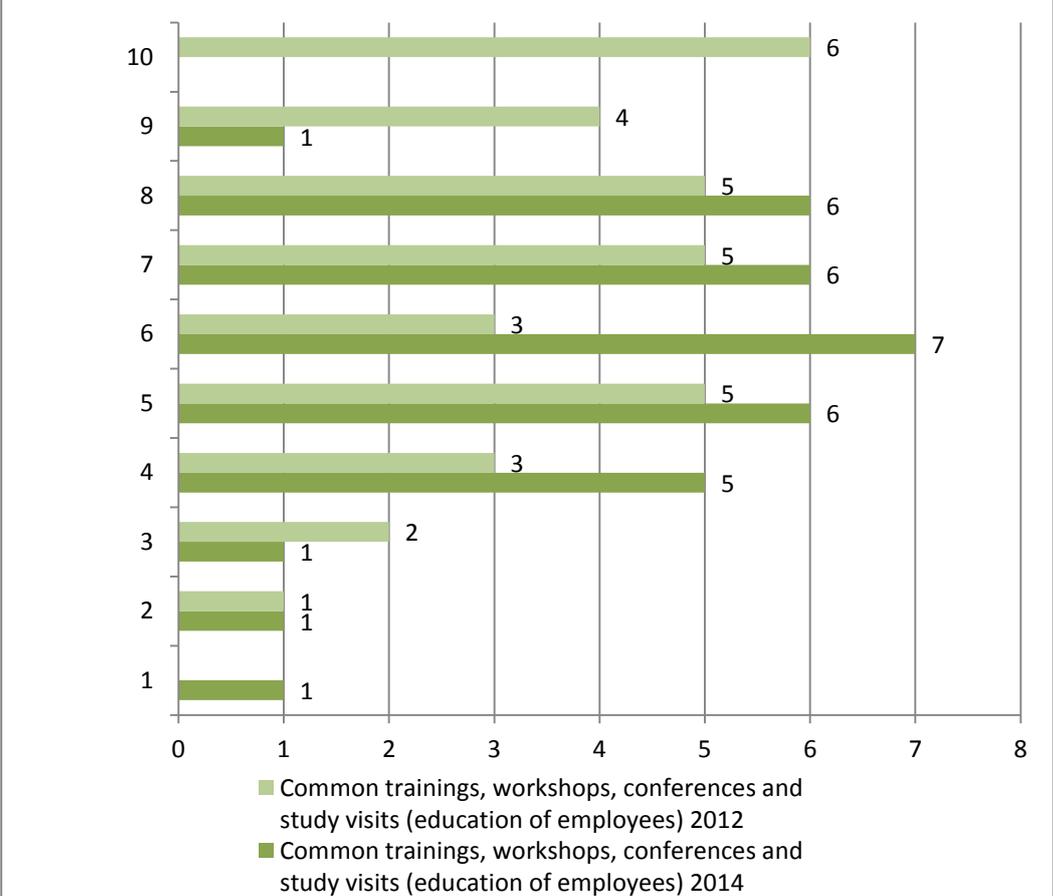
The benefits reaped by the entrepreneurs mostly include the ability to promote their products, e.g. through advertising in the Internet, during various meetings and trade fairs as well as many other events organised or co-organised by the cluster. Another direct benefit is the increase of sales through the internal product recommendation within the cluster. The certification is also beneficial to the brand of the Lower Silesian Renewable Energy Cluster. The principles of certification as well as the quality criteria are defined in the rulebook. The product submitted for the certification must be recommended by at least one cluster member in order to guarantee its high quality.

The certification system is enormously popular, validating its effectiveness and indicating the opportunity to apply this practice in other clusters.

##### **Result: Building the brand and common offer of the cluster.**

Chart 72 presents the assessment of the *Common trainings, workshops, conferences and study visits* of the clusters in 2012 and 2014. The benchmark value of one cluster in 2014 amounted to 9 points, while the benchmark value was achieved by 6 clusters in 2012. It depicts a significant decrease in educational activity of the leaders of the analysed group of clusters against the increase within this field in the clusters in general.

**Chart 72. Assessment of the *Common trainings, workshops, conferences and study visits* – comparison of 2012 and 2014 results.**



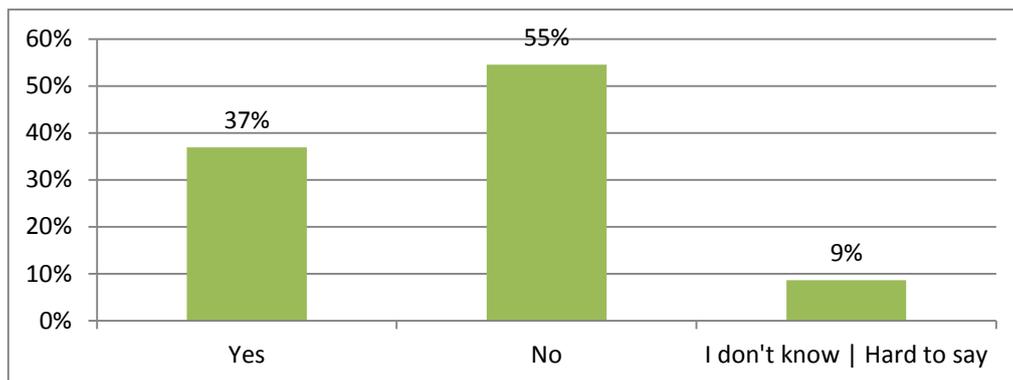
Source: Own work based on the results of a survey conducted among the cluster coordinators in 2012 and 2014.

However, some clusters increased their activity within the discussed scope in comparison to the results of the previous survey. The number of activities undertaken by the clusters and/or the number of cluster members involved in these projects increased. Most of the clusters were graded between 4 and 8 points. It can be observed that activity of the clusters within the scope of the *Common trainings, workshops, conferences and study visits* remains relatively high. Moreover, the tendency of the cluster leaders to reduce such activity is noticeable, while the number of clusters within the group that are usually involved in those activities is simultaneously increasing. This trend might result from the optimisation of the educational activity of the clusters which should be perceived as a positive sign of the clusters becoming mature. Such an interpretation is supported by the fact that the aspect of the *Common trainings, workshops, conferences and study visits* achieves the best results within the subfield of *Creating knowledge and innovation*.

The importance of measures related to the clusters' promotion of innovativeness requires the inclusion of opinions of the cluster members themselves. During the survey, they were asked whether they had participated or were participating at that moment in a common project, realised by the cluster members, aimed at developing new or heavily modified products or services. 37% of the cluster members (228 out of 618) responded positively (Chart 73 / Question 10). Thus on average, one cluster member out of three was engaged in the cooperative development of new or heavily modified products or services. Such a result slightly exceeds the estimates produced by the coordinators that have been presented above.

On the other hand, having taken into consideration the fact that the analysis within the field of *Cluster resources* indicated the significantly impeded access to the modern infrastructure, e.g. laboratories, the involvement of a one third should be regarded as a good beginning in the process of stimulating the cluster members to become engaged in the development of innovation in products and technologies. This index should be unquestionably increasing, particularly with reference to the industrial clusters.

**Chart 73. Participation in common projects, realised by the cluster members, aimed at developing new or heavily modified products or services**



Source: Own work based on CAWI/CATI surveys carried out among the members of 35 clusters; N=618.

The cluster members that responded positively to the previous question (228 members) were additionally asked whether that common project was related to research & development (the R&D encompasses chiefly the development of the prototypes of potential commercial viability, the experimental production and testing new products, processes and services). 65.4% (149) of the surveyed 228 cluster members responded positively (Question 11). The entities that were involved in the common R&D amount to 23.9% of the total number of the cluster members. Even if the fact that some cluster members are not interested in R&D due to their line of business is considered, the current index of participation in such undertakings can still be perceived as insufficient<sup>8</sup>. A significant increase in the frequency of participation in the R&D measures should be pursued. Apart from creating innovation and knowledge, the processes that improve knowledge and competence of the cluster members are equally crucial. Therefore, for the purpose of the confrontation of coordinators' statements regarding the *Common trainings, workshops, conferences and study visits*, the cluster members were asked whether they participated in any measures undertaken by the cluster (e.g. trainings) in order to improve competence of its members. Nearly 37% of the surveyed members (228 out of 618) declared they had taken part in measures aimed at ameliorating competence of the cluster members (Question 14). In this case, such a result still cannot be regarded as optimistic since, in most organisations, the vast majority of development processes, including the innovative ones, remains initially dependent on the competence of people who are responsible for the decision making and, probably even to a larger extent, the competence of those who are responsible for the implementation of strategic plans developed by the coordinators. An attempt can be made to explain the observed discrepancy between the conclusions drawn from

<sup>8</sup>More than half (57%) of medium-sized and large enterprises in Poland proclaim they undertake or commission the R&D projects. Such measures are clearly undertaken more frequently by industrial companies than those specialised in trade and services. 65% of industrial enterprises and every second company specialised in trade or services declare they undertake or commission the R&D projects. See e.g. *Raport Działalność badawczo-rozwojowa przedsiębiorstw w Polsce. Perspektywa 2020*, KPMG; <https://www.kpmg.com/PL/pl/IssuesAndInsights/ArticlesPublications/Documents/2013/Dzia%C5%82alnosci-BR-przedsi%C4%99biorstw-w-Polsce.pdf>

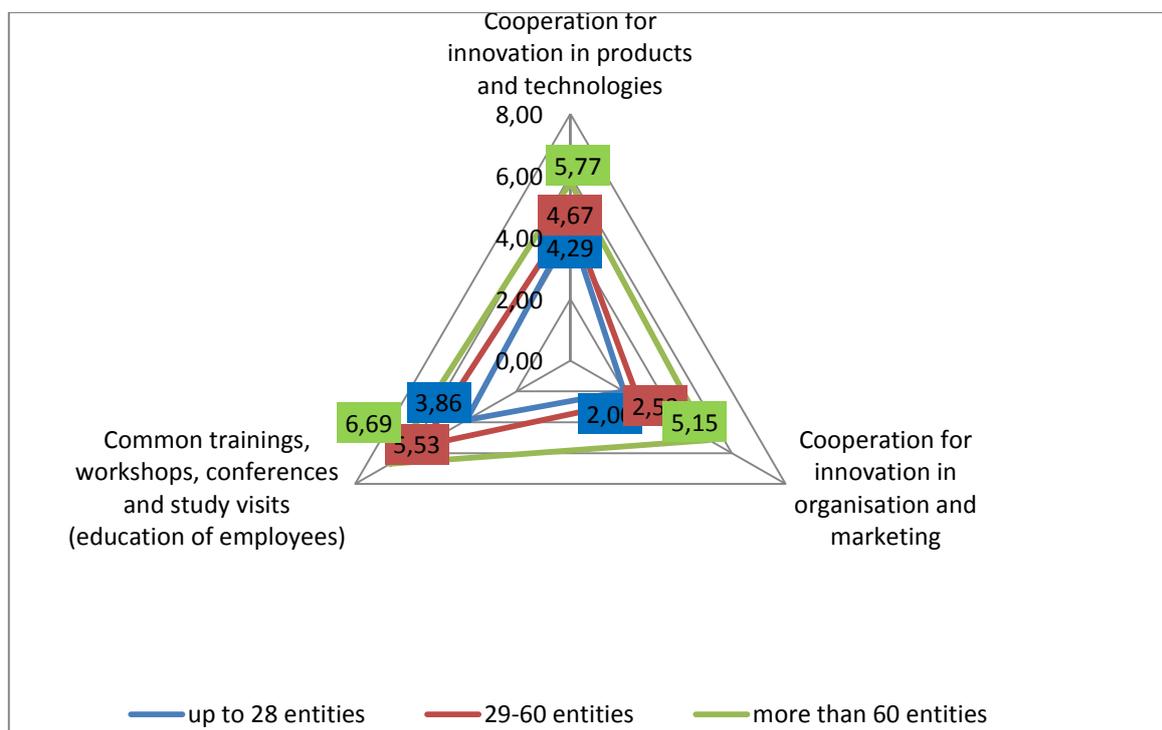
the benchmarking and the opinions of the surveyed on the educational measures of clusters. It can be hypothesised that an adequate activity in terms of education, along with networking and building the internal communication, has been provided, while the clusters tend to notice and realise projects of comprehensive competence improvement of their members' employees (chiefly companies) to an insufficient extent. The amelioration of competence of employees, particularly special competence regarding the leading industries within the cluster, can and should become one of the key tasks of the clusters. Numerous surveys and analyses concerning the satisfaction of the employers' needs in terms of competence of their current and future employees spotlight serious deficiencies in this field<sup>9</sup>. Clusters make a suitable environment for solving such issues, while the creation of conditions conducive to the advancement of the personnel may be one of the most important aspects of the development of the clusters themselves as institutional structures, including the source of self-financing. The provision of specialised services in terms of education and trainings to the benefit of the cluster members should be included in the development strategies of the clusters.

The importance of the subfield of the *Creating knowledge and innovation* requires the analysis of the factors that influence the achievement of better results in various cross-sections of the clusters. Chart 74 depicts the average values for the respective indices of the subfield in the cross-section of clusters of various sizes. The analysis of detailed data indicates a significant superiority of the large clusters over the medium-sized and small ones within the scope of all aspects of the discussed subfield. The large clusters demonstrate superiority in the *Cooperation for innovation in organisation and marketing*. Their result of 5.15 doubles the result of the medium-sized clusters (2.53) and, even to a larger degree, small clusters (2.0). In the context of *Common trainings, workshops, conferences and study visits*, the superiority of the large clusters is also significant since their benchmark value amounts to 6.69, while the numbers for the medium-sized and small clusters are 5.53 and 3.83, respectively. A similar tendency is observable in the *Cooperation for innovation in products and technologies*. However, the superiority of the large clusters is slightly less prominent in this case. They achieve the benchmark value of 5.77, while the medium-sized and small clusters reach the value of 4.67 and 4.29, respectively. This situation is quite interesting since the economic potential of larger clusters would rather suggest their superiority in terms of innovative products and technologies, which usually require considerable expenditures. Still, it is not the case. It can be concluded that the larger clusters, having considered their potential, do not get involved in the development of new products and technologies to the sufficient degree. The above-mentioned remark does not cross out the conclusion that large clusters provide better conditions for undertaking the measures aimed at creating knowledge and innovation. In order to intensify the pro-innovative measures undertaken by the clusters, the size of clusters should be increased, as have already been mentioned in this report in the chapter that contains the analysis of resources.

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<sup>9</sup> See e.g. conclusions in: B. Plawgo, *Badanie Rozwoju Struktur Klastrowych w województwie podlaskim*, BFKK, Białystok 2014; [www.bfkk.pl/przedsiębiorczosc/klastry.htm](http://www.bfkk.pl/przedsiębiorczosc/klastry.htm)

**Chart 74. Average values achieved by the clusters in the field of *Creation of knowledge and innovation* with the dependence on the cluster's size**

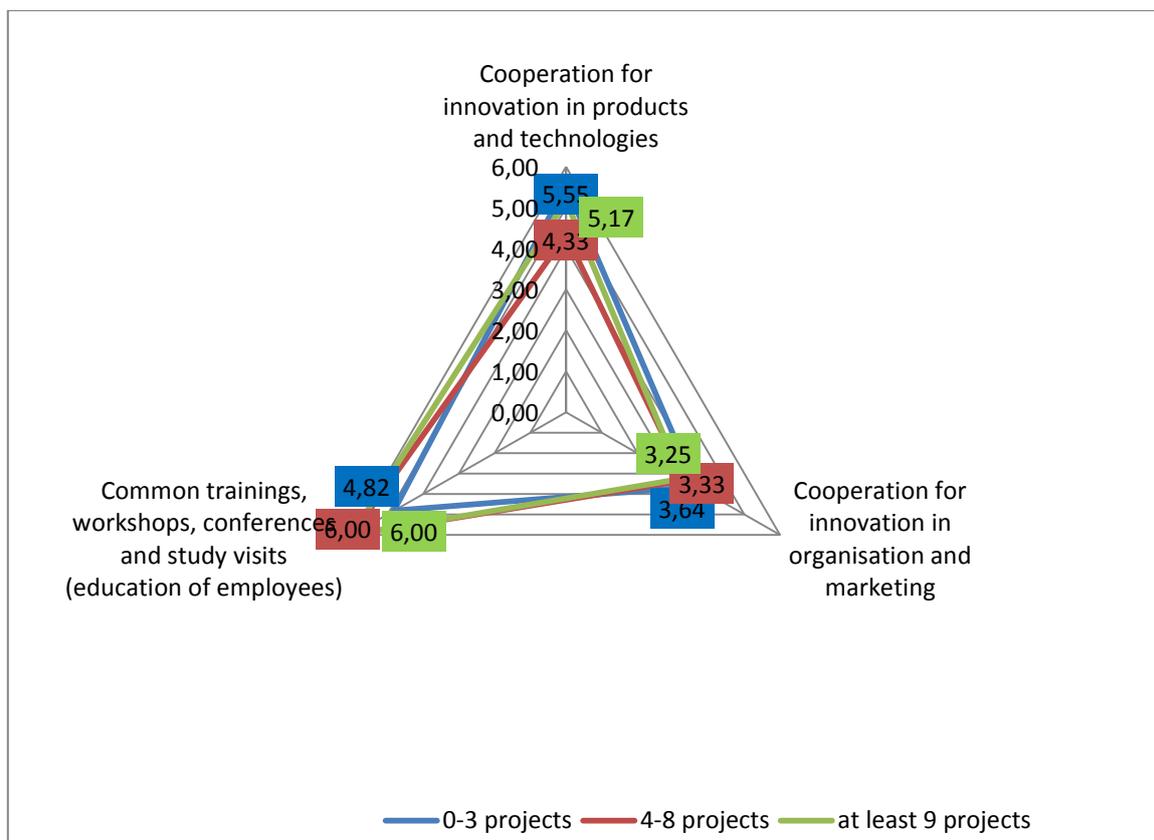


Source: Own work based on the results of a survey conducted among the coordinators of 35 clusters.

The analysis of measures undertaken within the field of *Creating knowledge and innovation* from the perspective of cluster groups that realise various numbers of project proved interesting but not very optimistic. Chart 75 presents the data gathered within this scope. It turns out that a positive dependence can be observed within this aspect only in the *Common trainings, workshops, conferences and study visits*, within which the benchmark value for the most active clusters draws level with the value achieved by those of average activity (6.0) and exceeds the results of the clusters that show small interest in projects (4.82). A different structure of results is noticeable in the *Cooperation for innovation in organisation and marketing*, within which the clusters that realise up to 3 projects achieve higher results (3.64) than those that realise an average number of projects (3.33) or even a high number of projects (3.25). Similarly, in the subfield of *Cooperation for innovation in products and technologies*, the best results are achieved by the clusters that realise small numbers of projects (5.55), while the most active (within this field) clusters come in second (5.17) and those of average activity occupy the last position (4.33).

The conclusions that follow this analysis unambiguously indicate that a significant part of the projects realised by the clusters was entirely or partly educational. Such a profile of the projects is well substantiated, particularly in the initial stages of development of the clusters. Simultaneously, the analysis revealed that the realisation of a larger number of projects does not translate into better results in terms of both technological and organisational innovations. It seems that the realised projects were focused on the improvement of innovation of the member companies to an insufficient extent, thus depriving them of the foundation of the long-term competitiveness of the companies and, in consequence, the entire clusters.

**Chart 75. Average values achieved by the clusters in the field of *Creation of knowledge and innovation* with the dependence on the number of realised projects**



Source: Own work based on the results of a survey conducted among coordinators of 35 clusters.

### 6.5. Summary of the *Processes in the cluster area in 2014*

The subfield with the relatively distinct appearance of unfavourable tendencies is the *Market activity*.

Most clusters maintain a stable and comparatively high level of measures undertaken by them with the aim of developing a common offer. However, an alarming fact is that the group of clusters remaining out of the benchmark's scale increased, which shows a lack of measures undertaken within this scope or their marginal character. It can be interpreted as a progressing diversity of the clusters in terms of their market activity. Generally, the number of cluster members, taking part in the creation of the common offer or providing a ready "input" of their products and services into the cluster's offer, remains insufficient. The participation of such entities can be estimated at approximately 40% of all members, which highlights the opportunity to improve the process of creating the common market offer of the cluster.

The results in terms of creating common distribution channels proved unsatisfactory. Such a result was influenced by the insignificant diversity of common distribution channels employed by the clusters and the relatively low percentage of the cluster members participating in this process.

A similar situation is observable in the area of common deliveries. The low benchmark values are a consequence of both the limited diversity of the used forms of common deliveries and the small number of entities that participate in the process of realising common deliveries. The issues with the organisation of common deliveries seem to be appropriate for almost the entire group of the analysed clusters.

The lack of a clear superiority of large clusters in terms of the market activity, considering their market strength and abilities to employ more diversified market mechanisms, proves that the barrier, which impairs the market activity of the clusters, is constituted rather by the difficulties with reaching an agreement upon the issue of undertaking such measures than the low economic or tender potential of the clusters.

It turns out that the already realised cluster projects have not brought the desired effects in terms of the market expansion.

The promotional activity of the clusters is organised in accordance with high standards and the observed cluster diversification within this scope is not as significant as in other indices. The change tendencies in terms of the promotional activity of the clusters can also be regarded as positive, beyond any doubts.

The most vivid diversification within the analysed group of clusters in terms of the activity regarding trade fairs and exhibitions is observable in the subfield of *Marketing and PR*, while at the same time the results recorded within this scope prove least favourable in comparison with the entire subfield. The decrease noticed in the activity regarding trade fairs and exhibitions seems to be a consequence of the restraints on external financing. It appears, however, that particularly the larger clusters are able to significantly activate their participation in trade fairs and exhibitions, the potential for which is currently only partially used.

The change tendencies in terms of the system of visual identification of the clusters can be definitely assessed in a positive way.

The positive picture of the marketing activity of the clusters needs to be slightly adjusted on the basis of the opinions of cluster members. The limited participation of the cluster members in the measures undertaken within the subfield of *Marketing and PR* concludes with a need to rethink and re-evaluate marketing strategies of particular clusters, with the inclusion (if such a necessity arises) of the need to promote not a cluster itself but at least the common offer of the cluster, the market offer of its individual members or the members themselves, particularly the companies which remain competitive regardless of the cluster.

The cluster coordinators report on the high and still increasing frequency of cluster members meetings. Beyond any doubts, it is a positive signal and a proof that cluster members are willing to intensify cooperation, build trust and, as a result, exchange knowledge. The information about the frequency of meetings gathered from the cluster members entirely confirm positive results of the analyses carried out within this scope by the coordinators., at the same time showing the willingness of cluster members to participate in the meetings.

The restriction of the variety of communication forms employed by the clusters should not be regarded as negative. On the contrary, it can be treated as a symptom of the improvement of management in the clusters that make use only of the most effective forms of communication. The presented assessments of the variety of communication forms employed by the younger and older clusters seem to assume a shape of a reasonable model of the communication development within a cluster that is completing consecutive stages of development as it is getting older.

Many clusters suffer from the insufficient employment of modern forms of communication, e.g. common communication platforms.

The cluster coordinators give an account of the properly carried out processes in terms of the informal exchange of knowledge. The situation within this aspect is rather improving in comparison to the previous analysis which seems natural due to the mutual trust that comes with the clusters' age.

The scope of the *Creating knowledge and innovation* within the *Processes in the cluster* field poses a highest threat to the proper development of clusters in Poland. The situation in the

subfield of Creating knowledge and innovation is disturbing if the average benchmark results for all the surveyed clusters are analysed, particularly including the importance of innovation in the contemporary economy. The fact that there are high-potential clusters that achieve the maximum benchmark value and function within the innovation-related aspects is quite optimistic. However, the simultaneously conducted analysis reveals a particularly significant stratification of the clusters in terms of the measures undertaken for the purpose of creating innovation in technologies as well as, to an even larger degree, organisation and marketing. The current index of the cluster members' participation in the measures related to the improvement of innovation is insufficient. Moreover, the situation of clusters in 2014 in comparison to the one in 2012 slightly exacerbated within the aspect of *Cooperation for innovation in products and technologies*. It means that the average number of the projects related to the innovation in products and technologies decreased and/or the number of their participants diminished. An even larger regression in the analysed period between 2012 and 2014 was observed within the field of *Cooperation for innovation in marketing and organisation*.

It is noticeable that activity of the clusters in terms of the *Common trainings, workshops, conferences and study visits* remains on a relatively high level. At the same time, a tendency to reduce such undertakings by the cluster leaders is observable, while the averagely involved clusters keep intensifying their activity of this sort within the group.

It turns out that the large clusters have a significant superiority over the medium-sized and small clusters in terms of the *Creating knowledge and innovation*.

Thus far, the realisation of a larger number of projects has not resulted in the achievement of better results in the field of technological and organisational innovations. It appears that the realised projects were focused on the improvement of innovation of the member companies to an insufficient extent.

#### **6.6. Changing trends in the *Processes in the cluster area in 2010-2014***

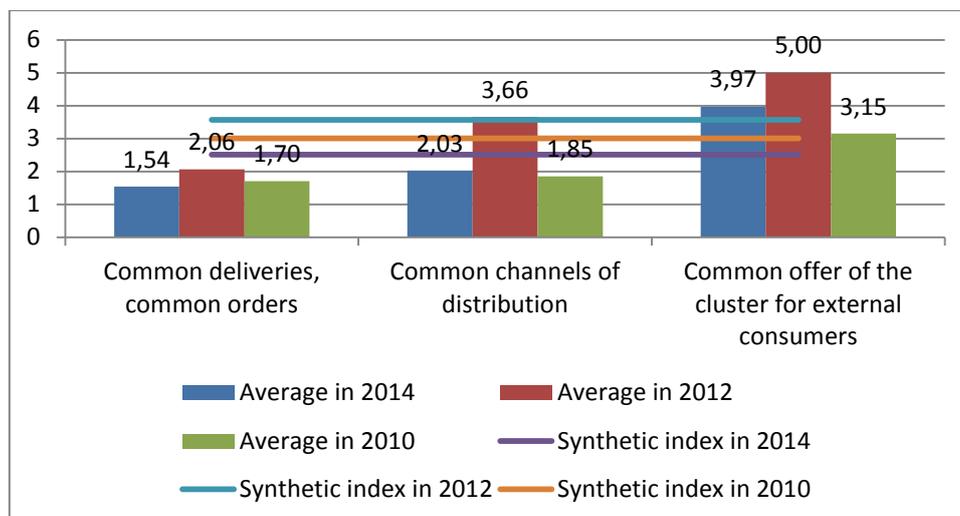
In the field of *Market activity* of the clusters, the situation of the surveyed clusters exacerbated in the analysed period, particularly in comparison to 2012. It is proved by the value of a synthetic index for the entire subfield which amounted to 2.51 in 2014. For the purpose of comparison, the synthetic index in 2012 reached the value of 3.57, while in 2010 it was 3.01 (Chart 76).

The undoubtedly negative influence with the regressive tendency within the discussed subfield was held by the downward tendency in the *Common deliveries, common orders*. The average value for the clusters in 2014 fell from 2.06 (in 2012) to 1.54, which constitutes a 25.26% drop. What is more, the average value recorded in 2014 is lower than the one in 2010 (1.70), producing a 9.4% drop.

An interesting phenomenon is the fact that the clusters make minimal use of the basic solution for minimising operating costs, i.e. making collective orders which is very likely to result in the increase of cluster members' effectiveness. This issue has already been discussed above but it is worth highlighting that the clusters were at some point able to do better within this field so it is advisable to return to these good practices.

**Once again, the validity of the increased measures undertaken by the clusters for the purpose of creating common purchasing groups should be emphasised – whether in relation to resources or, for example, telecommunications or ICT services.**

**Chart 76. Comparison of cluster results in the sub-area of *Market activity* in 2010, 2012 and 2014**



Source: Own work based on the results of a survey conducted among the cluster coordinators in 2010, 2012 and 2014.

The activity of the clusters within the scope of common distribution channels for their products and services significantly diminished in comparison to 2012 as well. The average value fell between 2012 and 2014 from 3.66 to 2.03 which constitute a 44.5% drop. The downward tendency proved rapid enough to reduce the average value to the level below the value recorded in 2010, i.e. 1.85. Nevertheless, the organisation of common distribution channels remains in another field of clusters' activity that is not properly employed for the purpose of minimising operating costs and increasing efficiency.

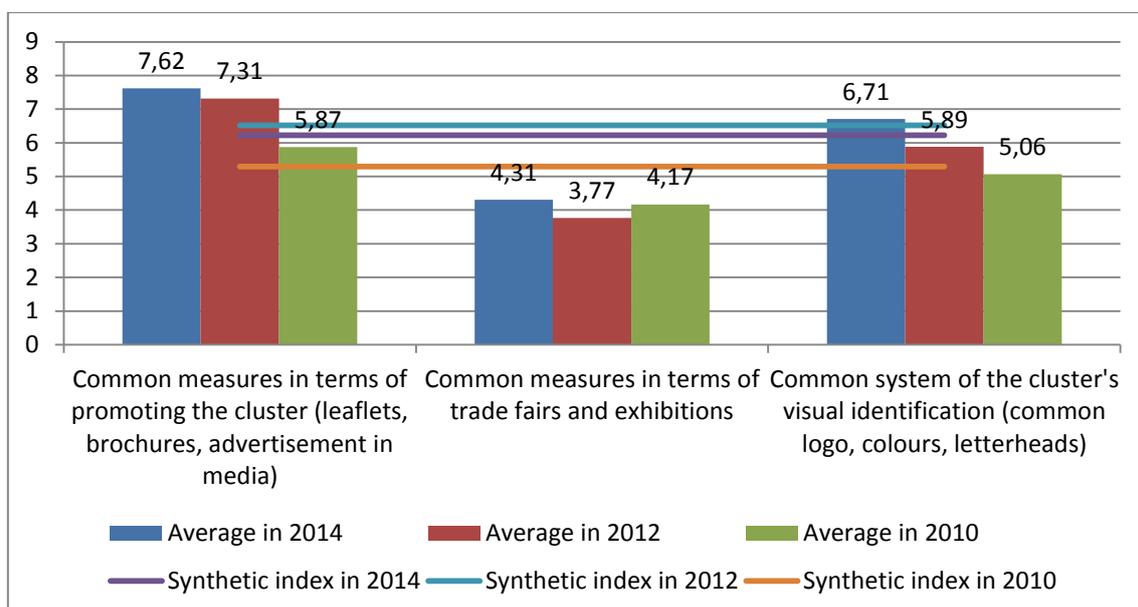
The downward tendency is also noticeable in the activity of the clusters in terms of creating common cluster offers for external consumers. The average value in 2014 reached 3.97 which makes 126.03% of the average value in 2010 (3.15) but only 79.4% of the average value recorded in 2012 (5.0). Thus, the 26% growth in the activity of the clusters in terms of constructing common market offers between 2010 and 2012 was overshadowed by a 20.6% drop between 2012 and 2014.

As opposed to the negative tendencies in the subfield of *Market activity*, the *Marketing and PR* subfield is characterised by the upward tendencies observed between 2010 and 2014, despite the fact that the synthetic index of 6.22 in 2014 turned out to be slightly lower than in 2012 (6.52) but considerably higher than the value recorded in 2010 (5.29).

The largest increase of the average value (32.26%) between 2010 and 2014 was observed within the scope of the *Common system of visual identification of the cluster*. The average value from 2010 (amounting to 5.06) increased in 2012 to 5.89, only to reach the value of 6.71 in 2014 (Chart 77).

An equally considerable progress was recorded by the clusters within the field of *Common measures in terms of promoting the cluster (leaflets, brochures, advertisement in media)*. Over a span of the last four years, the average value for the clusters has increased from 5.87 in 2010 through 7.31 in 2012 to 7.62 in 2014. The total index growth in the discussed period amounts to 31.15%.

**Chart 77. Comparison of cluster results in the sub-area *Marketing and PR* in 2010, 2012 and 2014**



Source: Own work based on the results of a survey conducted among the cluster coordinators in 2010, 2012 and 2014.

In case of the field of *Common measures in terms of trade fairs and exhibitions*, the upward tendency is hardly noticeable. The average value decreased from 4.17 in 2010 to 3.77 in 2012, only to eventually increase to 4.31 in 2014. Over a span of the last four years, the clusters have improved their results within the analysed scope merely of 3.36%.

In this context, the advisable measures should be undertaken for the purpose of reinforcing the marketing activity of the clusters through the support of participation in trade fairs and exhibitions, particularly the international ones.

The juxtaposition of the results of all three editions of the benchmarking indicates that there was a significant development within the field of *Communication within the cluster* between 2010 and 2012, only to clearly halt the advancement of communication systems and even reduce the efficiency in two particular aspects.

It is reflected in the values of synthetic indices for the entire subfield of *Communication within the cluster* which ran at the following levels: 2010 – 3.73; 2012 – 7.12; 2014 – 6.64.

A relatively most significant progress of the clusters in the last four years has been observed in the *Standard of the informal exchange of information and knowledge between the cluster members*. The growth of the average value in the analysed period amounts to 132.1% since it increased from 3.36 in 2010 to 7.43 in 2012, only to eventually achieve the value of 7.80 in 2014. This increase was higher than in other three analysed detailed indices within the subfield of *Communication within the cluster* (Chart 78).

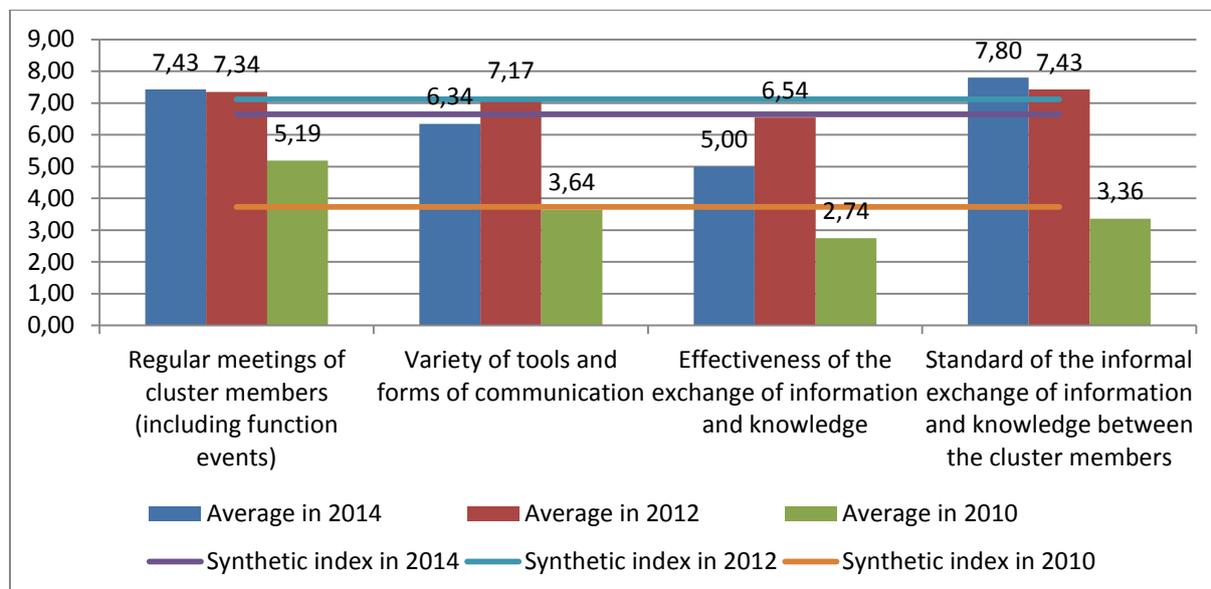
The above results provide a very promising prospects for the development of the surveyed clusters. The relatively high standard of the informal exchange of information and knowledge between the cluster members, as declared by the cluster coordinators, should denote the increasing trust within the cluster. The necessary condition for achieving success in all the development-oriented measures undertaken by the clusters appears to be satisfied to quite a large degree.

Similarly, the situation of the clusters in terms of frequency of internal meetings is also regarded as positive. In the analysed period of the last four years, the increase of average

values has been recorded at 43.7%. The average value of 7.43 in 2014 increased rapidly between 2010 and 2012 to the level of 7.43 (a growth of 41.4%) and minimally between 2012 and 2014 to the amount of 7.43 (a growth of 1.23%).

Such a situation means that the clusters have mostly established their system and frequency of meetings which, as indicated above, can be regarded as a sign of the clusters' maturity.

**Chart 78. Comparison of cluster results in the sub-area of *Communication within the cluster* between 2010 and 2014**



Source: Own work based on the results of a survey conducted among the cluster coordinators in 2010, 2012 and 2014.

In the two other cases: within the scopes of *Variety of tools and forms of communication* and *Effectiveness of the exchange of information and knowledge*, the clusters recorded a very large increase of average values in 2014 as compared to 2010 but, at the same time, a considerable decrease in comparison to 2012.

The downward tendency in terms of effectiveness of the exchange of knowledge and information is particularly alarming. The average value in this matter fell from 6.54 in 2012 to 5.00 in 2014 (a 23.6% drop).

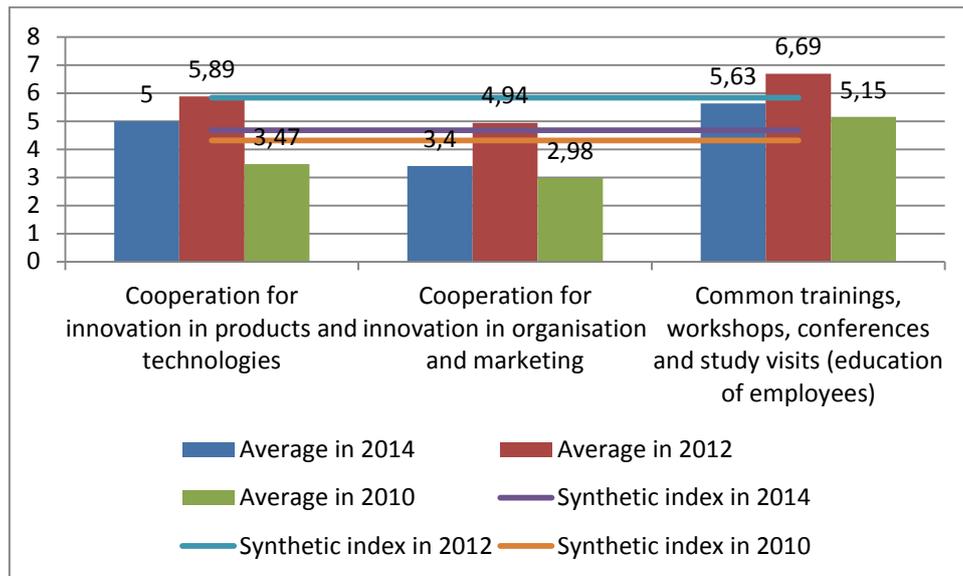
It denotes the reduction of employment of communication platforms which increase efficiency of the exchange of knowledge and information. The only explanation for this phenomenon is the fact that in some cases the projects that financed such platforms had already been completed. Provided such a rule exists, it should explicitly suggested that there is a need to support such platforms with the clusters' own resources. It is difficult to find a more adequate form of cluster activity than an effective stimulation of the exchange of information and knowledge between the cluster members. Thus, the cluster coordinators face the challenge of verifying the currently used communication channels and suggesting improved or completely new solutions that would help increase the efficiency of the exchanged information and knowledge.

The quantity- and quality-oriented verification of the applied tools and forms of communication can certainly be of service to the coordinators since this subfield have also featured the downward tendency – the average value has dropped from 7.17 in 2012 to 6.34 in 2014 (21.6%).

Chart 79 presents the cluster results within the subfield of *Creation of knowledge and innovation* between 2010 and 2014. The changes observed within the subfield of *Creation of knowledge and innovation* are less rapid than in case of the previously discussed subfield. The characteristic feature of these changes is a significant upward tendency recorded between 2010 and 2012 and a slight downward tendency observed between 2012 and 2014.

The synthetic index for the subfield of Creating knowledge and innovation in 2014 amounted to 4.68, while in 2012 and 2010 it reached, respectively: 5.84 and 4.31.

**Chart 79. Comparison of cluster results in the subfield of *Creation of knowledge and innovation* in 2010, 2012 and 2014**



Source: Own work based on the results of a survey conducted among the cluster coordinators in 2010, 2012 and 2014.

The highest current value and the lowest regression in relation to 2012 were recorded within the scope of the *Common trainings, workshops, conferences and study visits*. The average value in 2014 amounted to 5.63 due to a 15.8% drop in comparison with 2012 (6.69).

The comparable result and direction of changes should be highlighted within the field of *Cooperation for the development of products and technologies*. Between 2012 and 2014, the clusters recorded a 15.2% decrease in the activity in terms of the discussed aspect, having achieved the average value of 5.0 (5.89 in 2012). For the purpose of comparison, the average value in 2010 reached 3.47.

The worse situation of the clusters is observable in the *Cooperation for innovation in organisation and marketing*. The lowest average value, amounting to 3.4, diminished from the level of 4.94 recorded in 2012.

Changes that take place within the *Creation of knowledge and innovation* sub-area clearly indicate the deterioration of conditions conducive to creating modern solutions in terms of products and processes as well as the organisation and marketing.

It is necessary to intensify the organisational measures aimed at facilitating the pro-innovative cooperation apart from the further improvement of the competence of the cluster members' employees and the management's awareness of the need to create innovation as the only factor that can guarantee (to a large degree) international competitiveness of the cluster and its entities.

## 7. Cluster performance

The analysis of the cluster results included 4 subfields that were assessed in each cluster:

- 1) ***Human resources development*** – the employment increase in the entities functioning in the cluster's core in the last two years; the number of common trainings organised within the cluster in the last two years; the number of cluster delegates to external trainings, conferences, study visits and trade missions in the last two years (investing in competence);
- 2) ***Increasing the competitive advantage of a cluster*** – the number of new cluster members in the last two years (entities that joined the cluster); the number of start-ups and/or spin-offs in the cluster; the number of R&D projects realised by the cluster in the last two years, including the EU-financed projects;
- 3) ***Improvement of cluster innovation*** – the number of innovations that have been developed or purchased (including the copyrighted ones) and implemented in the cluster in the last two years; share of the R&D expenditure within the expenditure allotted to the innovation-oriented measures undertaken by the cluster in the last two years; the number of member companies that have implemented innovations in the last two years;
- 4) ***Cluster internationalisation*** – the number of foreign markets in which the member companies are present; share of the export in the product sales within the cluster's core; the number of formal agreements of cooperation between the cluster and foreign entities; the number of international networks/projects (thematic, branch-specialised) that involve the cluster.

Within the *Cluster performance* area, the average and benchmark values achieve low results, which concerns the average values, in particular. In terms of the sizes of the respective subfields, the surveyed groups of clusters achieved the relatively best results within the scope of the *Improvement of cluster innovation*. The benchmark and average values of the clusters within this subfield reached the highest values in comparison with the other three subfields. In 2014, the benchmark value within the subfield of *Improvement of cluster innovation* amounted to 2014, while the average value achieved 2.18 (Chart 80).

Slightly worse results of the clusters are observable in the subfield of *Increasing the competitive advantage of a cluster*. The benchmark value amounted to 8.33, while the average value for the clusters in general achieved 1.64.

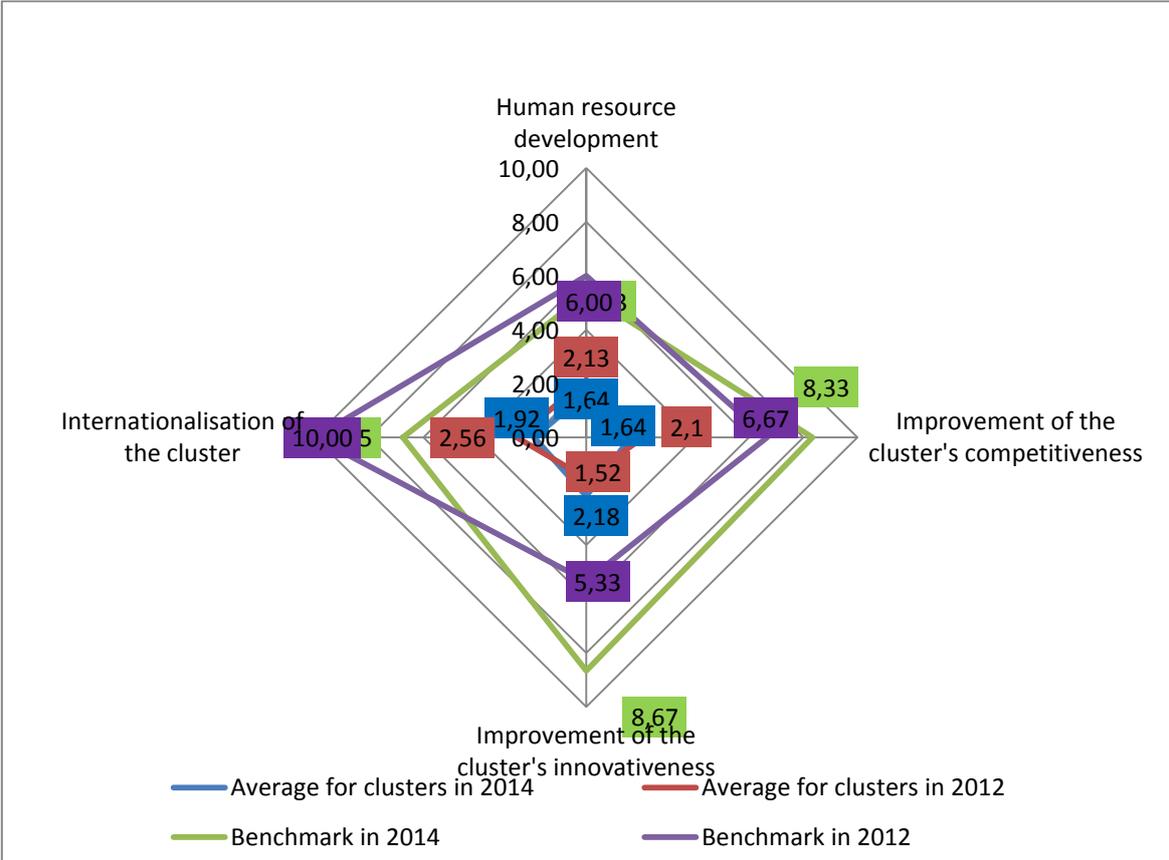
The next two subfields within the field of *Cluster results*: in the surveyed group of clusters, the subfields of *Human resources development* and *Cluster internationalisation* presented even worse parameters than in case of the two above-mentioned subfields. In particular, the subfield of *Human resources development* appears to be the most inefficiently used area of the clusters' activity. The benchmark value of the clusters' leader achieved 5.33, while the average value for the clusters in general amounted to 1.64 within the scope of the human resource development.

Slightly better results are observable within the subfield of *Cluster internationalisation* with the leader benchmark amounting to 6.75 and the average value achieving 1.92.

The most significant stratification of the analysed clusters (the difference between the benchmark value of the leader and the average value of other clusters – results of the cluster/average cluster) is easily noticeable within the subfield of *Increasing the competitive advantage of a cluster* and amounts to 6.69. The smallest difference between the benchmark and average clusters was recorded within the subfield of *Human resources development* at the level of 3.69. These initially outlined and relatively low results within the subfields of *Cluster results* appear to be a confirmation of the alarming phenomena that have already been

observed in this Report, particularly within the field of *Processes in the cluster*. In particular, it affects the issue of innovativeness, in case of which the low results (low average benchmark values) seem to be, at least in part, a consequence of the observed insufficiently active measures undertaken for the purpose of creating innovation in products and technologies as well as in the organisation and marketing. Similarly, the above-mentioned doubts concerning the range of the undertaken measures in terms of common trainings, especially in the light of the generally low average results of the subfield of *Human resources development*, seem to confirm the weakness of these processes as well.

**Chart 80. Average and benchmark values for the Cluster performance field**



Source: Own work based on the results of a survey conducted among coordinators of 35 clusters.

The average benchmark value of the clusters within the field of *Cluster performance* has hardly changed in the last two years. In 2014, the average benchmark value for all the subfields of *Cluster performance* amounted to 7.27, while in 2012 this value was recorded at 7.00 (Table 5).

**Table 5. Average of benchmark and average values for all the subfields of *Cluster performance* field**

<b>Average benchmark value <i>Cluster performance in 2014</i></b>	<b>Average benchmark value <i>Cluster performance in 2012</i></b>
<b>7.27</b>	<b>7.00</b>
<b>Average from the <u>average values</u> of all the subfields <i>Cluster performance in 2014</i></b>	<b>Average from the <u>average values</u> of all the subfields <i>Cluster performance in 2012</i></b>
<b>1.85</b>	<b>2.08</b>

Source: Own work based on the results of a survey.

Whereas, the value of average results of all the clusters decreased from 2.08 in 2012 to 1.85 in 2014. It denotes the deterioration of the clusters' situation within the field of *Cluster results* which can be regarded (in a simplified manner) as the fact that an average cluster achieves lower results than in 2012 (11.1% difference). The field of *Cluster performance* is characterised by an intensification of changes that have taken place in the respective subfields between 2012 and 2014.

The most significant change in the analysed period was been recorded within the subfield of *Cluster internationalisation*. The benchmark value decreased significantly (32.5%) from 10.0 in 2012 to 6.75 in 2014. The average value for the clusters in general also dropped (25.0%) from 2.56 in 2012 to 1.92 in 2014.

In relation to the previous edition of the benchmarking, the situation of the clusters within the subfield of *Human resources development* deteriorated as well. The benchmark value dropped from 6.00 to 5.33, while the average value decreased from 2.13 to 1.64.

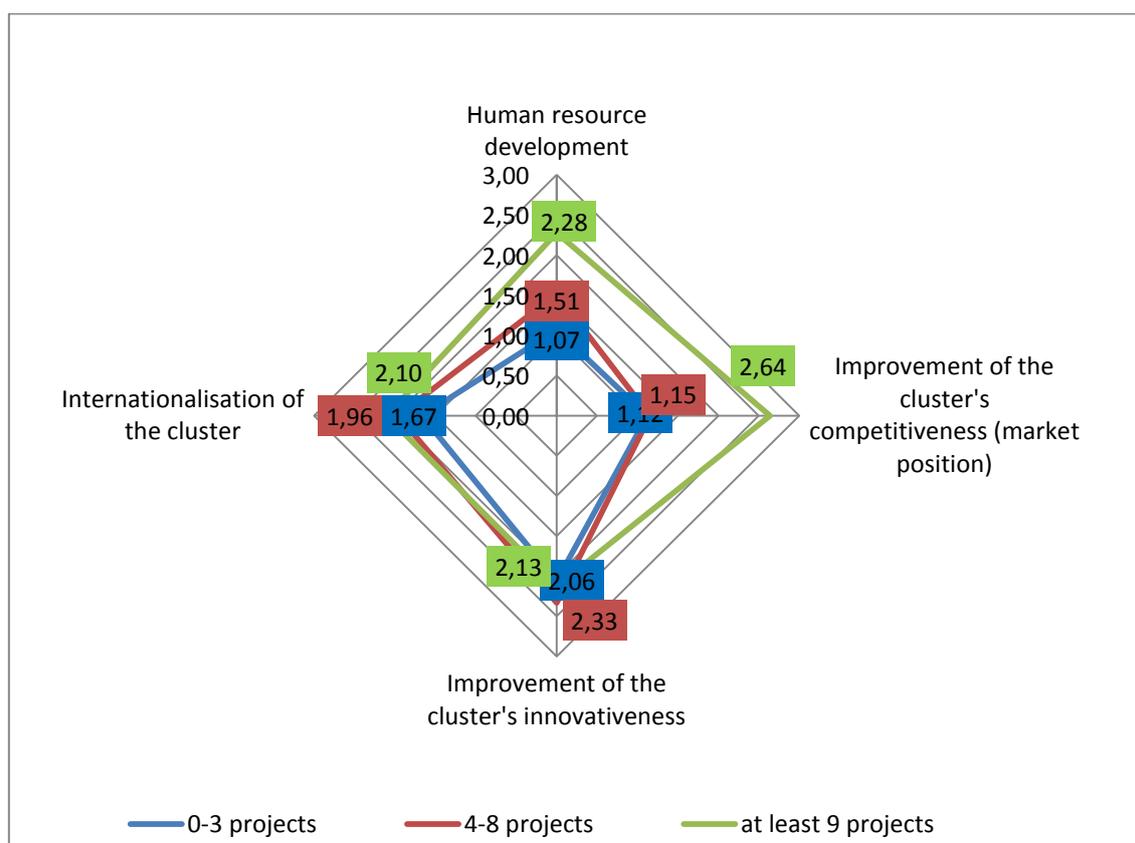
However, within the subfield of *Increasing the competitive advantage of a cluster*, the results achieved by the leader of the surveyed group of clusters turned out to be higher (8.33 in 2014) than the comparable results in 2012 (24.89% difference). At the same time, the average value for the clusters in general decreased from 2.10 to 1.64 (21.4%).

It turns out that the positive changes were observed within the subfield of *Improvement of cluster innovation* with the benchmark and average values for the clusters in general having recorded an increase in 2014, in comparison to 2012. The benchmark value has increased from 5.33 to 8.67 (as much as 62.66%). The recorded increase of the average value amounts to 43.4% (1.52 in 2012 in comparison to 2.18 in 2014). The improvement of cluster results in terms of innovativeness is a reason to be delighted, beyond any doubts. Nevertheless, it cannot be forgotten that the average result of the clusters still only slightly exceeds the threshold of two points, which proves the low innovation-oriented potential of the surveyed clusters.

The analysis of the results achieved by the clusters in general (average value) in the respective subfields, depending on the number of realised projects, indicates the fact that the least active clusters managed to produce the relatively worst results in particular subfields. In case of the subfield of *Improvement of cluster innovation*, the least active clusters achieved the relatively best results as compared to the most active clusters as well as those of medium activity, thus losing the shortest distance. Within this subfield, the best results were recorded by the clusters of medium activity, followed by the most active clusters (Chart 81). Therefore, it can be once again assumed that the already realised projects, for the most part, were not aimed at improving the innovativeness of the clusters, which have already been mentioned in this Report within the discussion about *Processes in the cluster*.

The subfield of *Human resources development* is the only subfield within which a direct and strong relation between the activity in terms of realising projects and the results can be clearly indicated since the clusters that realise more projects have achieved better results in terms of the development of human resources, followed directly by the clusters of medium activity and, at the end, those least active. These results confirm the initial assumption that a large number of projects realised by the clusters were aimed at developing human resources. Thus, a conclusion can be once again drawn that the more mature the clusters are, the more justifiable is the focus on the projects that support the development of innovativeness or internationalisation.

**Chart 81. Average values achieved by the clusters within the field of *Cluster performance* with the dependence on the number of realised projects**



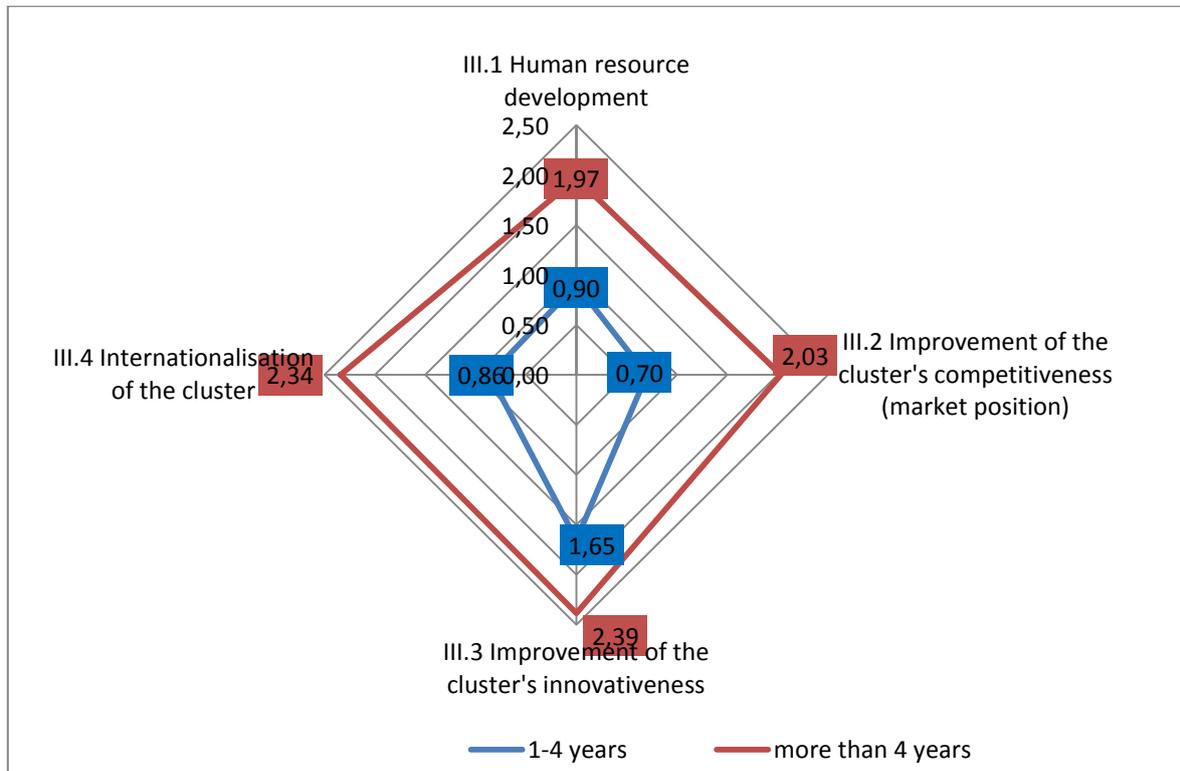
Source: Own work based on the results of a survey conducted among coordinators of 35 clusters.

The analysis of the subfields within the field of *Cluster performance*, with the allowance for the criterion of cluster's age, indicates a positive correlation between the cluster's experience that comes with the age and the results achieved in the respective subfields. In all four subfields, the older clusters (more than 4 years) achieved better results than the younger ones that have functioned for less than four years (Chart 82).

The most significant differences in the results are observable within the subfield of *Internationalisation of the cluster* – the average value for the older clusters is 172.1% better than the one achieved by the younger clusters. The results achieved by the older clusters in terms of the development of human resources have been 118.8% higher than the results recorded by the younger clusters. The observed differences between the results of clusters that function for various periods of time prove the positive influence of the clusters upon the important aspects of not only the results of the cluster but also the companies grouped within that cluster. It develops from the construction of the detailed indices for the field of *Cluster*

results which, to a large degree, refer directly to the situation of the cluster members, particularly the companies. Thus, they can be also interpreted in the following manner: the longer the cluster functions, the more frequently the companies participate in trainings, while producing higher standard of innovativeness and reinforcing their international presence.

**Chart 82. Average values achieved by the clusters within the field of *Cluster performance* with the dependence on the cluster's age**



Source: Own work based on the results of a survey conducted among coordinators of 35 clusters.

Chart 83, which shows the average values achieved by the clusters within the field of *Cluster results* with the dependence on the number of member entities, constitutes an unambiguous confirmation of the relation between of the cluster's critical mass and the results achieved by the cluster.

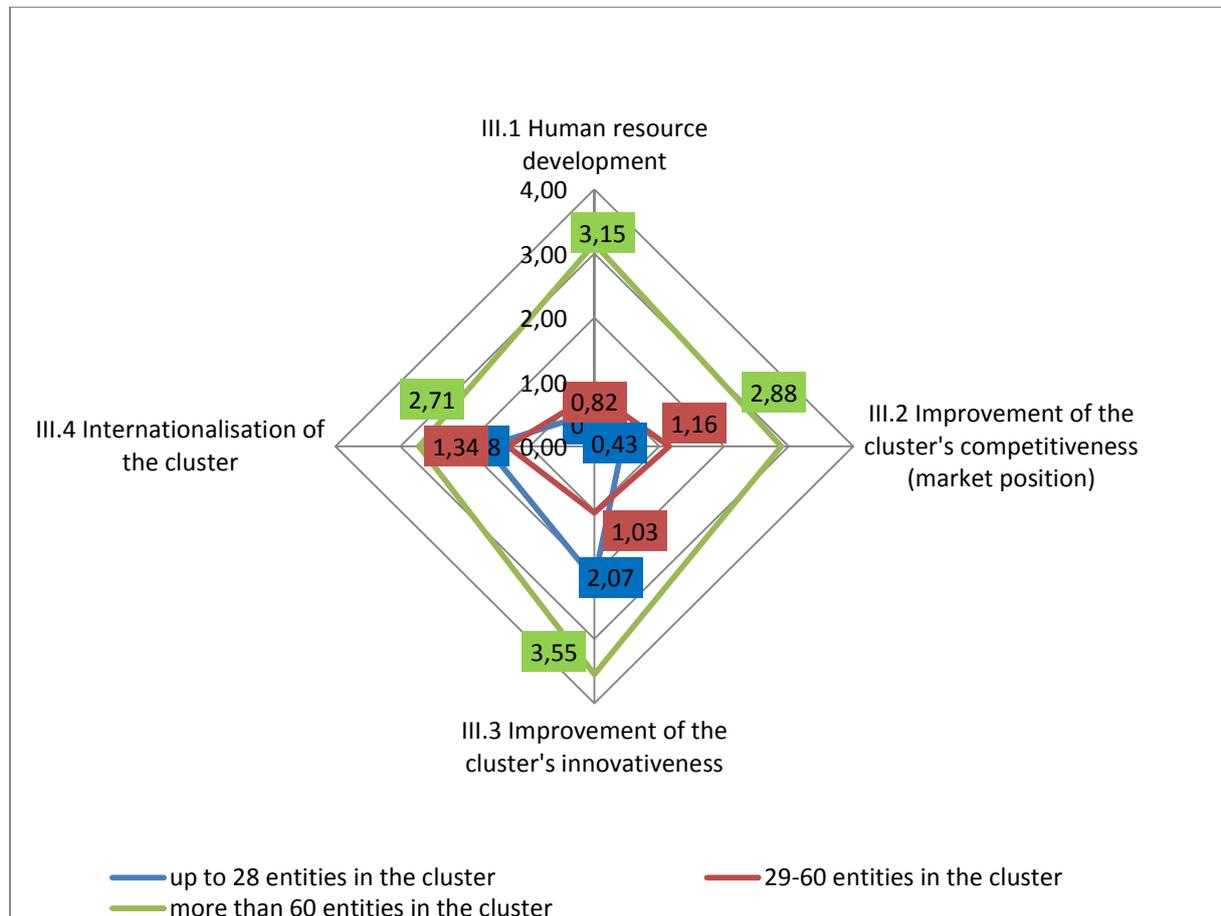
The large clusters recorded the best results in all four subfields. Respectively, the worse results were achieved by the medium-sized and small clusters. The medium-sized clusters presented worse conditions than the small ones only within the subfield of *Improvement of cluster innovation*

At the same time, it needs to be highlighted that the large clusters have an enormous superiority over the remaining groups in terms of the results achieved within the subfields of *Human resources development* and *Improvement of cluster innovation*. The average benchmark value for the large clusters within the subfield of *Human resource development* amounted to 3.15, while the value for the medium-sized and small clusters reached, respectively: 0.82 and 0.52. In turn, the average value within the subfield of *Improvement of cluster innovation* for the large clusters was recorded at 3.55, as opposed to the value for the medium-sized and small clusters reached, respectively: 1.03 and 2.07.

In relation to the already analysed fields of benchmarking, the superiority of large clusters is once again clearly noticeable, in this case in terms of the results achieved by the cluster, including all the subfields that concern human resources as well as innovativeness and

internationalisation. Such results appear to be an obvious instruction for the clusters themselves and the cluster policy. It is suggested to pursue the formation of large and strong clusters, provided the conditions of the given lines of business located in specified regions are conducive to such solutions.

**Chart 83. Average values achieved by the clusters within the field of *Cluster performance* with the dependence on the number of member entities.**



Source: Own work based on the results of a survey conducted among coordinators of 35 clusters.

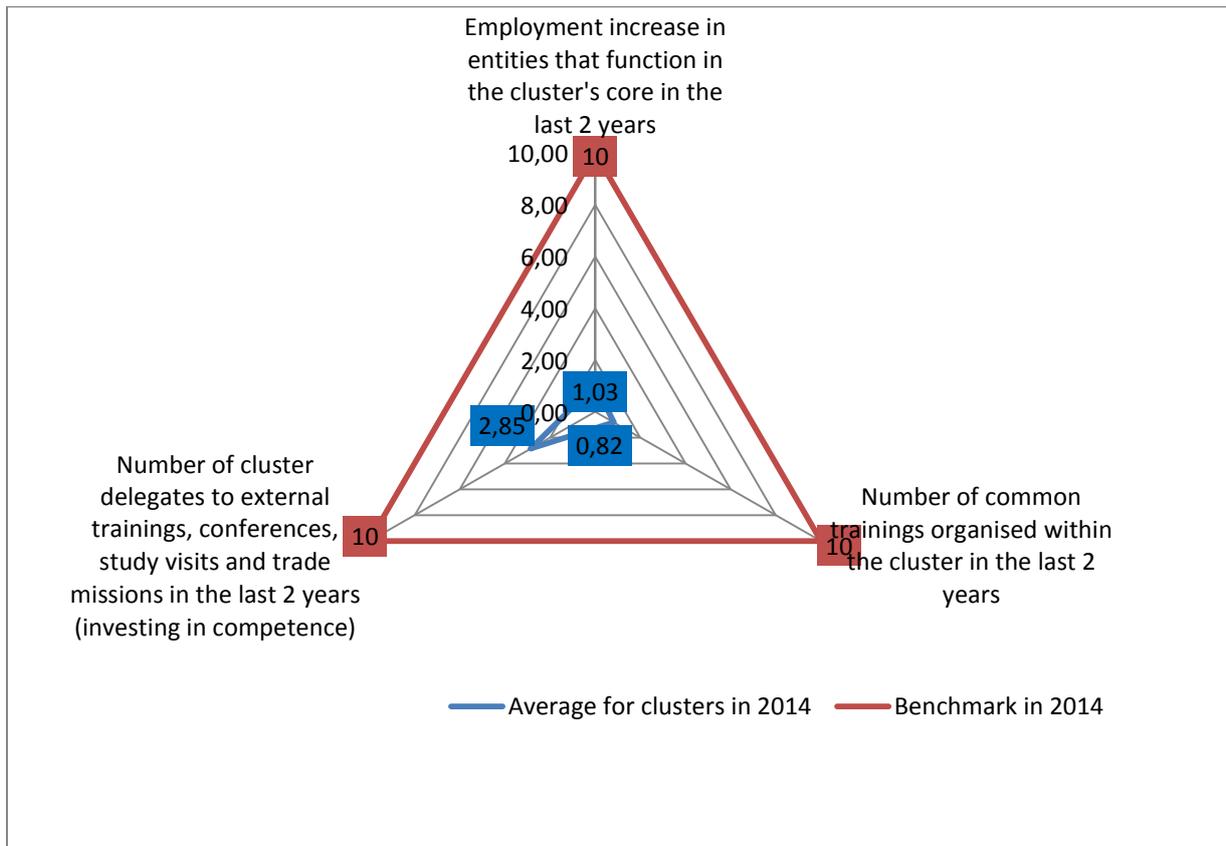
### 7.1. Human resources development

The data presented on Chart 84 shows that the relatively best situation of the clusters within the field of *Human resources development* is observable in the *Number of cluster delegates to external trainings, conferences, study visits and trade missions in the last 2 years*. Within the scope of this index, the benchmark achieves the level of 10, while the average value for the clusters in general remains the highest, amounting to 2.91.

In case of the *Employment increase in entities that function in the cluster's core in the last 2 years* and the *Number of common trainings organised within the cluster in the last 2 years*, the average values for the clusters in general amounted to, respectively: 1.03 and 0.82.

The biggest stratification of the surveyed group of clusters within the analysed subfield is observable in the number of organised trainings, while the smallest differences are present in the number of cluster delegates to external trainings, conferences or trade missions.

**Chart 84. Average and benchmark values within the subfield of *Human resources development***



Source: Own work based on the results of a survey conducted among coordinators of 35 clusters.

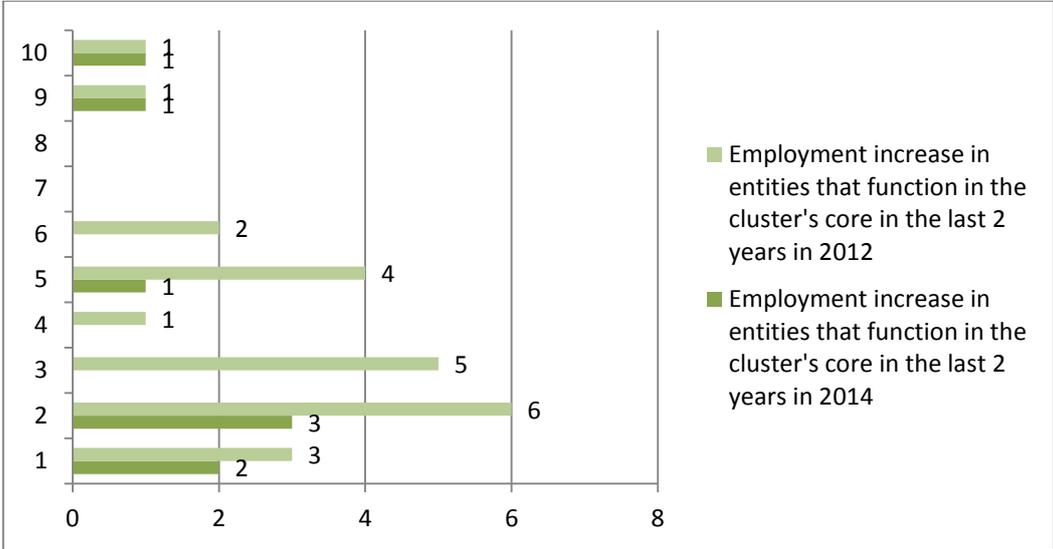
The analysis of the presented data suggests that the employment increase rate in member entities in 2014 was lower than the one identified in 2012 (Chart 85). However, the direct comparison in this case should be carried out with caution since the benchmark value of the respective clusters is strongly influenced, in accordance with the methodology, by the result achieved by the leader, which obviously differed between 2012 and 2014. Moreover, the structure of the surveyed clusters underwent slight changes. In 2014, the biggest benchmark increase in employment amounted to 1783 people. It is also worth mentioning that the total employment increase in the clusters between 2012 and 2014 amounted to 6583 people. The above-mentioned total employment increase allows for the decrease in employment (541 people) in the cluster between 2012 and 2014, as declared by one of the cluster coordinators. Another four coordinators indicated stagnation in employment and in six other instances it was impossible to obtain relevant data. In 27 clusters, the employment increase did not exceed 18 people in the analysed period, thus the assessments reached 0 – not specified on the Diagram.

The impartial assessment of the scale of the employment increase in the surveyed clusters should relate to the number of people employed by the member entities. According to the data presented in *Cluster performance* section, the total employment in the member entities amounted to 96540 people so the employment of additional 6583 people can be regarded as an increase of approximately 7.3%. Having considered the fact that, according to the data for this period provided by the Central Statistical Office (GUS)<sup>10</sup>, the number of the employed in

<sup>10</sup> The number of the employed according to the BAEL survey: in January 2012 – 16 200 000; in April 2014 – 15 793 000; <http://rynekpracy.org/x/1002424>

Poland has remained almost unchanged, then the employment increase in the member entities of the surveyed clusters should be regarded as one of the key results of the clusters, the factor for their future development and the validation of support. The employment increase in the clusters is a proof that they tend to gather the entities characterised by high competitiveness and expansiveness. Similarly to the well-developed countries, they are the centres of economic growth.

**Chart 85. Assessment of the employment increase - comparison of 2012 and 2014 results**

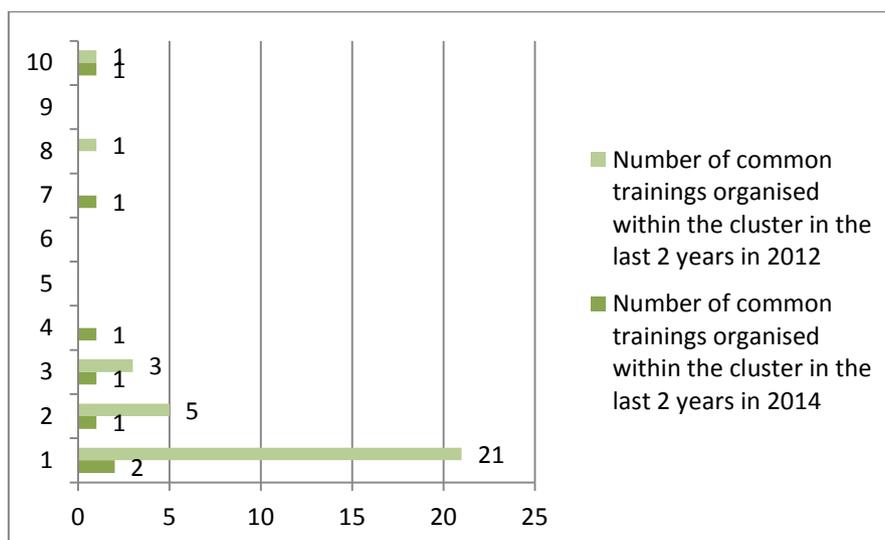


Source: Own work based on the results of a survey conducted among the cluster coordinators in 2012 and 2014.

The data presented on Chart 86 in relation to the *Number of trainings organised within the cluster in the last 2 years*, similarly to the employment increase, indicate rather a drop in clusters' activity in terms of improving competence of employees. In each of the analysed periods, one of the clusters set the highest benchmark value. Its activity strongly influences the benchmark values achieved by other clusters. Having considered the above, it can be nevertheless noticed that the number of clusters scoring points in the benchmarking rapidly dropped in 2014 (6 clusters) in comparison to 2012 (29 clusters). To some extent, it can be attributed to the overstated results of the leaders in the analysed group of clusters but it probably reflects the actual decrease in educational activity as well. It should not be forgotten that the best cluster has organised as many as 150 trainings for its members in the last two years, while the smallest recorded number of trainings amounted to one. The vast majority of clusters (24 out of 35) organised less than 15 trainings for its members between 2012 and 2014, which is reflected in the number of members of the clusters that scored points in the benchmarking.

In the last two years (2012-2014), the surveyed group of clusters has organised a total of 590 trainings, which constitutes an average of 16 trainings per cluster. It has already been emphasised in the section devoted to *Processes in the cluster* of this report that the educational activity of the clusters cannot be interpreted as focused only on trainings aimed at the development of the cluster itself or the preparation of employees to undertake cooperative measures. The educational activity of the clusters cannot be restrained to the sole aspects related to managing the cluster. The clusters should support the employees of all their members, especially through specialised trainings.

**Chart 86. Assessment of the index - *Number of participants of trainings organised within the cluster* - comparison of 2012 and 2014 results**



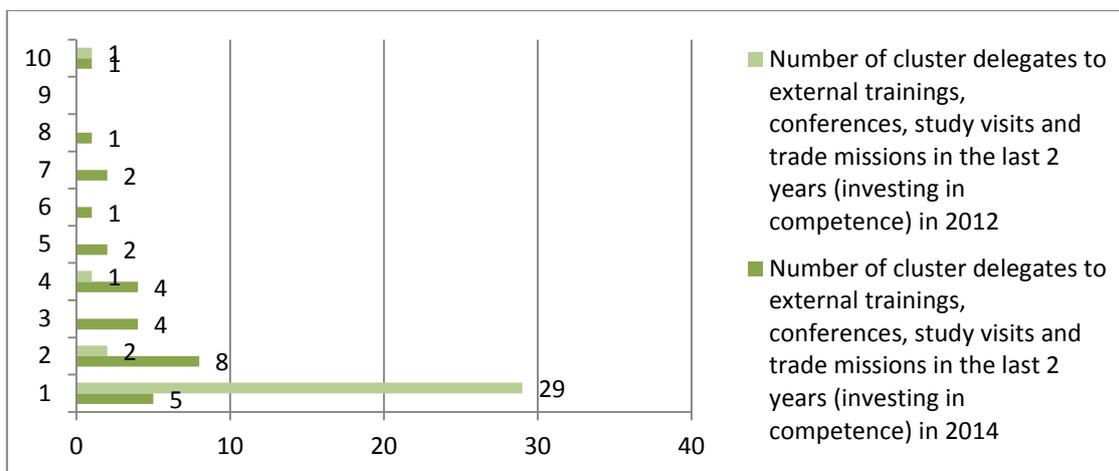
Source: Own work based on the results of a survey conducted among the cluster coordinators in 2012 and 2014.

The scope of educational activity of the surveyed clusters should be assessed from this particular perspective. Considered the fact that these clusters have organised a total of 590 trainings in the last two years, it can be estimated, with the assumption that the average training is attended by 15 people, that approximately 8850 people have been trained, which constitutes approximately 9% (4.5% annually) of the entire number of employees of the entities grouped within the clusters. Having estimated the educational activity in such a manner, it can be regarded as significant but far different from the objective needs of the cluster members. Thus, there is a great opportunity for the analysed clusters to develop their educational activity.

The assessment of the index of *Number of cluster delegates to external trainings; conferences, study visits and trade missions in the last 2 years*, as opposed to the above-mentioned, pictures a positive change in the cluster results (Chart 87). The number of clusters graded with 2-8 points has increased significantly.

Between 2012 and 2014, the clusters delegated a total of 904 people to external trainings, while as many as 83 of this group were delegated by the leader. The smallest delegations from a single cluster consisted of two people. The average number of the delegated employees in the surveyed group of clusters amounted to 25 people. In case of 6 clusters, the number of delegates was smaller than 9, thus depriving them of benchmark points. The assessment of the scale of delegation to external trainings in the surveyed clusters cannot differ from the above-mentioned comprehensive assessment of the educational activity of the clusters. The issue of selecting the form of training (external or internal) is secondary and should develop from the optimisation of the training forms in relation to the assumed education results.

**Chart 87. Assessment of the index – the *Number of cluster delegates to external trainings, conferences, study visits and trade missions in the last 2 years* - comparison of 2012 and 2014 results**



Source: Own work based on the results of a survey conducted among the cluster coordinators in 2012 and 2014.

In each of the three assumed cross-sections that consider the number of projects realised by the cluster, the age of the cluster and the size of the cluster, there is a positive correlation between the increasing activity of the clusters, their age and size and the average value for the analysed subfields. The most active, the oldest and the largest clusters achieved the highest average values in the three analysed indices of the subfield of *Human resource development*. Respectively, the least active, the youngest and the smallest clusters achieved the lowest average values in the three analysed indices of the subfield of *Human resource development*.

These results confirm the initial conclusions that a large part of the projects realised by the clusters was aimed at developing human resources. Moreover, it needs to be emphasised the quite obvious fact that the large clusters are naturally more active in terms of organising trainings. What is more, the cluster's age has a positive influence over its educational activity and is conducive to the employment increase in the entities group within this cluster.

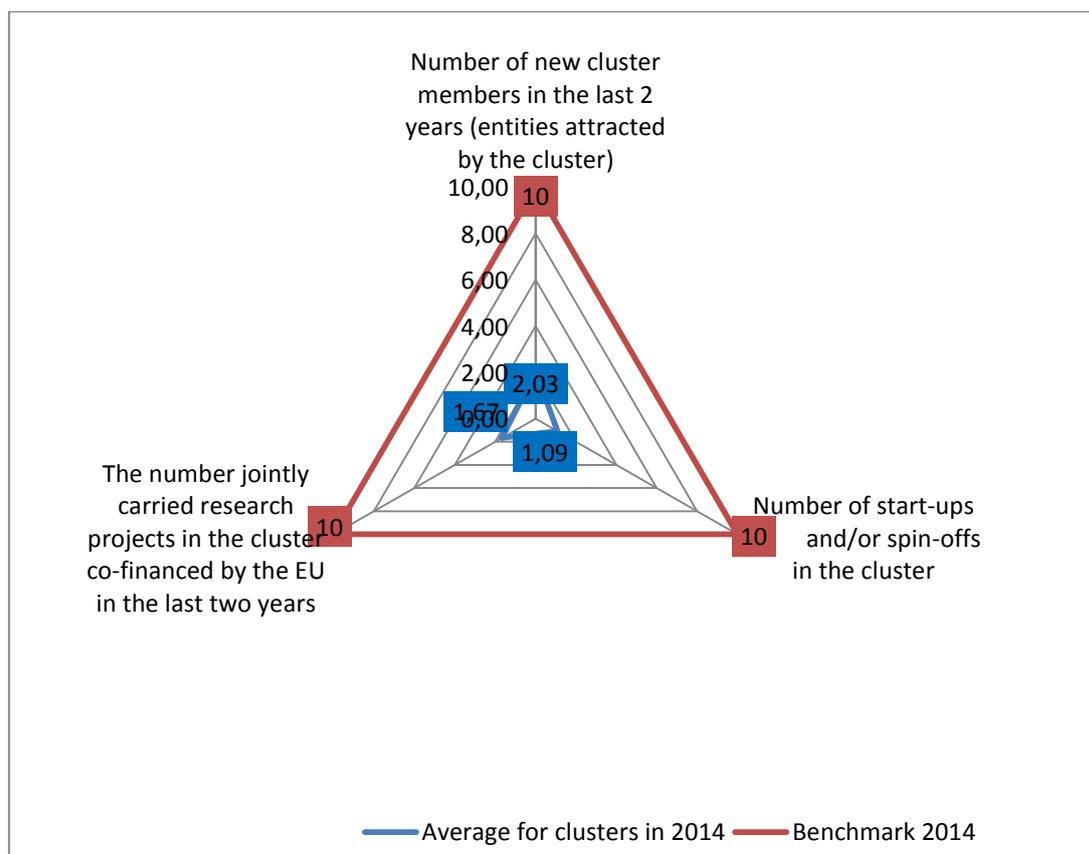
## 7.2. Increasing the competitive advantage of a cluster

Within the framework of *Increasing the competitive advantage of a cluster* subarea, three indicators were analysed: the *Number of new cluster members in the last 2 years (entities attracted to the cluster)*; *Number of start-ups and/or spin-offs in the cluster* and *Number of joint research projects in the cluster in the last two years co-financed by the EU*.

Relatively best results in the subarea achieved clusters examined in terms of the *Number of new cluster members in the last 2 years*. With the benchmark figure at the highest level of 10.0, the average for the cluster was 2.0. Clusters in the number of joint research projects are slightly lower, with the benchmark figure at the level of 10.0 they have reached an average value of 1.67 (Chart 88).

The lowest result was reached by clusters in the indicator of *Number start-ups and/or spin-offs in the cluster*, where the average for the total number of clusters was only 1.09, thus constituting a little more than 10% of the benchmark figure. Thus, for this indicator this gives the highest level of stratification of the researched group of clusters.

**Chart 88. The average values and benchmark figures for the *Increasing the competitive advantage of cluster subarea***



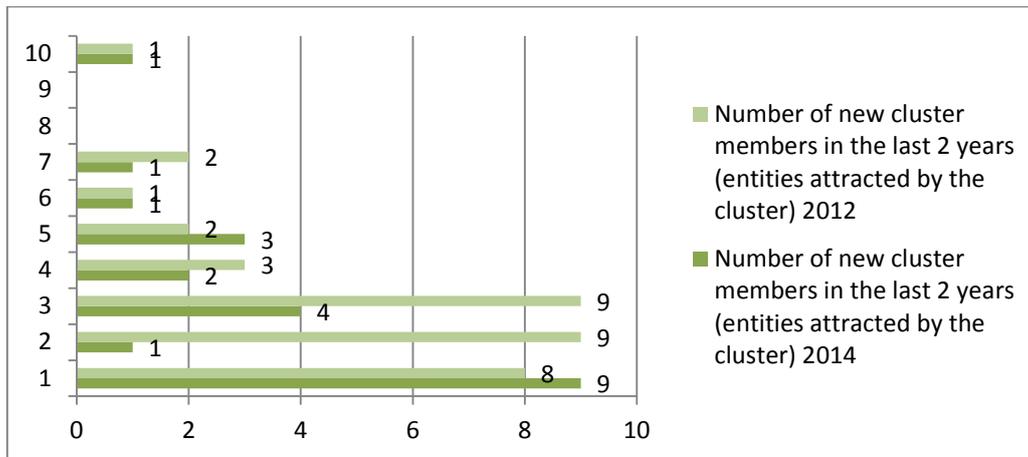
Source: Own study based on the results of a survey of coordinators of 35 clusters.

Evaluation of the *Number of new cluster members in the last two years* characterizing the subarea of *Increasing the competitive advantage of cluster* allows to carefully point out that the admission of new members was rather less intense according to the data obtained in 2014 as compared to 2012 (Chart 89). Considering only the number of clusters that were rated equal to and higher than the average (5-10) the situation in clusters in the analysed period has not changed. However, in the survey of 2014, despite one gap in data obtained in the cluster, in as many as 12 cases the clusters have admitted less than 7 new members, which did not allowed to get even the lowest score in the benchmark. Again, it should be emphasized that the results of the benchmark in a given year to a large extent are affected by the result of a leader.

The leader in the researched group of clusters in 2014 (benchmark value) for the period from 2012 to 2014 gained 67 new members to the cluster, with the total number of new members obtained in the analysed period by all the clusters at the level of 560.

The dynamics of the admission of new members can be assessed primarily taking into account the total number of members of surveyed clusters that at the time of the study amounted to 1917, of which it can be estimated that in the past two years, the number of members has increased by approx. 41%. It seems that this result confirms that the clusters are still at the stage of growth. This reflects well on their attractiveness for many newly joining members. What should also be noted is openness of clusters to new members as a positive factor.

**Chart 89. Assessment in terms of the *Number of new cluster members in the past two years* - a comparison of study results of 2012 and 2014**



Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

Data on the admission of new members can be evaluated positively, while in the light of data on large clusters advantages, clusters should be encouraged to maintain the openness and further expansion.

When admitting new members their potential of contribution to the development of the cluster should be taken into account and in this process the cluster structure should be optimized as in a good practice of the Leszno Printing and Advertising Cluster.

**Good practice 15. The aim of the practice is to acquire new cluster members, who contribute to its development.**



KLASZTER  
POLIGRAFICZNO  
REKLAMOWY  
W LESZNIE

**Leszno Printing and Advertising Cluster**

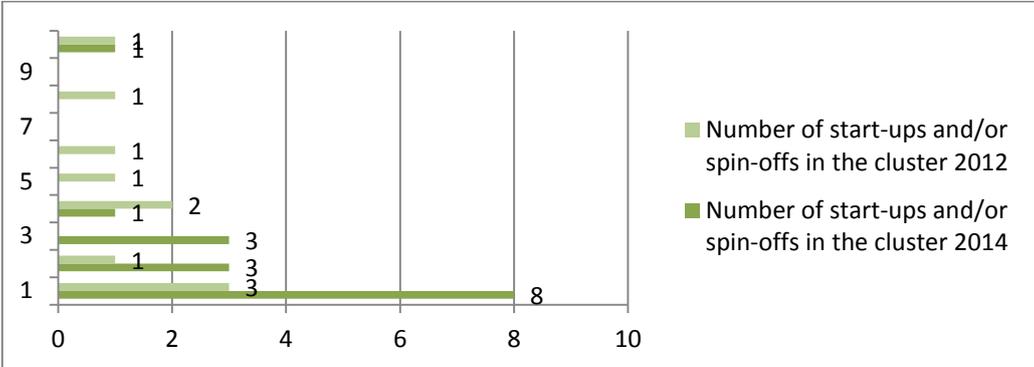
**Aim: The aim of the practice is to acquire new cluster members, who contribute to its development.**

Implementation of the practice is based on including in the search for new members of the Cluster not only Cluster coordinator, but also its other present members. Importantly, these actions are characterized by not so much formal recruitment, but they focus on the direct assessment of the value that the participation of the entity would bring to the Cluster. In this regard, new potential members are first identified and then - in the second stage - based on a personal interview with the coordinator/members of the Cluster, it is proposed to participate in the Cluster.

**RESULT: Applying this rule allows achieving a very important result, which is to obtain the composition of the cluster, which is characterized by high involvement of its members in the activities of the cluster. In addition, members of the cluster are entities whose profile and activity fit into the realm of values around which the cluster is created. This reduces the risk of misunderstanding or unmet expectations member and coordinator of the cluster in the future.**

When analysing the assessment of the *Number of start-up or spin-off entities in the cluster* based on the study of 2012 and 2014, the marked improvement in this field should be indicated, while the obtained scores were at the lowest levels (1-3) (Chart 90).

**Chart 90. Assessment in terms of the *Number of start-up and/or spin-off entities in the cluster* - a comparison of study results of 2012 and 2014**



Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

Benchmark for the leader of the study group, both in 2012 and in the current edition of the research has reached the maximum, which results from to the same methodology for its determination in case of this ratio being a result of the best cluster. The value for 2014 means that the leader of the study group achieved 29 cases of appearing of start-up and/or spin-off entities in its structure over the last two years with the total number of 123 such entities (95 of start-up and 28 spin-off entities). In this particular case of the cluster (leader) in the period 2012 to 2014 a total of 26 business start-up and 3 spin-off companies were established. In the audited population of clusters in 2014, 14 of the 35 clusters indicated the absence of this phenomenon in this period. In one cluster no data were possible to obtain. At the same time in 4 clusters, the number of newly formed start-up and spin-off business was so low that they have not received any points in the audit.

The overall evaluation of the *Number of start-up or spin-off entities in the cluster* must include a relatively small scale of establishment of new entities in clusters (they constituted approx. 5% of all current participants in clusters), on the other hand, it should be noticed that the investigated cluster structures are relatively young and they have not yet developed advanced R&D processes, and the process of the foundation of new start-up or spin-off businesses in Poland is not sufficiently recognized and supported. Given these circumstances, it can be assumed that the audited clusters are already a significant and particularly promising source of new start-up or spin-off businesses. Clusters being a natural source of new innovative companies should be supported in generating the formation of such entities. Evidence of this is also provided by a good practice of the Eastern Construction Cluster.

## Good practice 16. Establishment of spin-off - special purpose entities in the cluster



Wschodni Klaster Budowlany  
Wiarygodność Rzetelność Innowacyjność

Eastern Construction Cluster

### Aim: establishment of spin-off - special purpose entities in the cluster

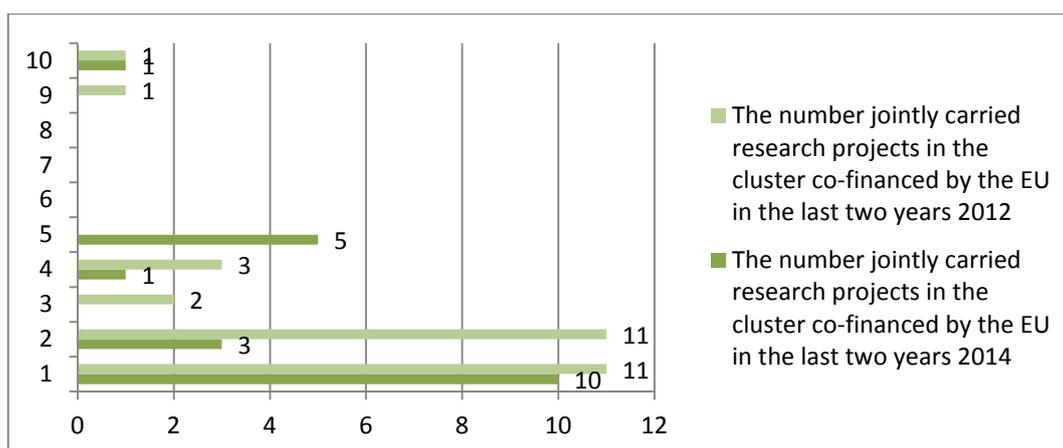
In order to facilitate business activities, cluster members established two special purpose entities: Streb Polska Sp. z o.o. and Polska Eksportowa Misja Budowlana Sp. z o.o. Streb Polska Sp. z o.o. - specializes in professional investing and property management, also provides comprehensive services for foreign entities on all stages of the investment in Poland. Polska Eksportowa Misja Budowlana Sp. z o.o. is to assist entrepreneurs in entering the foreign markets (foreign trade office formula). The creation of special purpose entities at the level of the cluster shows that the benefits of mutual cooperation, as well as the willingness to cooperate and mutual trust between the cluster members are visible.

**Result: Increasing internationalization of the cluster and facilitating cluster members to conduct business abroad. Closer cooperation within the cluster.**

The analysis of *Number jointly carried research projects in the cluster co-financed by the EU in the last two years* shows a decrease in activity of clusters in this area.

During this period, a leader in the study group of clusters in 2014 realized 10 research projects funded by the EU, and in the whole population of audited clusters 55 such projects were carried out in the last two years. It should be noted that 13 of 35 clusters in the period 2012-2014 have not carried any research project supported by funding from EU sources (Chart 91).

**Chart 91. The analysis of *Number jointly carried research projects in the cluster co-financed by the EU in the last two years* – comparison of the results of 2012 and 2014**



Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

Probable decline in activity in the implementation of research projects financed from EU sources as compared to the results recorded in 2012 can be attributed to reduction of funds at the end of the programming period. Nevertheless, what should be noted is the following diversification of clusters into those that are able to acquire funding for research also from European sources, and into those that do not apply for this type of projects at all. Wide possibilities in this regard are best seen through the prism of the leader, who has realized as

many as 10 research projects funded by the EU. This should serve as an example for the largest possible number of clusters. It should, however, be realized that not all clusters in its current structure have the potential to take such action. This should not be an excuse, but rather a clue to perform such transformations to the structure of clusters to obtain the unique potential to conduct research and development operations. An excellent example of the effective action in this regard is the West Pomeranian Association of Chemical Cluster "Zielona Chemia" from Szczecin, which manages to raise significant funds for research projects.

### **Good practice 17. Closer cooperation between science and business worlds based on joint R&D projects**



#### West Pomeranian Association of Chemical Cluster "Zielona Chemia"

#### **Aim: Closer cooperation between science and business worlds based on joint R&D projects**

The cluster, together with the Centre of Bioimmobilisation and Innovative Packaging Materials (CBIMO) of West Pomeranian University of Technology in Szczecin has four projects under international initiative CORNET (Collective Research Networking), aiming at combining science and business: SubWex (subcritical water as a "green" solvent used for extraction of plants), SmartFlowerPack (development and implementation of intelligent packaging system based on biomaterial designed for packing flowers - B2B solution), FreshCoat (functional use of edible coatings to extend the shelf life of fresh foods), ExtruMIBI (preparation and application of thermostable natural antimicrobial agents). In each of these projects, there are three groups of actors involved: R&D institutions responsible for carrying out of the research (in this case: CBIMO), Cluster - in the role of coordinator for the activities and entities interested in potential results of the projects that could be implemented in their companies.

**Result: Development of links between science and business, based on collaborative research projects. Technology transfer from universities to business, with an active role of cluster as an intermediary in the process.**

The analysis of the subarea of *Increasing the competitive advantage of cluster* (by age, activity and the size of the cluster) does not show any custom dependencies. Clusters with more experience and that are more active and larger each time achieved better results than clusters with less experience, being less active and smaller.

#### **7.3.Improvement of cluster innovation capacity**

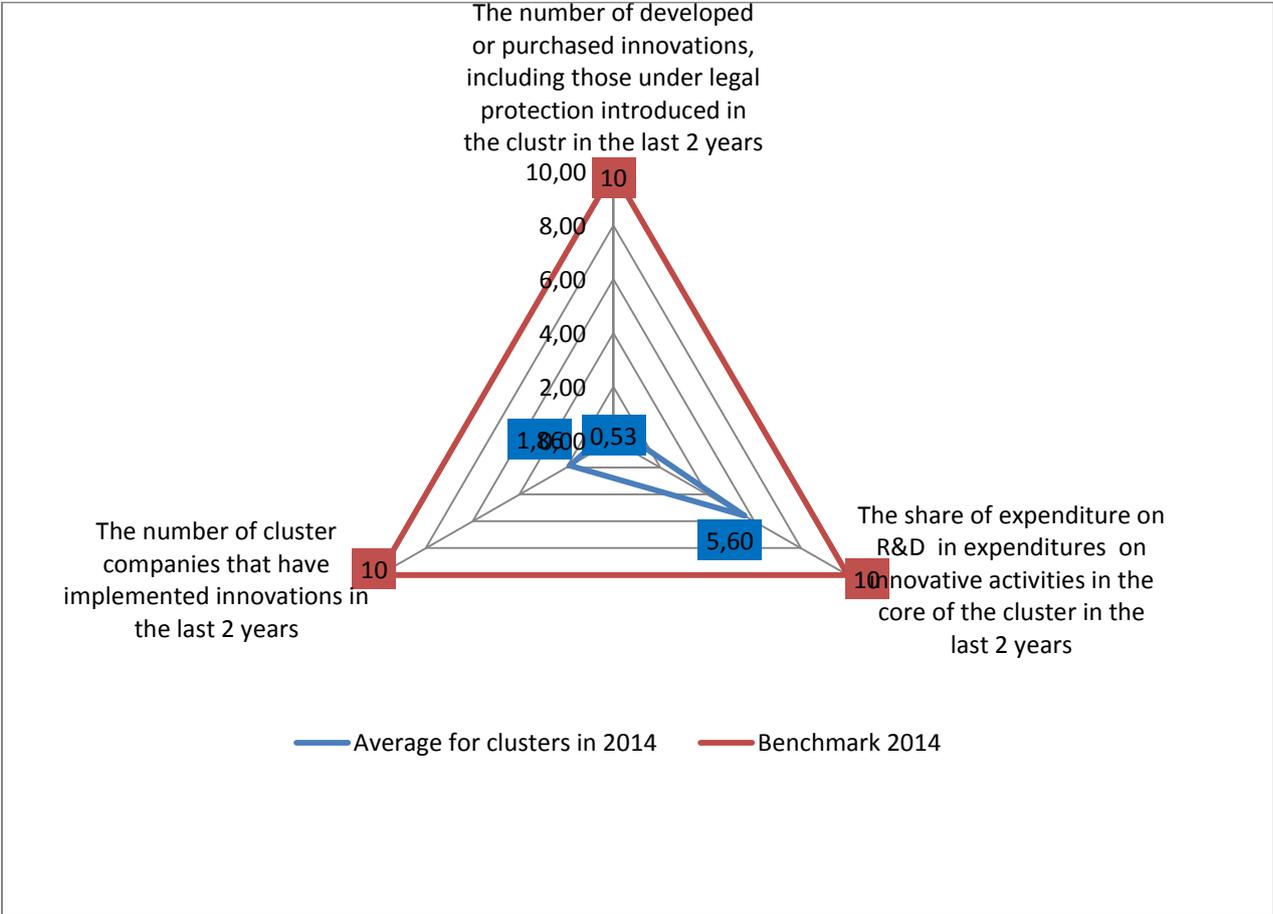
The subarea of *Improvement of cluster innovation* was considered from the point of view of three indicators: *Number of developed or purchased innovations, including those under legal protection introduced in the cluster in the last 2 years; Share of expenditure on R&D in expenditure on innovative activities in the core of the cluster in the last two years and Number of cluster companies that have implemented innovations in the last two years.*

The best results of audited group of clusters were achieved in terms of the *Share of expenditure on R&D in expenditure on innovative activities in the core of the cluster in the last 2 years*. The value of the benchmark reached a maximum height of 10, while the average for the total number of clusters was up 5.60. In terms of this indicator, we also have to deal with the smallest stratification of the audited group of clusters (Chart 92).

The relatively high level of average benchmark for the expenditure on R&D in clusters to a small extent led to a good layout of the benchmarking results in the field of introducing innovations. In terms of the *Number of developed or purchased innovations, including those protected by law, introduced in the cluster in the last 2 years*, the benchmark according to the adopted methodology reflecting the leader's results amounted to 10, while the average for the total number of clusters was only 0.53. This situation indicates the highest level of stratification in the audited group regarding innovative activities.

On the other hand the average for the *Number of cluster companies that have implemented innovations in the last 2 years* was 1.86.

**Chart 92. The average values and benchmark figures for Improvement of cluster innovation subarea**

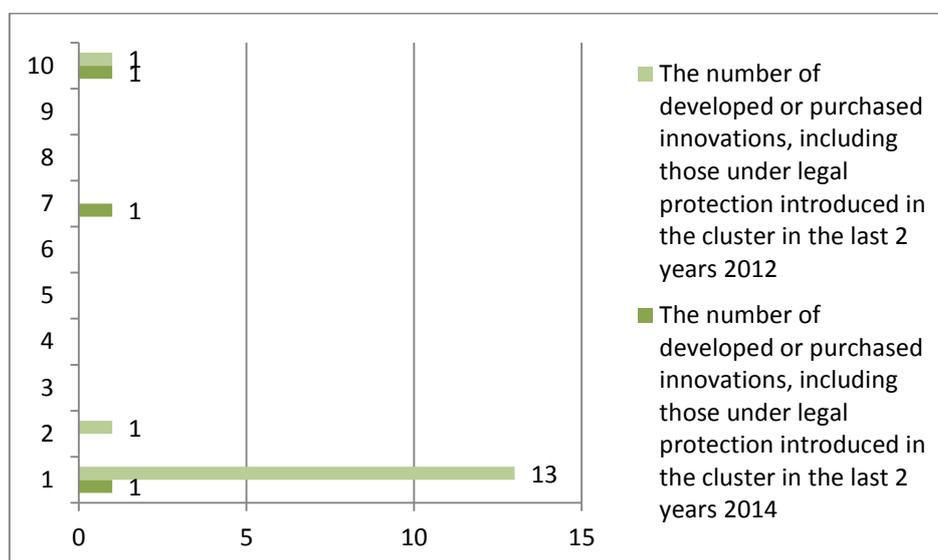


Source: Own study based on the results of a survey of coordinators of 35 clusters.

The evaluation of *Number of developed or purchased innovations, including those under legal protection introduced in the cluster in the last 2 years* clearly reveals a very poor result in terms of cluster benchmarking implementation of innovative solutions under legal protection both in 2012 and 2014 (Chart 93). In addition, data on the chart suggest deterioration of the situation in 2014 as compared to 2010. Such low score of clusters is probably largely connected to generally low level of innovativeness of the Polish economy,

especially in terms of innovation for the market scale that often should be covered with legal protection. At the same time, however, it would be expected from companies operating in clusters to have a higher level of innovations with a unique character. In the light of the quoted benchmarking results, it cannot, unfortunately, be confirmed that the clusters are highly innovative in terms of unique and ground-breaking innovations. However, it should be recognized that a very low average score of clusters in this area could, in both audit from 2012 and the current one, be strongly affected by a relatively high position of the leader. In the audited group of clusters in the period 2012-2014 a total number of 221 innovations were implemented under legal protection. From this number, 104 were realized by the leader of the audited group. The remaining 117 innovations have been implemented by only 12 clusters, of which for the 10 of them the number of introductions was less than 11 – so they were rated 0. As many as 22 of 35 clusters during the period from 2012 to 2014 have not implemented any innovations covered by legal protection (including, one case of no information obtained).

**Chart 93. The evaluation of *Number of developed or purchased innovations, including those under legal protection introduced in the cluster in the last 2 – comparison of results of 2012 and 2014***



Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

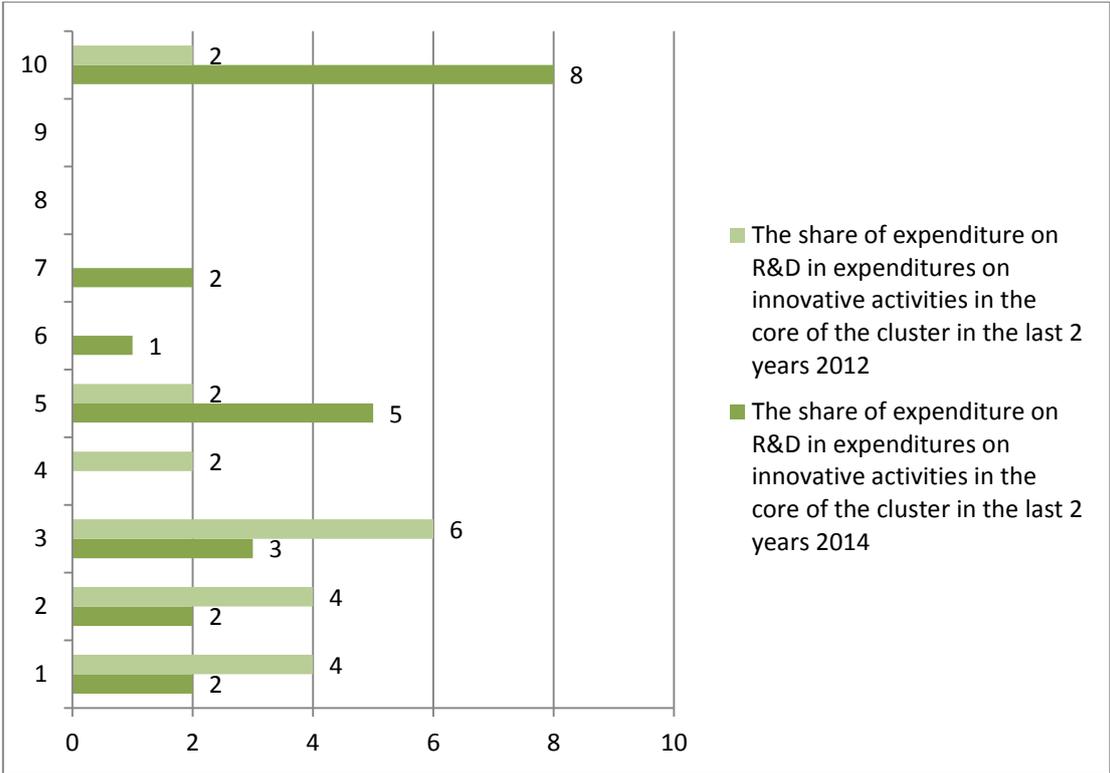
Data on the absolute number of innovations under legal protection implemented in clusters confirm the conclusions of a very strong stratification of the clusters studied in this respect. For the implementation of unique / ground-breaking innovations three groups of clusters may be identified: two/three leaders with a great or significant potential for innovation; group of 10 clusters implementing innovators under legal protection at a low level and the other group of 22 clusters not engaged in the innovative activity under legal protection. Considering the need for a strong increase of innovativeness of the Polish economy, including innovation unique on the European and global scale, while taking into account the clusters as the optimal environment for generating this kind of innovation, a strong intensification of activities in the development of ground-breaking innovations, including those legally protected should be expected in Polish clusters. It is, on the one hand, the right direction for the development of the clusters themselves, which should suggest not only to undertake activities and projects related to the development of innovative solutions, but also it should be an important guideline to form the entity structure of the clusters, which will be conducive to the creation of innovations. In the context of the need for development of an appropriate institutional

structure, the increasing share of research units in clusters should be taken into account. Despite the lack of respective entities in the region, where the cluster is rooted may prove to be the problem. In these cases, it is reasonable to initiate cooperation also with more distant units, able to intensify the innovation processes in the cluster. On the other hand, negative results of the indicator of *Innovation under legal protection in the cluster* should be a guideline for cluster policy, but also the general policy of innovation in terms of the need to support unique innovation within the cluster structures.

Nevertheless, the analysis of the data contained in Chart 94 shows that we should look at the next period of implementation of innovations under legal protection with a certain optimism. Data indicate a slight improvement for the benchmark clusters in the range of *Share of expenditure on R&D in expenditure on innovative activities in the core of the cluster in the last 2 years*.

In eight cases 100% share of expenditure on R&D in expenditures related to innovation activities was declared. Average expenditures for all the clusters amounted to 64.5%, and the lowest declared share was 0.08%. In eleven clusters no data were possible to obtain in this regard.

**Chart 94. Assessment of the Share of expenditure on R&D in expenditure on innovative activities in the core of the cluster - a comparison of study results of 2012 and 2014**



Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

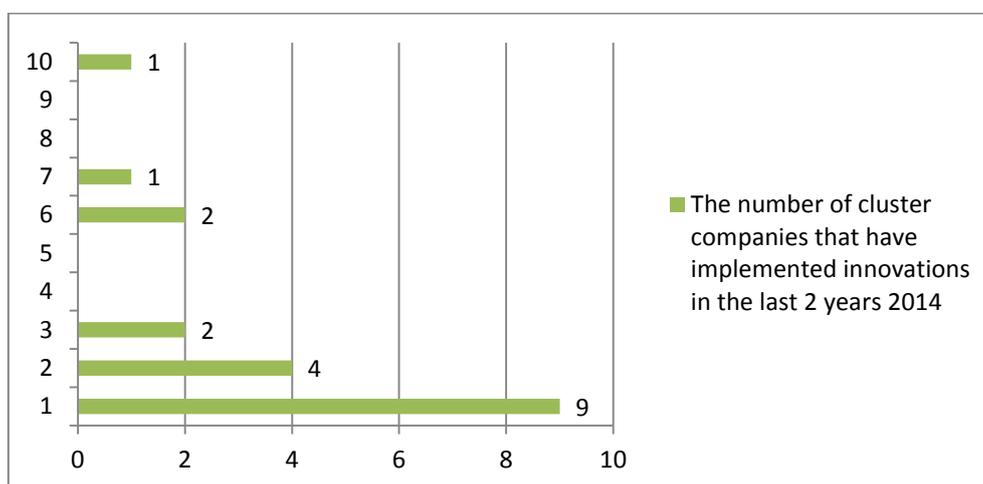
In the case of indicator of *Number of a cluster of companies that have implemented innovations in the last two years* it is not possible to refer to the previous study of 2012, as in the previous edition it had a slightly different structure: the *Number of joint international research projects funded from external sources*. Therefore, Figure 95 presents the assessment of the results of the current index only for 2014.

In 2014, the maximum value of assessment is equal to 10, which means that the leader of the audited clusters groups together 140 companies that have implemented innovations in the past two years. The total number of companies operating in clusters that have implemented

innovations in the audited period was 900. The result is relatively high, considering the fact that totally in all 35 clusters currently operates 1,559 companies. Thus, 57.73% of the total number of clusters' companies have implemented innovation in the period of the past two years. This indicator is not directly comparable with data on innovativeness of Polish enterprises collected by the Polish CSO (GUS), for statistical data are collected in the context of enterprises implementing a particular type of innovation<sup>11</sup>. Nevertheless, judging by the significant positive disproportion of indicators obtained in the audit with respect to the data presented by the CSO, it can be reasonably assumed that companies belonging to clusters show higher innovation as compared to the average performance across the business population.

It is worth noting that in the case of the seven cluster, it could not be determined whether and on what scale innovations in cluster enterprises were introduced. In nine cases, in the period 2012-2014 the clusters implemented less than 14 innovations, thus were assessed zero and were not included in Chart 95.

**Chart 95. The assessment of Number of cluster companies that have implemented innovations in the last 2 years – results for 2014**



Source: Own study based on the results of a survey of coordinators of 35 clusters.

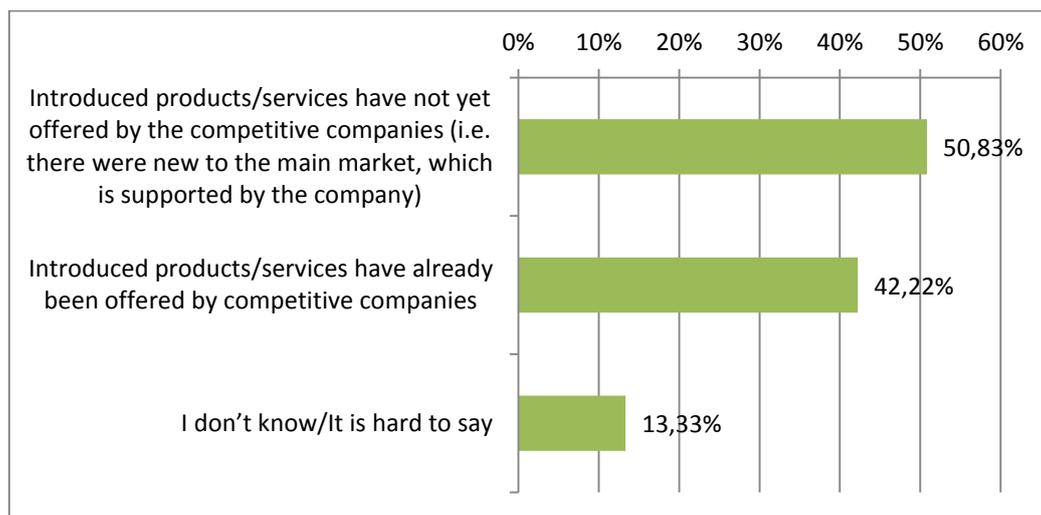
In order to verify and to refine the information about the state of innovativeness of clusters, this issue has been included in the polls of enterprises. First of all, the analysis of types of implemented innovations has been conducted.

70.3% of 512 surveyed companies declared they have launched a new or improved product/service, 52.3% declared that they significantly modified or introduced new production process, 51.2% implemented organizational changes, and 53% significant changes in the company's marketing strategy (quest. no. 31). These data suggest that the level of innovation in enterprises belonging to clusters is even higher than that expected from the evaluations of cluster coordinators and thus, it the above request for a higher overall innovativeness of companies in clusters is even more feasible in relation to the total number of companies in the country, also taking into account the different types of innovations. It is worth noting that innovation processes in enterprises are not fully known to the coordinators of clusters, suggesting the need to improve the flow of information in this regard. What should be done is to, for example, devote a separate function in the communication platforms used by the clusters to the aspect of the implementation of innovations,.

<sup>11</sup>*Działalność innowacyjna przedsiębiorstw w latach 2009-2011*, Główny Urząd Statystyczny, Urząd Statystyczny w Szczecinie, Warszawa 2012.

The survey of entities included the question of the degree of corporate originality, or otherwise, degree of innovativeness (Chart 96/quest. no. 31a). It is worth noting that 50.83% of 354 companies declared that the introduced products/services were not yet offered on the market by the competitive companies. Another 42.22% stated that the new products/services, from their point of view, were already introduced on the market by competing companies. And for 13.33% of the respondents the degree of innovativeness of products and services implemented proved to be a difficult question. These data can be summarized by a claim that original innovations are introduced to the market by about 40% of the companies belonging to the clusters. These data are not comparable with the statistical data, but in their context it appears that this ratio is relatively high. It can be assumed that clusters to a large extent combine companies with considerable potential for innovation. This confirms a natural feature of clusters as pro-innovation environment. However, given the earlier data on the low concentration of activities/projects of clusters on issues of innovation, it can be assumed that the identified potential for innovation could be better used by the wider cooperation to support innovation in clusters. Clusters should be encouraged to seek the implementation of activities related to enhancing innovativeness of enterprises. On the other hand, the future cluster policy and innovation policy should take into account the high innovative potential of clusters as the proper environmental for implementation of public actions aimed at improving innovativeness.

**Chart 96. The level of *Innovativeness of new/significantly improved products/services introduced***

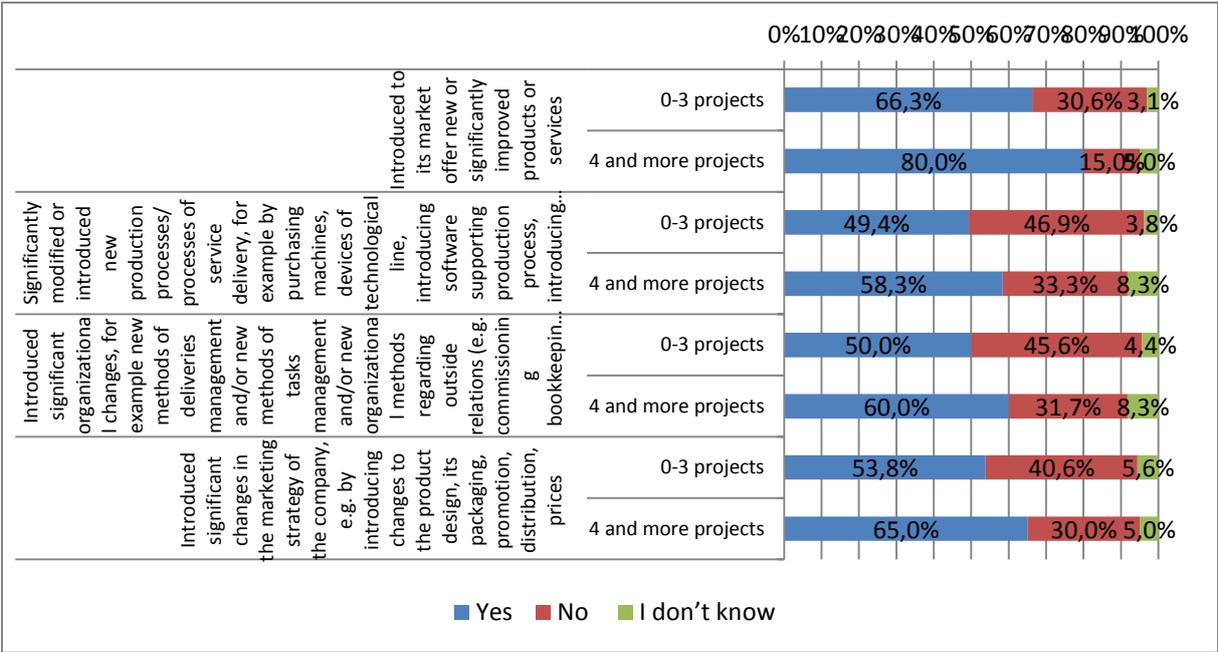


Source: Own study based on CAWI / CATI surveys on members of 35 clusters, N = 354, the companies that introduced innovative products or services in the last two years.

The above conclusions on the need for intensification of pro-innovative activities in the clusters can be somewhat verified by the analysis of current impact of clusters on innovativeness of companies. This can be done by comparing the degree of innovativeness of enterprises engaged in cluster cooperation to a greater extent and of these companies who participated in the activities of the clusters to a lesser extent, which could also be caused by generally lower activity of the cluster itself. Chart 97 shows a sample of the surveyed companies analysed in terms of implementation of the different types of innovation according to two groups: more active and less active entities. Companies more active in clusters, using the large number of cluster projects simultaneously exhibit a higher innovation than less active companies. The largest difference between active and less active clusters in the implementation of innovations is visible at the implementation of product innovations. The

percentage of active companies that have implemented new products/services was 80%, and 66.3% of the companies that are less active. The presented results can be understood that projects realized in clusters increase innovativeness of the enterprises. Such an interpretation is acceptable, it should be remembered that, as previously stated in the Report, the concentration of cluster projects regarding increasing innovativeness is relatively low. There is also another possibility, that there is an inverse relationship based on the fact that the more innovative companies are willing to engage in a greater number of cluster projects. It seems that, in practice, both possibilities occur. Probably some of the projects implemented by active clusters were set to implement innovative solutions and, moreover, proved to be effective, yet more innovative companies are more involved in the activities of the cluster. Regardless of what is the strength in both directions of debated dependency of higher activity in the cluster and the level of innovativeness of enterprises, its occurrence confirms that the clusters are favourable pro-innovative environment. In light of this observation, the above mentioned conclusions on innovation as the direction of the development of clusters and innovation policy implemented in clusters should be emphasised.

**Chart 97. Innovative activities of cluster enterprises in the last two years - depending on the number of projects**

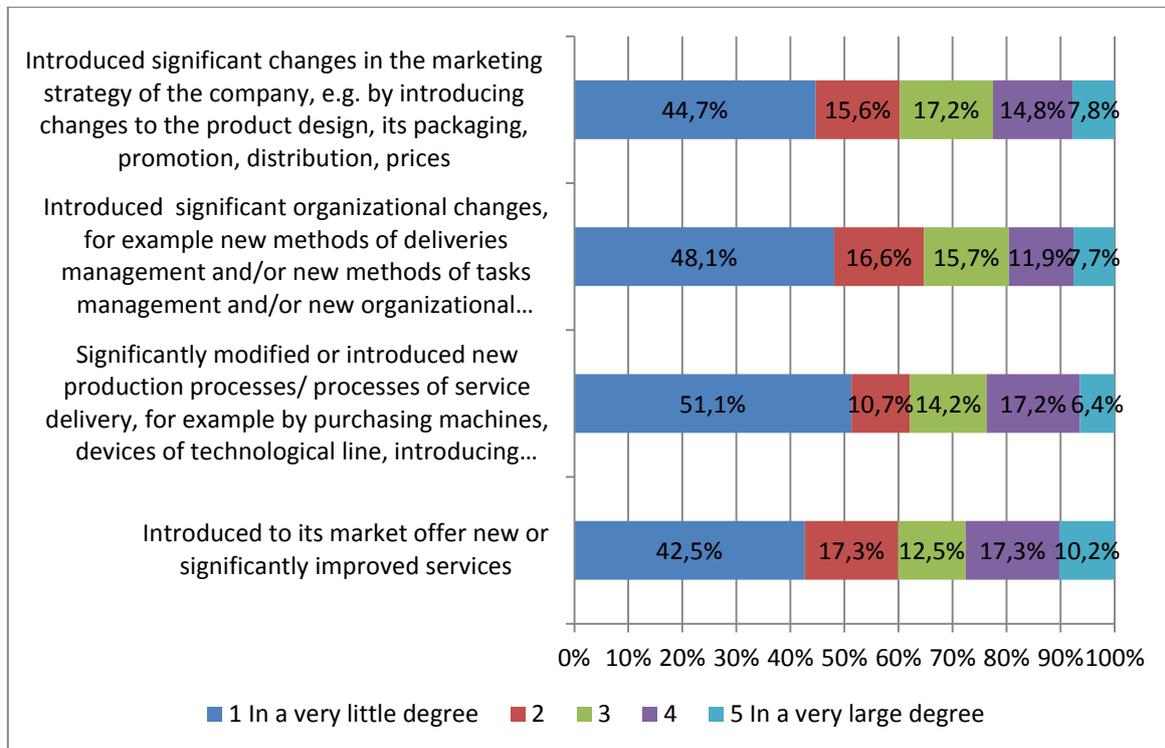


Source: Own study based on CAWI / CATI surveys on 35 cluster members; N = 220; N<sub>0-3 projects</sub> = 160; N<sub>4 and more projects</sub> = 60.

The problem of whether rather innovative companies join the cluster or clusters has already substantially increase the innovativeness of enterprises can be resolved to some extent based on the evaluation of companies that have implemented at least one of the four types of innovation, and the extent to which the cluster contributed to their innovative activity. The results of this assessment are presented in Chart 98. The vast majority of respondents declared that the cluster slightly or hardly contributed to their innovative activity. Percentage of companies indicating a negligible impact of a cluster on the implementation of innovative product or organizational and marketing processes in enterprises amounted to an average of 61.65%. This means that for less than 40% of enterprises involved in the implementation of innovation, a cluster proved to be helpful in some way, and a very large impact of cluster

on the implementation of the different types of innovation showed about 8% of the companies. This indicates that the impact of clusters on entity innovativeness is already being felt; however, the scale of this impact is still insufficient. This creates a large field for development of pro-innovation activities of cluster structures and confirms previous findings in this regard.

**Chart 98. Assessment of the extent to which the cluster contributed to implementation of innovations by the companies**



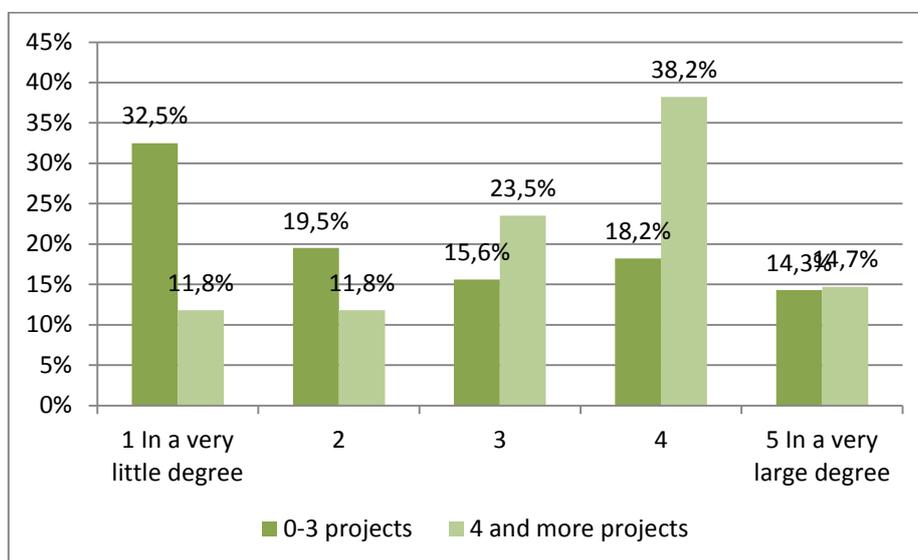
Source: Own study based on CAWI / CATI surveys on 35 cluster members; N = 244 companies introducing innovations.

The possibilities of development regarding innovative activities of clusters can also be identified on the basis of the current state of efforts in cluster enterprises related to R&D activities. Entrepreneurs indicated whether in the last two years they have undertaken R&D activities. 51.4% of companies (263 of 512) answered affirmatively (quest. no. 33). Then entities undertaking R&D activities could assess the extent to which the functioning in the cluster actually contributed to their R&D activities. For 51.6% of 248 companies cluster impact on R&D activities of the company was very small or insignificant. In the opinion of 17.7% of respondents cluster moderately helped in the implementation of R&D activities. High impact of cluster was indicated by 18.1% of the companies, and very high impact by 12.5% of respondents (quest. no. 34). It is worth noting that more active companies more positively evaluate the impact of the cluster on their R&D activities as compared to less active entities (Chart 99). Among the active companies (4 or more projects), 52.9% indicated that their presence in the cluster in a large extent supported R&D activities. The percentage of less active companies that have the same opinion was 32.5%. In contrast, a limited and very limited influence of the cluster on R&D activities was indicated by 23.6% of active companies and 52% of companies that are less active.

Discussed results of the state of R&D activities in clusters enterprises and the impact of clusters on this activity are also fully consistent with earlier findings regarding innovative

activity. Firstly, it should be noted that the level of R&D activities in cluster enterprises is relatively high. The impact of clusters on R&D activities was significant for 30.6% of the companies engaged in these activities (considered very significant and substantial), and therefore even higher than for the overall innovative activity. Analysis of activity in cluster project implementation of companies engaged in R&D activities has shown that there is a positive correlation between the number of realized projects, and a sense of a greater influence on the R&D activity of a cluster. These data also do not determine clearly the direction of the relation: whether participation in the cluster and implementation of its projects has an impact on the intensification of R&D activities in enterprises, or rather the opposite: companies with high R&D potential are more strongly involved in clusters and projects implemented there. Undoubtedly, it can be confirmed that the clusters are not only the right environment for innovative business, but also for the part, which is associated with research and development activities.

**Chart 99. The impact of Participation in a cluster on R&D activity of a company based on the number of realized projects**



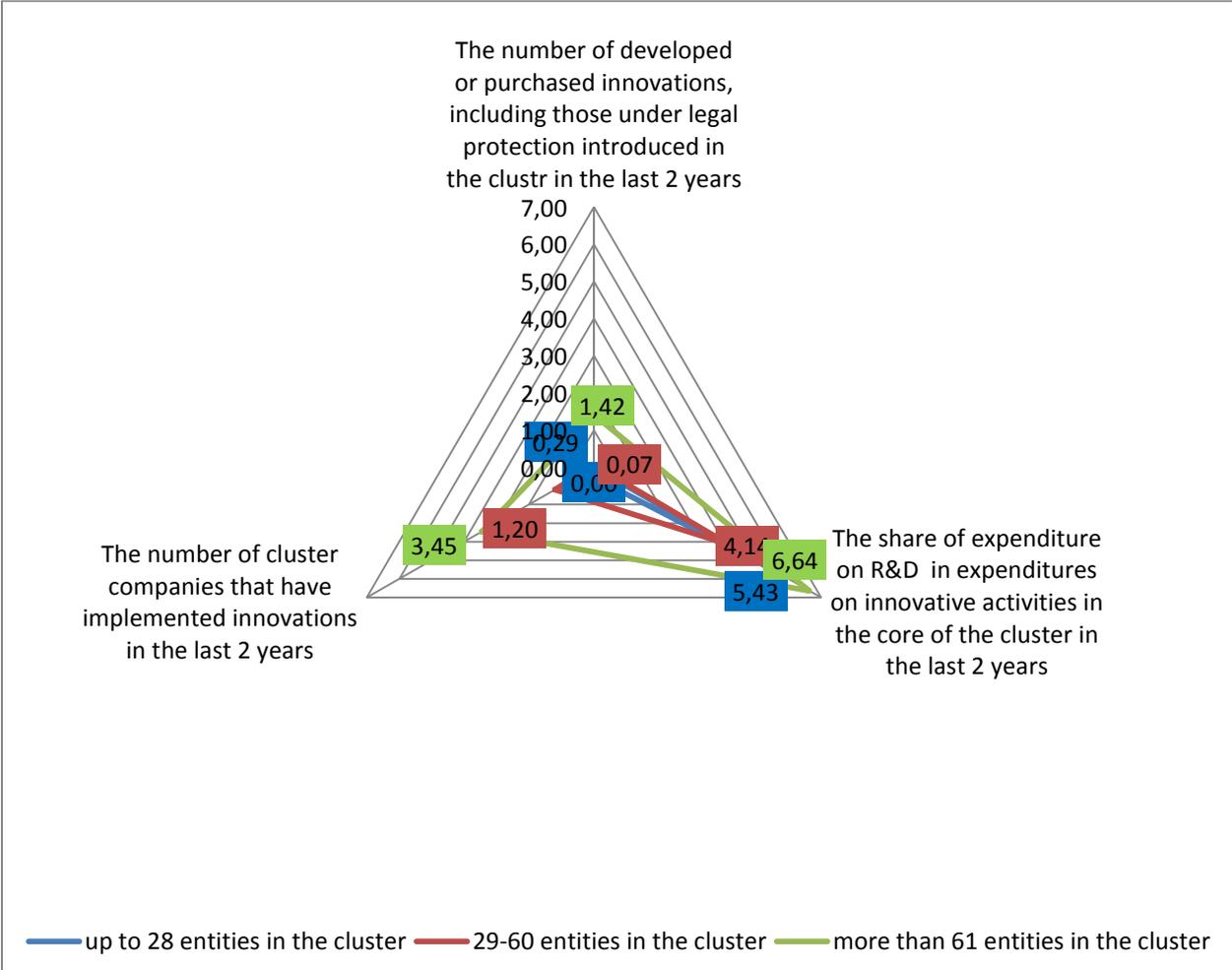
Source: Own study based on CAWI / CATI surveys on 35 cluster members; N = 111; N<sub>0-3 projects</sub> = 77; N<sub>4 and more projects</sub> = 34.

Reasonable requests of the need to treat clusters as the proper environment for the promotion of innovation make it worth to consider what type of clusters can to the greatest extent foster innovation processes. Analysis of subdivision of the *Improvement of cluster innovation* carried out depending on the age of the cluster does not show significant deviations from the anticipated results because the older clusters have higher mean values of the different indicators as compared to the younger clusters. It is worth to interpret this result as if the length of the period of performance of the cluster structure had a positive effect on their innovativeness. A different interpretation involving the conclusion that the clusters were formed in the earlier period by more innovative companies is also acceptable, but less likely. The interpretation proposed first is supported by understanding of the nature of cluster structures as pro-innovative ones.

When analysing the characteristics of cluster structures that particularly support innovation, the issue of the size of the clusters already discussed in this context should also be noted. Chart 100 shows the average value obtained by the clusters within the subarea of *Improvement of cluster innovation* depending on the size of the cluster. It should be emphasized that in all dimensions of innovativeness, the results of the largest cluster are

clearly the best. In the case of two indicators: *The number of companies implementing innovations in the cluster* and *The number of implemented innovations protected by law*, the correlation between cluster size and the average level is also, as expected, positive. Only in the case of *The share of expenditures on R&D in expenditures on innovation activities in the core of the cluster in the last two years* the largest clusters have the best results, but right behind them are the smallest clusters, with a relatively large advantage over the average clusters. The average ratio for the group of the smallest cluster was 5.43, with an average of 6.64 for the largest clusters and average for the cluster of an average size at the level of 4.14.

**Chart 100. Average value obtained by the clusters within the subarea of *Improvement of cluster innovations* depending on the size of the cluster**



Source: Own study based on the results of a survey of coordinators of 35 clusters.

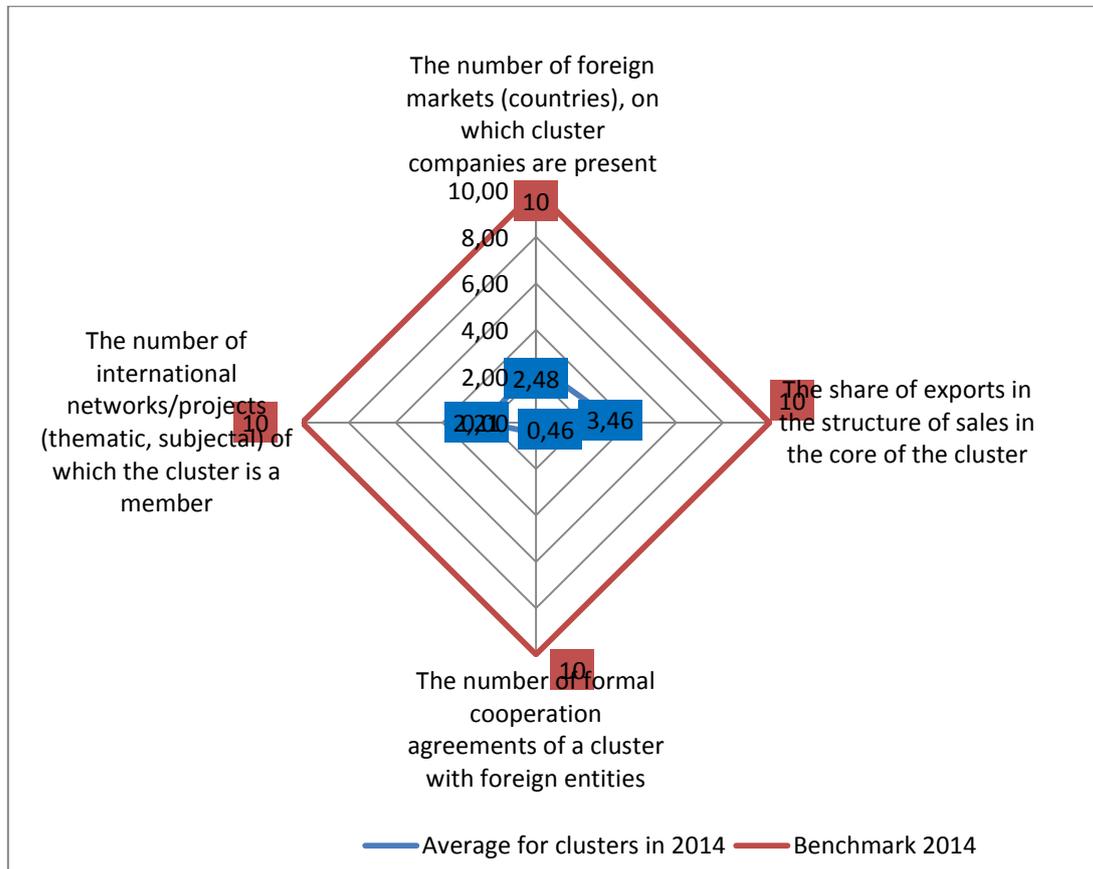
This last result, reported in the context of a specific indicator related with the share of expenditure on R&D in total innovation expenditures in general, which may be specifically associated with the leading industry of clusters, does not undermine the already formulated conclusion on better conditions for innovations created by large clusters. Increase of the impact of clusters on innovation processes can be made also by expanding the size of clusters (with other factors at the constant level).

**7.4. Cluster internationalization**

Chart 101 shows the mean values and the benchmark figure for the subarea *Cluster internationalization*, which was considered with the use of four indicators: *Number of foreign*

markets (countries), on which cluster companies are present; Share of exports in the structure of sales in the core of the cluster; Number of formal cooperation agreements of a cluster with foreign entities and Number of international networks/projects (thematic, sectorial) of which the cluster is a member.

**Chart 101. The average values and benchmark figures for Cluster internationalization subarea**



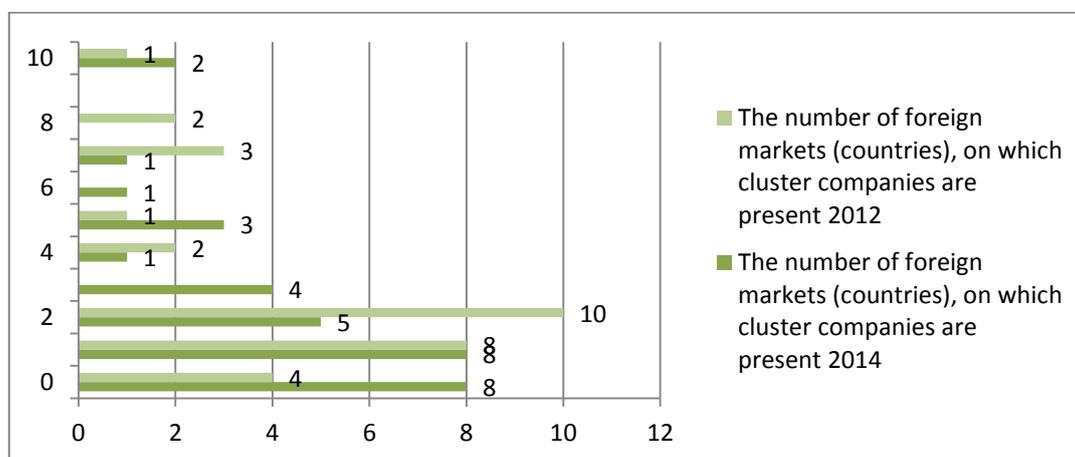
Source: Own study based on the results of a survey of 35 cluster coordinators.

Benchmark values according to the adopted methodology in respect to all the indicators determined by the results of the leader reach the maximum level of 10. In contrast, the mean results for each of the indicators are varied. The highest average level is obtained by clusters in the case of the *Share of exports in the structure of sales in the core of the cluster*, and it amounts to 3.46. With similar benchmark values it means at the same time that the studied group of clusters is the least diverse in this respect. Export is therefore a characteristic activity for a relatively large part of the clusters. Indicator, in case of which the average for the clusters is on the second level, in terms of its height is the *Number of foreign markets (countries), on which cluster companies are present* - average is 2.48. Larger deviations from the benchmark level than in the case of the share of exports proves that, in terms of the number of export markets, clusters are more diversified than in terms of the same value of exports. It suggests that some of the clusters support a relatively large number of foreign markets (many countries), while others are more concentrated on a limited number of markets. Even the observation itself leads to the indication that individual clusters can exchange experiences on knowledge of specific foreign markets, at least in the institutional sphere, which could contribute to increased expansion especially of the clusters present on a limited number of markets.

The average score for the indicator the *Number of international networks/projects (thematic, sectorial) of which the cluster is a member* at the level of 2.21, on the one hand shows limited activity in this area of "average clusters" and reveals a strong diversification of clusters. In this context, it can also be inferred that there is a need for the exchange of experiences between clusters with large and small experience. The average value for the fourth indicator of the *Number of formal cooperation agreements of a cluster with foreign entities* at the level of 0.46 can be explained on the one hand by a limited activity of most of the clusters, and on the other by a particularly active leader.

The data in Chart 102 refer to the evaluation of the number of foreign markets, on which cluster enterprises are present as for the research conducted in 2012 and 2014. It should be noted that there is a relative stability in terms of the presence of companies on foreign markets. The structure of evaluations has changed, but the size of the clusters with enterprises exporting their products abroad has not changed much.

**Chart 102. Assessment of the Number of foreign markets (countries), on which cluster companies are present – comparison of results obtained in 2012 and 2014**



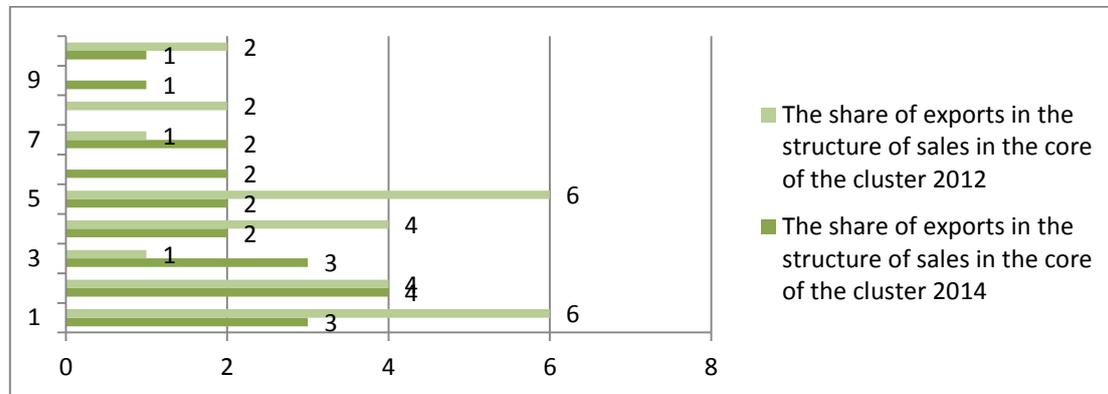
Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

In 2014 the value of the benchmark in the studied group of clusters represents 100 markets, on which the cluster companies sell their products and services. While the average for a single cluster was 27. The smallest number of foreign markets declared by the coordinator was equal to 3. Only in two cases the clusters declared zero export revenues, at the same indicating the lack of export activity. It can be concluded that almost all clusters involved in the study have an export potential. However, the number of markets supported by the studied clusters is highly varied. It should be noted that a very high number of markets indicated by the leader (100) contributed significantly on the understating of benchmarking evaluations in the present study. The potential of the markets supported by clusters is confirmed by the average number of markets supported by the cluster, which amounts to 27. The clusters that support a small number of foreign markets can undertake actions to help companies to explore new markets, as it is in the case of leading clusters. One of the instruments to support external expansion into new markets would be the exchange of information between the clusters, for example, organized as a "Club of exporting clusters".

According to Chart 103 the structure of evaluations provided for each cluster underwent some changes, but does not reveal significant changes of the share of export in the studied group of clusters. As is it can be inferred from the detailed data of the 2012 study, the average share of exports in the structure of sales in 2012 amounted to 28% for a single cluster, and the maximum value fluctuated around 90%. In 2014, the maximum value of exports in the

structure of exports was 90%. In contrast, the average was 35%, which indicates an increase in export activity of clusters over the last two years at the level of 7% of total sales.

**Chart 103. Assessment of the *Share of exports in the sales structure* - comparison of research results of 2012 and 2014**



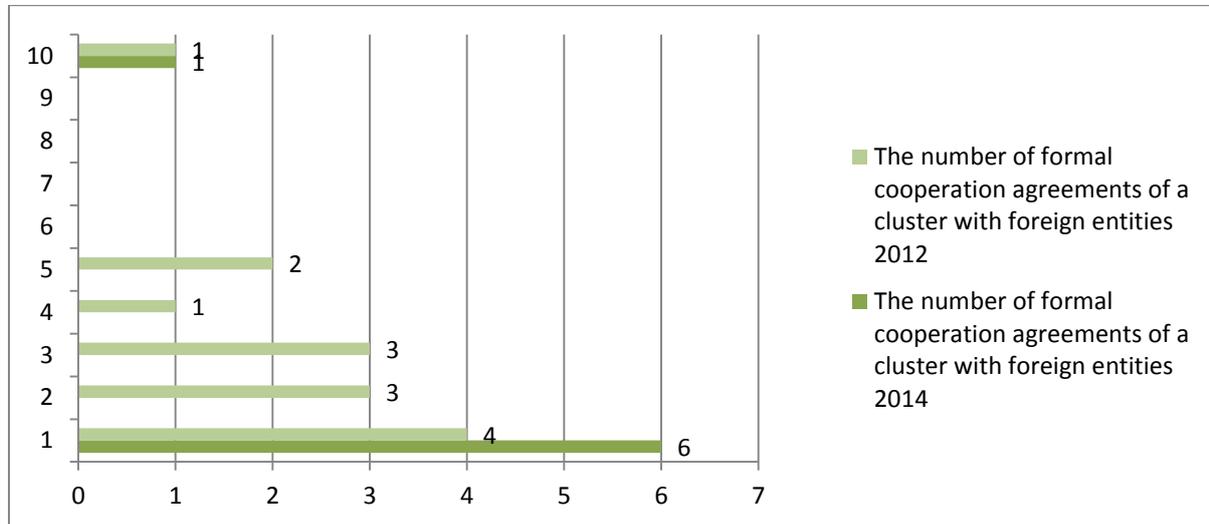
Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

The smallest declared share of exports in the structure of sales amounted to 2%. In two cases, clusters have declared the lack of export activity. In another 13 cases, there are no data obtained to verify the structure of the sale subject to the export. Data on the share of exports in total sales of the clusters, but most of all their dynamics, confirm the earlier conclusion drawn from the analysis of export markets on clusters having a significant export potential. Undoubtedly the situation of the leader exporting 90% of its sales serves as a good illustration. However, the responses of coordinators on a detailed value of exports in the sales structure of enterprises consist of numerous lack of answers probably resulting from the lack of knowledge on the subject. This shows that the issue of export was not in the centre of attention in these clusters. There is a lack of information flow not only between the participants, but also in relation to the coordinator. It can be assumed that joint efforts to increase the number of export markets and export growth in the sales structure in these clusters were not being implemented, or were implemented in a limited range. It seems that this type of actions, using the best practices of other clusters can bring significant benefits to the companies and to the institutional structure of the cluster providing a valuable pro-export services to its members. Support for internationalization should be one of the main directions of development of cluster structures in Poland, because this is the only way of providing the appropriate markets to rapidly growing businesses and clusters.

Chart 104 displays the level of the benchmarks set for clusters based on the data of the *Number of formal cooperation agreements of a cluster with foreign entities* including the comparison of research results from 2012 and 2014. Once again, caution in drawing categorical conclusions from presented benchmarks regarding the absolute level of the phenomenon in the whole group should be emphasized. It is necessary to take into account the strong influence on the benchmark defined by the leader, the level of which strongly determines assessments lower than the maximum. In a study of 2014 the result of a leader has demonstrated the signing of 67 agreements in total with clusters from all over the world, which dramatically reduced the level of evaluation of other clusters involved in the study. It is therefore necessary to refer to the source data. Clusters in 2012 had 67 concluded formal agreements, which constituted an average of close to 2 for the cluster (1.91). However, in the current edition of benchmarking, clusters declared a total of 172 formal cooperation agreements of the cluster with foreign entities, which gave an average of nearly 5 agreements

(4.91) per a single cluster. In eleven cases, clusters did not have a single contract with a foreign entity.

**Chart 104. Assessment of the Number of formal cooperation agreements of a cluster with foreign entities - the comparison of research results of 2012 and 2014**



Source: Own study based on the results of a survey of cluster coordinators in 2012 and 2014.

Considering the number of cooperation agreements of cluster with foreign entities, it should be noted that there is a significant increase in the number of agreements, and thus a positive sign of the internationalization of the clusters. Internationalization of clusters, although important, must be treated as an intermediate target to increase the involvement of foreign companies belonging to clusters. Such a practice is implemented by the INTERIZON cluster, which concluded the largest number of contracts with clusters from all around the world.

### Good practice 18. Active business cooperation with foreign clusters



#### INTERIZON Cluster

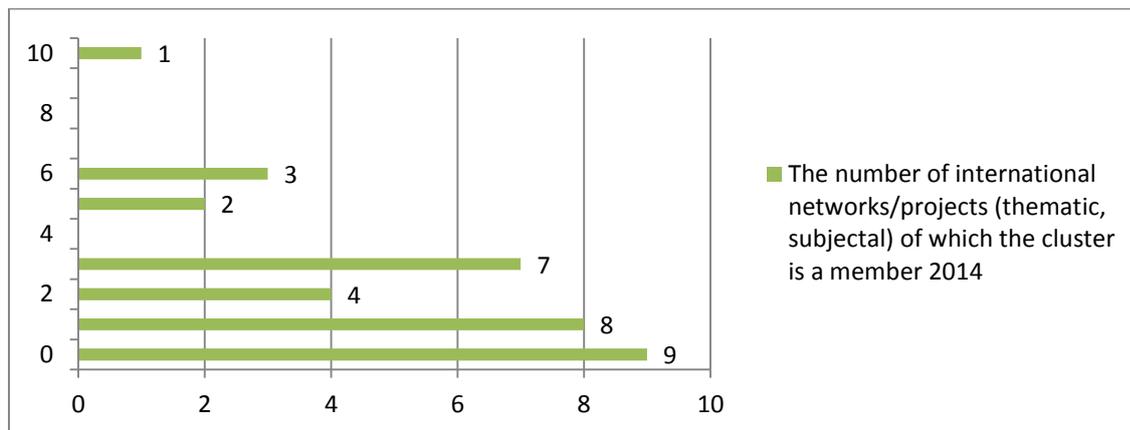
##### Objective: Active business cooperation with foreign clusters

The cluster has signed an agreement linking the 67 clusters from all over the world, under which members of the cluster being in another country can make free use of the resources available there to facilitate business operations (e.g. rent an office, obtain market information, establish contacts with potential partners of the foreign markets).

**Result: Increasing internationalization of the cluster and facilitating cluster members to conduct business activities abroad. Development of cooperation with foreign partners - clusters and cluster enterprises.**

Another indicator characterizing subarea of *Cluster internationalization*: the *Number of international networks/projects (thematic, sectorial), of which the cluster is a member* was first used in the current edition of the benchmark, which is why Chart 105 contains only the assessments obtained by clusters in 2014 and it is not possible to analyse the dynamics of changes in this area. As it can be inferred from the detailed data, researched clusters are involved in 68 networks/international projects in total. The average for the studied clusters is close to 2. The highest number of participation in international networks/projects was 8. In 9 of 35 cases, clusters did not implement any international project, nor are they in any network of international scope.

**Chart 105. Evaluation of the *Number of International networks/thematic projects* - comparison of the research results of 2014**



Source: Own study based on the results of a survey of 35 cluster coordinators in 2014.

These preliminary data of clusters on participation in international networks and thematic projects indicate that the process of internationalization of clusters has started, which undoubtedly should be assessed positively. However, the overall level of internationalization of clusters as structures is still relatively low. At the same time, in the light of the detailed data, the conclusion on a significant diversification of clusters in the analysed area should be repeated. Nearly one-third of the clusters do not have any agreements on participation in international cooperation networks. Clusters should be supported in the process of internationalization, but at the same time it is important to keep in mind that here the ultimate goal is not the internationalization of clusters but, as stated above, the internationalization of enterprises. Internationalization of clusters can also serve perfectly to the activities associated with an increase of innovativeness of enterprises, particularly in the case of participation in international research consortia.

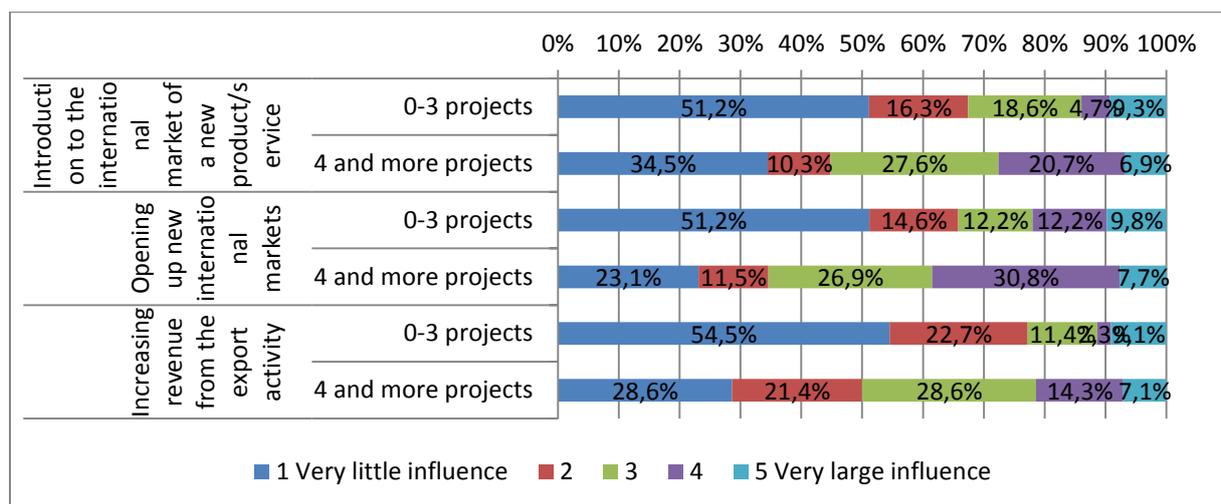
From the above observation the conclusion can be drawn that the clusters should strive for greater internationalization in order to better support the innovativeness and competitiveness. Internationalization of clusters should be supported as in the case of promotion of export activities, what is especially recommend is the exchange of experiences between the clusters and the use of good practices.

Above reported information obtained from cluster coordinators regarding the processes of internationalization of clusters and companies belonging to the clusters did not always turn out to be complete. In this situation, when assessing the internationalization, information collected from the companies during CAWI / CATI surveys are particularly important. First of all, it was attempted to assess the extent to which the active membership in the cluster affects succeeding in foreign markets for those companies that treat foreign market as one of the main markets (quest. no. 42). There were 119 such businesses in the researched group.

These companies were asked to answer three questions about the last 24 months: whether the company has introduced new products/services to the international market; won a new international market, or whether it increased revenues from export business. At the same time, positive responses to these questions were analysed in cross-section of enterprises more active and less active in clusters. What was adopted as a measure of activity, similarly to what was already used in the report, is the number of projects implemented in the cluster by a company.

Chart 106 contains the responses of enterprises divided into companies implementing 0 - 3 projects (less active) and 4 and more projects (active). Companies implementing more projects in clusters function much better on the international markets. 72.5% of active enterprises declared the introduction of more products on the international markets, and only 57% of companies that are less active in the activities of the clusters. In similar proportions, both groups of enterprises gained new international markets. Companies implementing fewer cluster projects experienced relatively smaller loss in successes on the international markets in relation to the companies that were more active in clusters in case of an increase in revenues from export activities that was declared by 59.0% of less active companies and 70.0% of active companies. These data raise the conclusion that there is a correlation in the case of companies operating in foreign markets and their success in these markets and the activity in clusters. Increased number of projects supported greater expansiveness of companies in the past two years. Perhaps, it is the nature of the projects, in which the companies participated directly helped them to open up new markets, introduce new products on international markets, and increase their revenues from the export business. It is also possible that the companies most expansive in the international markets are interested in active participation in clusters, including participation in cluster projects. Without making a determination of this dilemma, it can be inferred, just as in the case of innovative activity, that clusters create the right environment to stimulate success on foreign markets focusing companies that export actively, and supporting them by facilitating implementation of cluster projects.

**Chart 106. Successes of companies on international markets, for which the international market is the main market and the number of projects realized in the cluster**



Source: Own study based on CAWI / CATI surveys on 35 cluster members; N = 119; N<sub>0-3 projects</sub> = 79; N<sub>4 and more projects</sub> = 40.

The dilemma of whether clusters already strongly support successful companies operating on the foreign markets can largely be resolved in the light of the analysis of responses of the enterprises themselves to the question of the extent to which participation in the cluster contributed to the introduction of new products/services to the international markets, opening

up new international markets and the increase of revenue from exports. This question has been asked only to those companies that have declared that in their case mentioned successes on foreign markets actually occurred. The vast majority of companies assessed the impact of the cluster in which they operate on their international activity to be on a minimum level. In total 70.9% of the 144 companies that reported an increase in revenues from exports indicated that the impact of the cluster was very small, and only 13.2% evaluated the effect of the cluster as a factor that increased export revenues significantly.

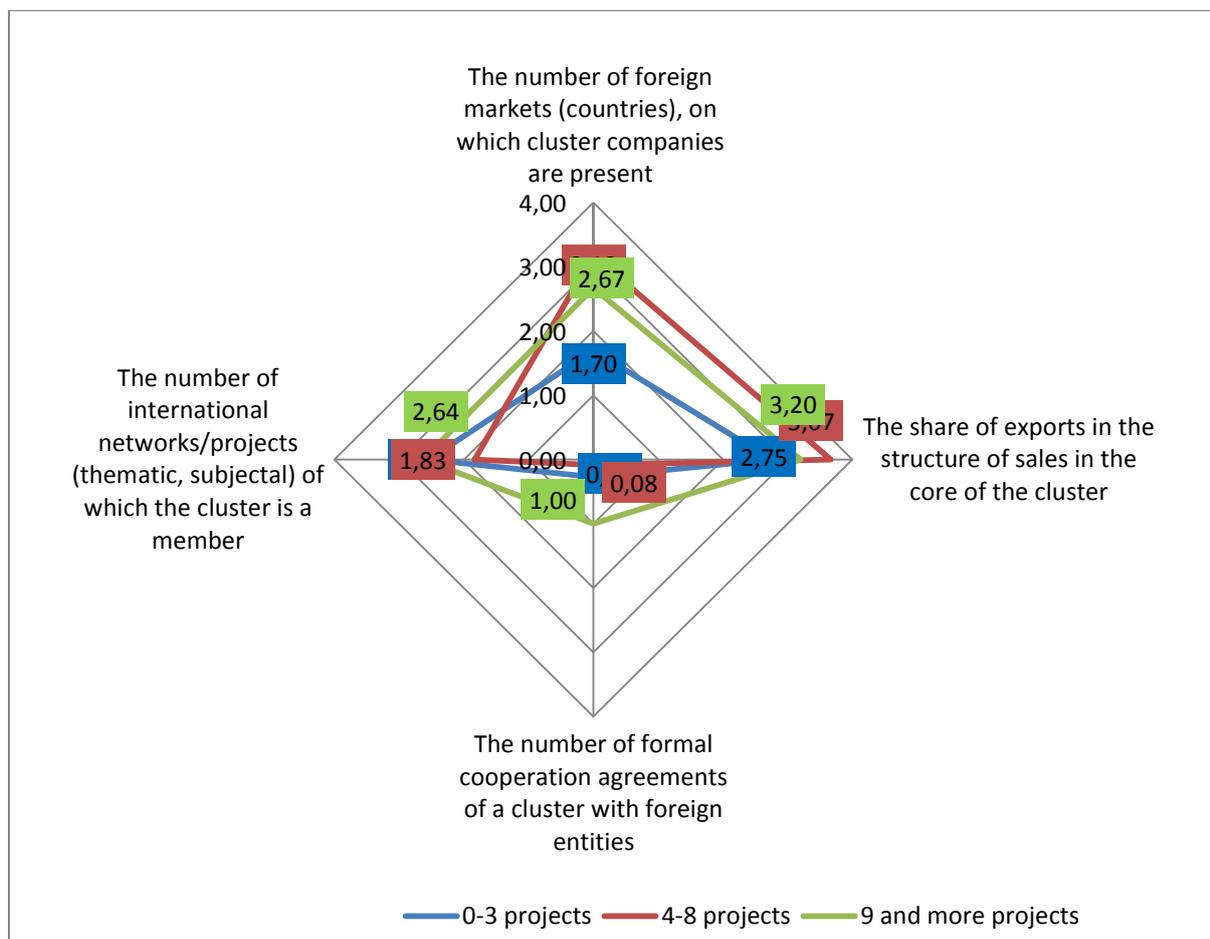
The clusters had large and very large impact on launching of new products on international markets in the opinion of 13.9% of 151 companies, while as many as 68.8% of the other companies indicated a negligible effect of the cluster on the implementation of product on a new international market.

Clusters had relatively the largest positive impact on gaining new international markets for their members. The percentage of companies that believe that the clusters to large and very large extent helped in the implementation of international expansion was 23.4%. Quite the opposite was indicated by 63% of respondents.

It can be noted that some effect of clusters on successes of the companies on foreign markets already exists. The scale of the impact is still relatively limited. The clusters had the largest impact on opening up new markets, where every fourth company that has gained such new markets admits that the impact of cluster was significant. However, considering the fact that the clusters are focusing companies with significant export potential and, furthermore, this type of companies are actively engaged in cluster projects, there is still a large potential of positive impact of clusters on the internationalization of companies, which has not yet been fully exploited. It can be concluded that the projects previously performed by clusters not sufficiently support exports and other forms of internationalization of enterprises.

Insufficient orientation of projects in clusters on the processes of internationalization is confirmed by the analysis of benchmarks of subarea of *Cluster internationalization* in the frame of the number of realized projects. It indicates that in the process of internationalization both clusters that are the most active in terms of number of projects (9 or more projects) and clusters of average activity in this respect (4-8 projects) function similarly in a rather moderate degree (Chart 107 ). Both groups of clusters excel in two different indicators of *Cluster internationalization* subarea. The most active clusters present themselves best against two other groups of clusters in the *Number of formal cooperation agreements of cluster with foreign entities* and the *Number of international networks/projects (thematic, sectorial), of which the cluster is a member*. In the first case, the most active clusters have reached an average level of 1.00, with the average for the least active clusters (0-3 projects) of 0.27 and with moderately active clusters at the level of 0.08. In the case of an indicator regarding international projects and participation in international networks average for the most active clusters was 2.64, while the average for the least active clusters amounted to 2.55 and for active clusters to 1.83.

**Chart 107. The average values obtained by clusters within the subarea of *Cluster internationalization* depending on the number of projects**



Source: Own study based on the results of a survey of 35 cluster coordinators.

In turn, moderately active clusters achieved the best results for the *Share of exports in the structure of sales in the core of the cluster* indicator. The average for moderately active cluster was 3.67, while the most active clusters obtained 3.20 and clusters the least active in the implementation of projects reached 2.75. In addition, clusters of moderate activity are leaders in the group of clusters in terms of the *Number of foreign markets where the cluster companies are present*.

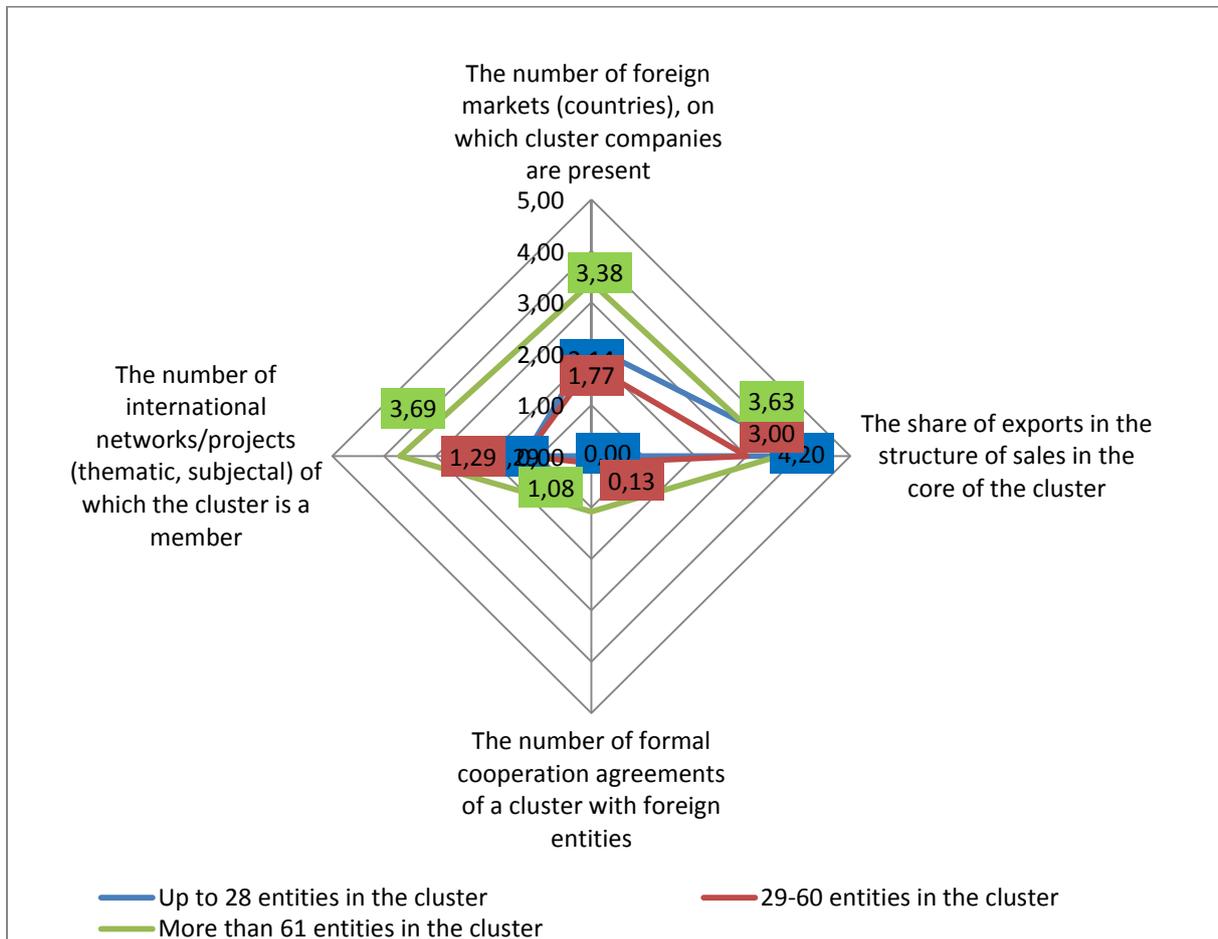
The above analysis shows that there is a strong relation between the number of projects implemented by the cluster and the level of internationalization of the cluster and its member companies. It should be concluded that the projects implemented so far by the clusters were insufficiently focused on the processes of internationalization. Furthermore, considering that the clusters concentrate companies with significant export potential and also that these especially actively companies engaged in cluster activities in the form of projects, should be encouraged by clusters to significantly reorient joint ventures/projects in the direction of internationalization. Such projects should be supported also by public funds.

In the frame of clusters' age in the subarea of *Cluster internationalization*, in all indicators there occurs an undisturbed positive relationship, where larger experience of clusters reflects in better performance of clusters in individual indicators of internationalization.

Chart 108 presents the average values obtained by clusters within the subarea of *Cluster internationalization* depending on the number of subjects. Large clusters work on the biggest

number of markets as compared to the other two groups of clusters, they are also involved in the largest number of international networks and projects.

**Chart 108. The average values obtained by clusters within the subarea of *Cluster internationalization* depending on the number of subjects**



Source: Own study based on the results of a survey of 35 cluster coordinators.

In both cases, the average values fluctuate around 3.5. In particular, the largest stratification occurs in the number of international networks and projects regarding the size of the clusters. The largest clusters also excel in terms of the number of formal agreements with foreign entities. Although, in this rate the largest clusters present very weak results similarly to medium and small clusters.

At the same time, in the indicator of the *Share of exports in the structure of sales in the core of the cluster* the medium clusters indicate that the smallest clusters cope best with sales on foreign markets. Average value for the smallest clusters was 4.20 and 3.63 for large clusters and for medium-sized clusters - 3.00. Medium clusters also work well when it comes to the number of foreign markets.

While it is understandable that the dominance of large clusters in terms of indicators such as the number of foreign markets, on which the companies are present, the number of international networks/projects or the number of cooperation agreements, it is surprising that they have a weaker position in the dimension of the share of exports in the sales structure. The explanation for this situation is probably not the negative impact of large clusters on export sales of the companies, but rather a phenomenon of combining strong exporters in small

clusters. Here, it is possible to see the discussed problem of insufficiently export-oriented approach of many clusters, according to data, including also some of the large clusters. It should be inferred, particularly in case of large clusters that not only programs to support internationalization should be strengthened, but also as efforts to attract exporters to the cluster to inspire and share their experiences with the current members should be increased.

### **7.5. Summary of the *Cluster performance area in 2014***

The research results of the cluster coordinators' opinions indicate that the increase of employment by over 7% in the entities that were part of the investigated clusters should be considered one of the key results and an indication of their development as well as a justification for support.

There has been a decrease of benchmarks that represent training activity. This may be partly attributed to the inflated result of the leader, but it probably also reflects a real decrease in training activity. Based on the source data that provides the number of trainings organised by the clusters in the last two years at the level of 590, it can be concluded that, although this activity is significant, its size greatly differs from the actual objective needs of the cluster members.

In the last two years, there has been an estimated 41% increase in the members of studied clusters. This appears to confirm that the clusters are still at their growth stage.

In the last two years, 123 start-up and spin-off companies have been created in the clusters participating in the study. Those clusters are already a significant and particularly promising source of new start-up and spin-off companies.

It should be noted that there is a diversification of the clusters into those that are able to obtain funding for research (including those from European sources) and those that do not attempt these types of projects. It turns out that the most positive changes for all the clusters under investigation occurred in the sub-area of *Improvement of cluster innovation*.

Unfortunately, within this sub-area, the poor result is apparent both for 2012 and 2014, in the clusters' benchmarking for the implementation of innovative solutions that are legally protected. The data regarding the absolute number of legally protected innovations that have been implemented by the clusters supports the conclusion that the clusters are strongly stratified in this respect. In regards to the implementation of unique/breakthrough innovations, there are three groups of clusters: two/three leaders with a great or significant innovation potential; a group of 10 clusters that introduce legally protected innovations in a low degree; and, the remaining group of 22 clusters that are uninvolved in the innovation protected legally.

There has been a slight improvement within the area of *Allocation of R&D cost in the expenses for the innovative activity in the core of the clusters in the Last 2 Years*. It creates a foundation for the future growth of unique innovations.

The enterprises belonging to clusters show higher innovativeness than the general population of enterprises. This confirms that the natural feature of clusters is pro-innovative environment. The influence of clusters is tangible, but the scale of this influence is still insufficient.

The level of the activity of R&D in the enterprises belonging to clusters is relatively high. The influence of the clusters themselves on the activity of R&D was significant for 30.6% of such companies. It confirms that the clusters are the proper environment not only for innovative endeavours but also for its part related to research and development.

Unfortunately, the projects that have been carried out so far have not been directed towards the improvement of the innovativeness of clusters, which was discussed in the *Clusters Processes*.

Although practically all the clusters participating in this study have some export potential, the number of markets and the export sale shares are diffused in those clusters. The clusters declared altogether having 172 formal contracts about co-operation with foreign entities. Eleven clusters had no contracts at all with foreign entities.

The clusters create a suitable environment to stimulate success on the foreign markets by both bringing together the enterprises that are active in export and supporting them by facilitating the clusters projects. However, the projects carried out by the clusters supported the export and other forms of internationalisation in an insufficient degree.

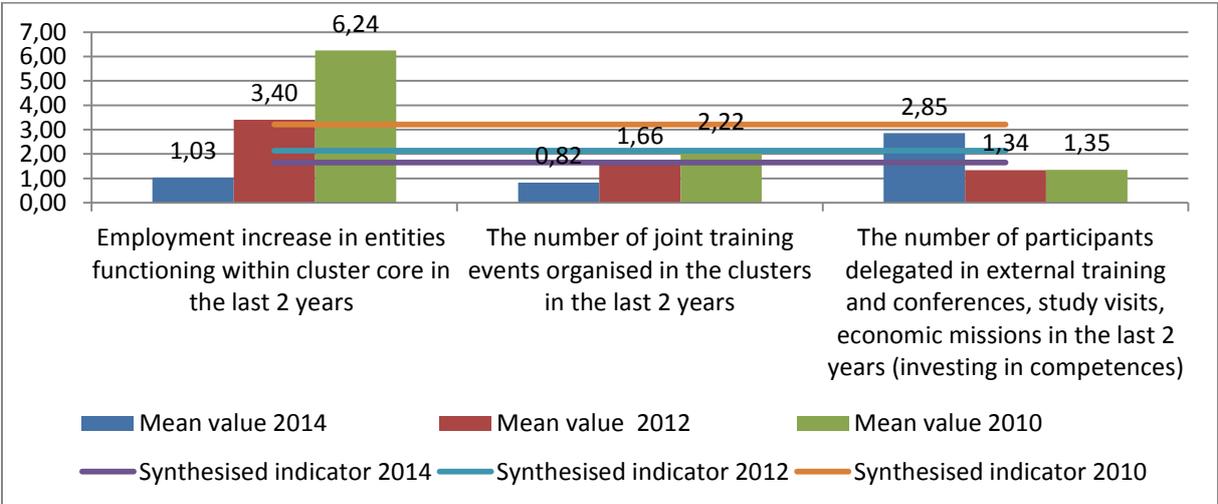
It needs to be emphasised that the level of results and probably the management in the clusters have become increasingly divergent, and the process of mutual learning and sharing experience among clusters is insufficient.

**7.6. Changing trends in the Cluster performance area in 2010-2014**

The evaluation of investigated clusters can be conducted from the point of view of observed changes in the successive benchmarking editions. The data contained in Chart 109 indicate negative trends for two indicators of the Human Resources Development area, and a positive trend in relation to the third indicator.

The synthesised indicator for the year 2014 was 1.65, for the year 2012 – 2.13, and for the year 2010 – 3.21. Thus, the drop in the synthesised indicator suggests a systematic decrease of results achieved by the clusters during the investigated period. However, this should be treated with caution, since, as stated above, when analysing the indicators for the whole area of *Cluster performance*, the mean benchmarking level is greatly affected by the leader results. Earlier, detailed analyses have indicated that the worsening of the mean indicators in the present research was really not so much of the absolute decrease of clusters results but more from the increasing diversification of the results particularly in relation to the leader. Thus to a large extent, the fall in the partial indicators should be interpreted as evidence of the diversification of the clusters, where a few achieved particularly high results, while the results of others remain at a moderate level, and in consequence, the benchmarking indicators diminished. During the period under investigation, there was a continuing decline in the mean value for the indicator called *The Increase of Employment in Entities Functioning within the Core of Clusters* as follows: from 6.24 in 2010, to 3.40 in 2012, to 1.03 in 2014.

**Chart 109. The comparison of the Clusters results in the Human resources development sub-area in 2010, 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2010, 2012 and 2014.

A similar tendency can be observed in the mean values for the indicator *Number of joint trainings in the cluster in the last 2 years*. However, the decreases occur here with a lesser intensity than for the previous indicator. The mean for 2014 was at 0.82, for 2012 at 1.66, and for 2010 at 2.22.

The *Human resources development* sub-area shows an increase only for the indicator of *Number of company sponsored participants of external conferences and training, study visits, economic missions, in the last 2 years (Investing in competences)*. The mean for this indicator was at 1.35 in 2010, with a minimal drop to 1.34 in 2012, which ultimately increased to 2.85 in 2014.

The sub-area of *Increasing the competitive advantage of cluster*, similarly to the *Development of human resources*, showed the value of the synthesised indicator for all the indicators of this sub-area the lowest in 2014 for the period 2010-2014. The synthesised indicator in 2010 was 1.94, and having increased in 2012 to the level of 2.10, and it ultimately decreased in 2014 to 1.65. This suggests the possibility of a worsening of the clusters' results, but, as indicated above, it more likely is a result of diversification of the clusters in 2014, in the sub areas related to the competitiveness of the clusters in relation to the results in 2010 as well as 2012.

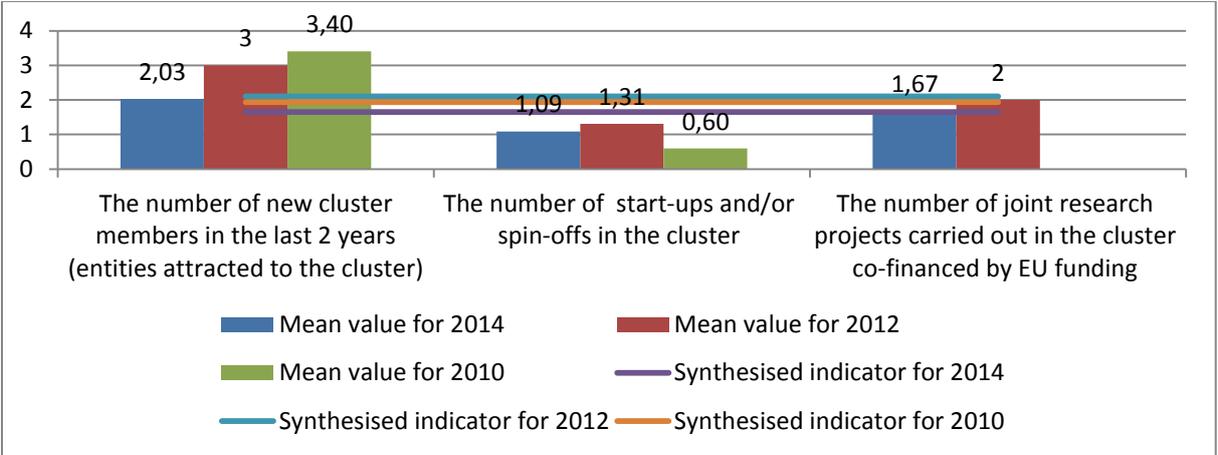
The drop in the synthesised indicator is the consequence of the decreases of mean values of all three indicators sub-area of the *Increasing the competitive advantage of cluster*, as illustrated in Chart 110.

The most pronounced decrease can be observed in the indicator of *Number of new cluster members in the last 2 years*. The mean value throughout the four years under investigation dropped from 3.40 in the year 2010, to 3.00 in the year 2012, and to the level of 2.03 in 2014.

Even though the mean value for the *Number of Start-ups and/or Spin-offs in the Cluster* increased in 2012 to the level of 1.31 in relation to the year 2010 (mean 0.60), the mean for start-ups and spin-offs in 2014 dropped to 1.09 for the group included in the study.

The third indicator - *Number of research projects in the cluster in the last 2 years co-financed by the EU* (in the sub-area: the *Increasing the competitive advantage cluster*) - was analysed only in the last two benchmarking editions. It should be noted that the mean for this indicator dropped from the value of 2.0 in 2012 to the value of 1.67 in 2014.

**Chart 110. A comparison of the cluster results in the sub-area: the *Increasing the competitive advantage of cluster* in 2010, 2012 and 2014**



Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

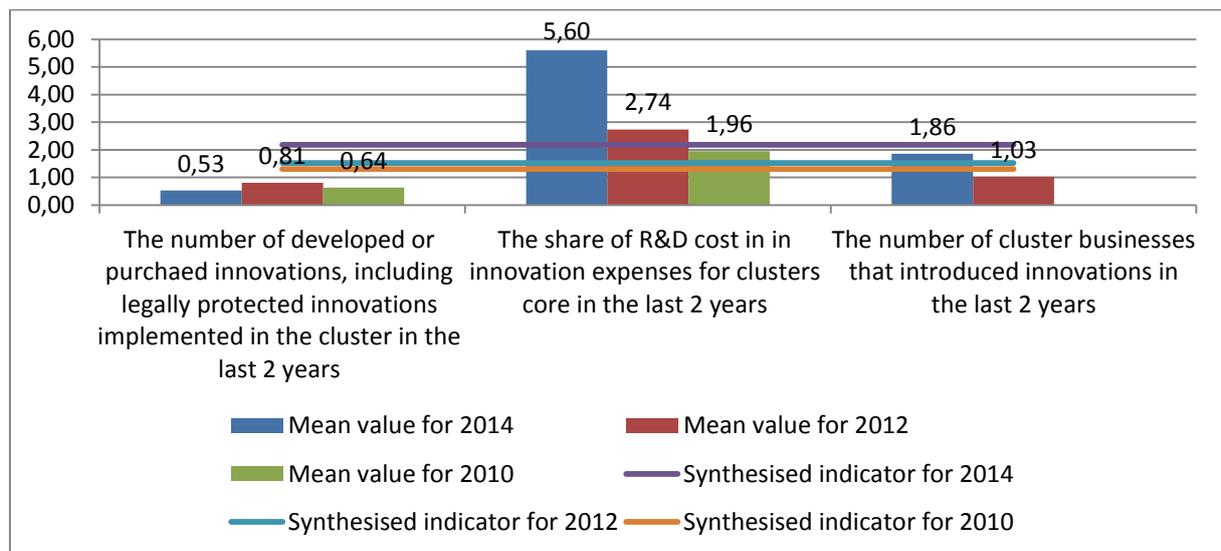
In contrast to the previous two sub-areas, in the sub-area called the *Improvement of the cluster innovation*, the value of the synthesised cluster indicator increased during the 2010-2014 period. The synthesised indicator in 2010 was 1.3 and increased in the following two years to 1.52. The final synthesised indicator for the sub-area called the *Improvement of the cluster innovation* in 2014 was 2.18 (Chart 111).

Doubtless, the growth of the synthesised indicator was influenced by the continual expansion (since 2010) of the share of R&D costs in the innovativeness expenses. The mean for the *Share of the R&D cost in innovativeness expenses in the core of the cluster during the last 2 years* indicator increased steadily from the level of 1.96 in the year 2010, to 2.74 in the year 2012, and to 5.60 in the year 2014.

Positive changes were also observed for the *Number of enterprises in the cluster that implemented innovations in the last 2 years* indicator. Only in the last two editions, the mean value for the analysed indicator increased in 2014 to 1.86 from 1.03 in the year 2012.

However, for the third indicator describing the *Improvement of the cluster innovation* sub-area, a decrease was observed in the mean values for the clusters analysed during the period of 2010-2014. The mean for the number of *Purchased or developed innovations (including legally protected innovations) in the last 2 years* dropped in 2014 from the level of 0.81 to the level of 0.53. It should be added here that the mean value for this indicator in 2010 was higher than in 2014, and was at 0.64.

**Chart 111. The comparison of cluster results in the *Improvement of the cluster innovation* in 2010, 2012 and 2014**



Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

The *Cluster internationalisation* is another sub-area of the *Cluster performance* area that underwent a decrease in the synthesised indicator. The value of the synthesised indicator in the different benchmarking editions was respectively: 2010 – 1.96; 2012 – 2.56, and 2014 – 1.92.

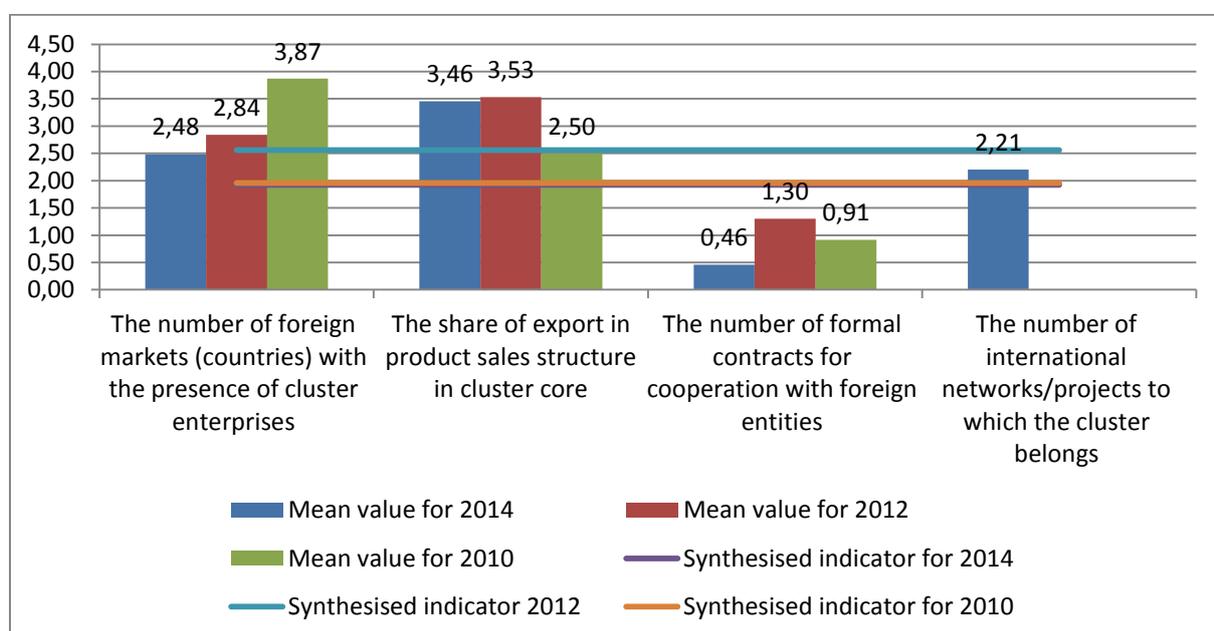
The drop in the synthesised indicator was greatly influenced by the negative trends in benchmarking in relation to foreign markets where the cluster’s entities are active. The mean value for this indicator has seen a continuous decline since 2010, dropping from 3.87 that year to 2.84 in 2012 and further to 2.48 in 2014.

The other determining factor in the decrease of the synthesised indicator for the *Cluster internationalisation* is the mean value for the *Number of formal contracts for the co-operation of the cluster with foreign entities* indicator. After the initial increase from 0.91 to 1.30 in the year 2012, the mean for the analysed group decreased 0.46 in the year 2014.

On the other hand, the mean for the *Share of export in the structure of product sale in the core of the cluster* indicator during the 2010-2014 period stabilized at the level of about 3.46 after and earlier increase from 2.50 in the year 2010, to the level of 3.53 in 2012.

The fourth indicator for the *Cluster internationalisation* sub-area, namely, the *Number of international networks/projects (thematic/industry specific) to which the cluster belongs* was analysed for the first time in this research, thus there is no possibility to show trends. It is worth mentioning that that the mean for this indicator reached a slightly higher level from the value of the synthesised indicator for the entire sub-area of *Cluster internationalisation*.

**Chart 112. Comparison of cluster results in the *Cluster internationalisation* sub-area in 2010, 2012 and 2014**



Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

As has been pointed out in the beginning of this section related to the trends in the area *Cluster performance* in 2010-2014, merely comparing the mean benchmarking values may show an absolute change in the condition of a given area. In many cases, the decrease in the mean values of benchmarks points to the stratification of the group of clusters. Often the leader's results go so far beyond the results of the rest of the clusters and, in accordance with the adopted methodology, they lower the values of their benchmarks. This explanation, however, cannot entirely eliminate the concern about the rate of development of the whole group of the investigated group of clusters.

The differentiation in the rate of development among the clusters is clearly evident. There are clusters that achieved significant improvement of their results even when the access to external financing was limited. There are also clusters that stabilized or limited their activity even more. It should be strongly emphasised that the level of results, and probably also of management, has undergone a process of differentiation, and the process of mutual learning and experience sharing is not taking place at a satisfactory degree. There is a need to ensure

better flow of information among the clusters that have dissimilar results, so that the clusters that merely stabilized their achievements in absolute terms could more easily make up the increasing distance to the best clusters. Perhaps a good solution would be suggesting a program for the exchange of know-how with the management of the clusters that have the best results.

## 8. Cluster growth potential

Researching the potential of a cluster included 4 sub-areas evaluated in each cluster as follows:

- 1) **Regional conditions** - potential, natural resources, local economic traditions, availability and mobility of highly qualified employees; the region's ability to attract investment (attractive investment opportunities, municipal infrastructure, openness of the local/regional community to co-operation (entrepreneurs, enterprise related institutions, etc.);
- 2) **Public authorities' policy supporting cluster development** –cluster promotion by the authorities, financial support by the of the cluster's development; aiding in training and education and modifications in the education system for the needs of the cluster;
- 3) **Associated institutions** - adapting information, consulting and training services to the cluster's needs; availability of funds supporting the development of the cluster (e.g. loan and guarantee funds, *venture capital*, *seed capital*, etc.); openness to co-operation and the quality of the R&D sector in the region;
- 4) **Cluster management** –leadership in the cluster (strength and position) of the coordinator's; coordinator's involvement in the animation of cooperation in the cluster; the cluster's involvement with the *external* environment.

In the population of investigated clusters, the best sub-area among the four in the area of *Growth potential* in the year 2014 appears to be the sub-area of *Cluster management*. The benchmarking of this area reached the maximum value equal to 10, and the mean value for all the clusters was 8.19.

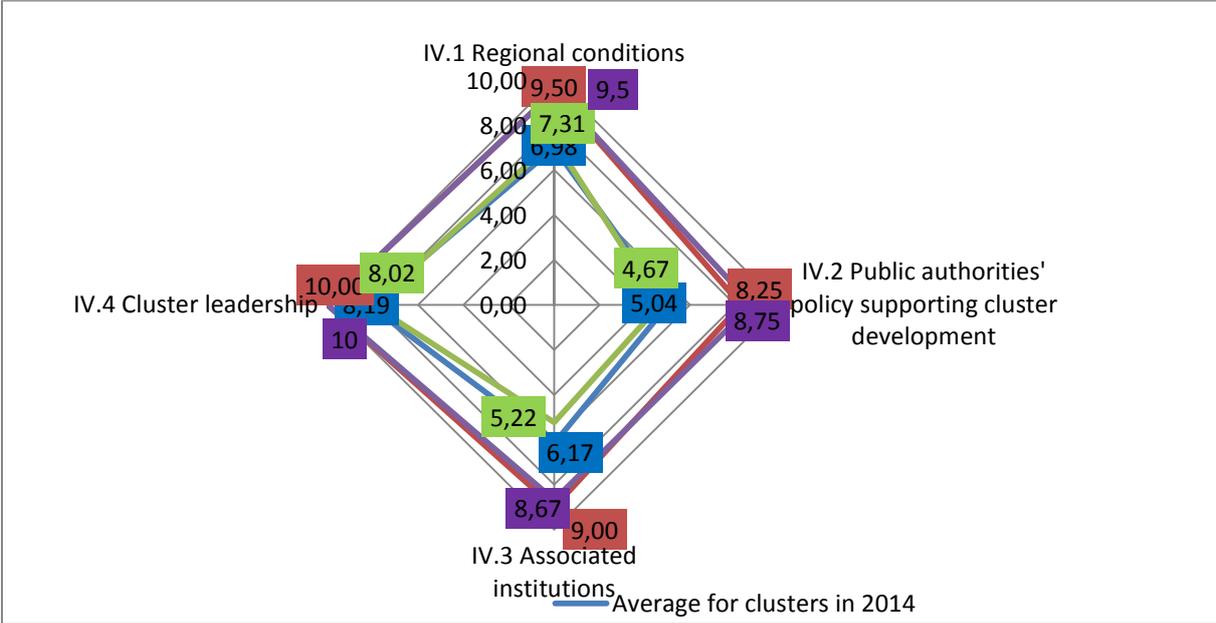
Based on the results, the sub-area *Regional conditions* constitutes the second largest potential for growth of the clusters under investigation. For this sub-area, the mean for all clusters was almost 7.0, while the benchmark had the value equal to 9.50.

The situation appears similar for the *Associated institutions*. The rating of the institutional milieu provided by the coordinators show that the mean overall value is 6.17, with the benchmark value at 9.00.

In the area of *Growth Potential*, the least favourable outcome appears in the *Public authorities' policy for the development of the cluster*. For this sub-area, both the benchmark and the mean value were situated at the lowest levels. Benchmarking was at 8.25 while the mean value was at 5.04.

The greatest stratification of the researched clusters (at the level 3.21) was observed in the sub-area *Public authorities policy supporting cluster development*, while the smallest difference between the benchmark and the mean was found in the sub-area of *Cluster lead Cluster management* at 1.81. This shows that the regional authorities vary greatly in their attitudes toward the clusters based in their regions. It appears that, in some regions, there is insufficient understanding of the role the clusters can play in promoting the regional development. In this situation, an encouragement is justified for the regional authorities to exchange their experiences in supporting the development of the cluster structures as an important element of the regional development policy. The lack of understanding among the public managers of how to use the clusters as an effective way to support regional development can be counteracted by direct contact with the authorities at home and abroad that use the clusters to promote the economic development and have achieved successes in this respect.

**Chart 113. Mean values and benchmark values for the area of *Cluster growth potential***



Source: Developed based on the results of research among the coordinators of 35 clusters.

The mean results of the *Cluster growth potential* allow one to conclude that the situation of the clusters in the last two years has not undergone any significant changes. In the last two years, the benchmark mean changed slightly to the disadvantage of the clusters in 2014. The decreases of the benchmark mean in the *Cluster growth potential* area was only 0.44% from 9.23 in 2012 to 9.19 in 2014. The overall mean calculated from all means of sub-areas in 2014 in relation to 2012 increased 4.6% from 6.30 to 6.59.

**Table 6. The mean value for the benchmark, and mean of the mean values of all sub-areas for the *Growth Potential*.**

The mean <u>benchmark value</u> of all <i>Growth Potential</i> area for 2014	The mean <u>benchmark value</u> of all <i>Growth Potential</i> area for 2012
9.19	9.23
The mean of <u>mean values</u> of all <i>Growth Potential</i> area for 2014	The mean of <u>mean values</u> of all <i>Growth Potential</i> area for 2014
6.59	6.30

Source: Developed based on research results in 2012 and 2014.

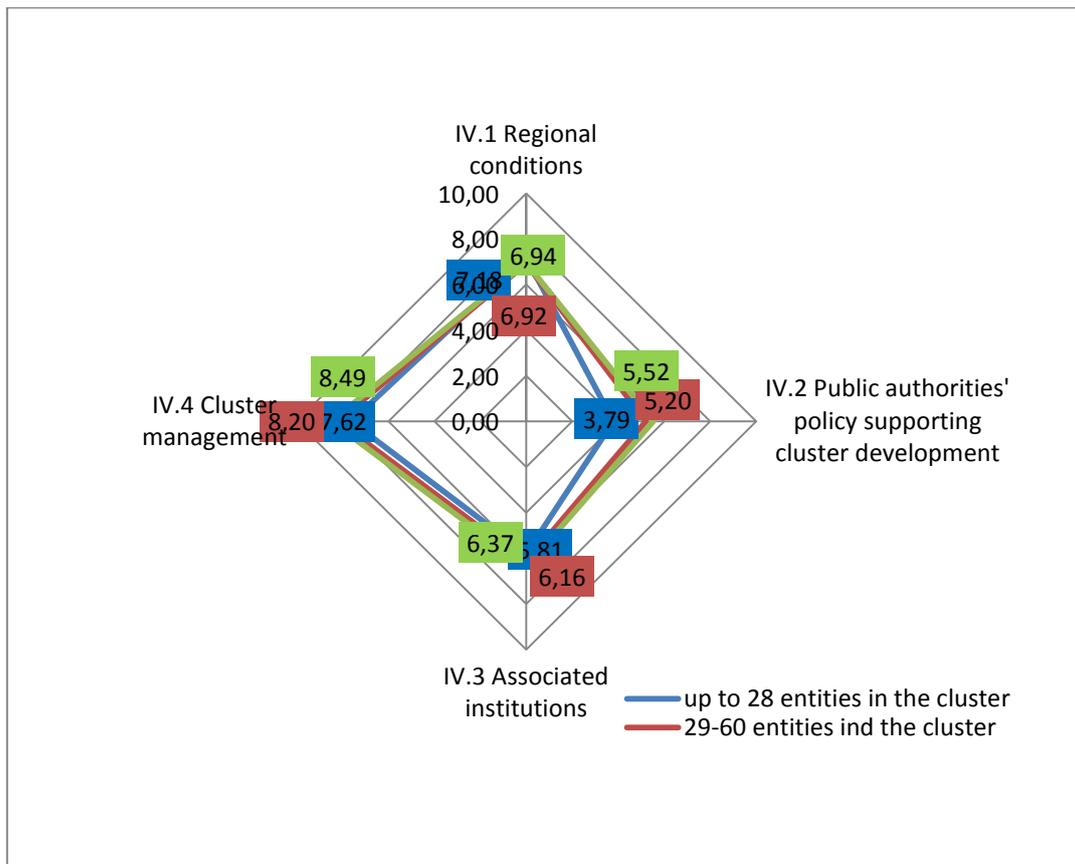
From the comparison of benchmarking results in the current edition with those in the 2012 edition as illustrated in Chart 113, a conclusion can be drawn that the evaluation of the clusters' growth potential presented by their coordinators is slightly more optimistic than 2 years earlier.

The largest increment of positive evaluations during 2012–2014 among the coordinators can be observed in the sub-area *Associated institutions*. Although the benchmark for this sub-area increased only by 3.8% (from 8.67 to 9.0), the mean increased by 18.19% - from 5.22 in 2012 to 6.17 in 2014.

In the sub-area of *Public authorities' policy supporting cluster development* there is also a significant increase in the positive evaluations regarding the growth potential of the clusters. The benchmark value increased to 8.75 in this edition from 8.25, creating an increment of 6.06. The average clusters increased their positive rating of the authorities' policy that supports the development of clusters by 7.92%. The mean value in 2012 was 4.67, to increase in 2014 to 5.04.

For the sub-areas of the *Regional conditions* and *Cluster management* the benchmark value did not change, and the changes in the means were barely perceptible. For the *Regional Condition* sub-area the mean increased by 4.72% and for *Cluster management* by 2.12%.

**Chart 114. Mean values for the *Growth potential* area in relation to the size of the cluster.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

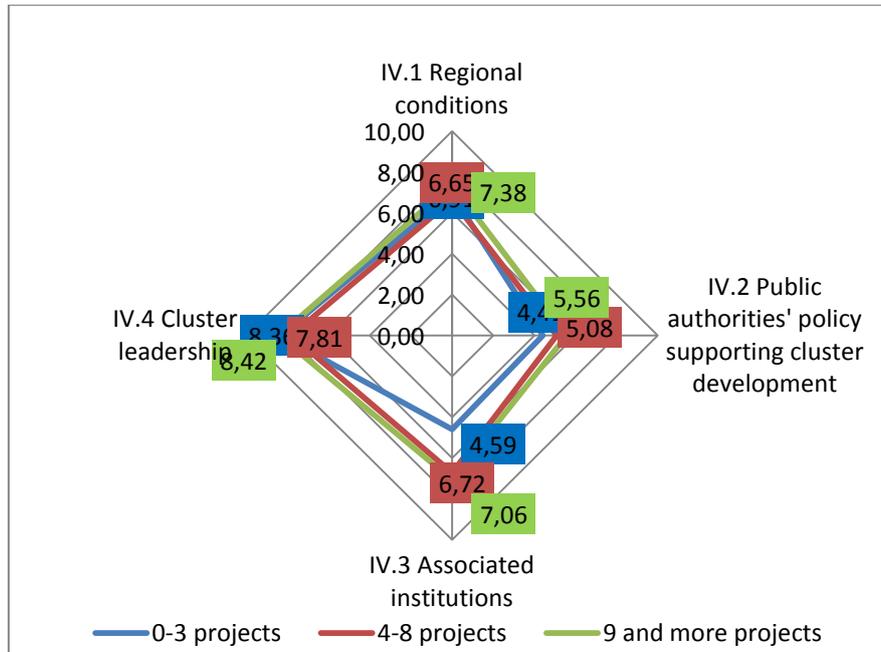
The largest clusters evaluated most positively the following sub-areas in relation to the *Cluster growth potential* were *Cluster management*, *Associated institution*, and *Public authorities' policy supporting cluster development*. However, the differences among the groups of clusters are relatively small.

The smallest clusters evaluated the *Regional conditions* most positively as the appropriate potential for growth of the cluster they represent. It may stem from a better adaptation of the small clusters to the specific features of the regions they are rooted in, and that would include their assets.

The cross-section of the number of projects carried out the value of the means is positively correlated with the number of the projects particularly for the most active clusters. In each of the sub-areas, the mean for the most active clusters was the highest. The highest values for the

most active clusters were obtained in the sub-area of *Cluster Management* at 8.42, and the lowest for the mean in the sub-area of *Public authorities' policy supporting cluster development* 5.56. The active clusters (4–8 projects) for *Public authorities' policy supporting cluster development* and *Associated institutions* obtained means lower than the most active clusters, and higher means than the least active clusters.

**Chart 115. Mean values for the *Growth potential* in relation to the number of carried out projects.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

Moreover, the least active clusters obtained means in two other sub-areas that placed them among the most active and active clusters. It was the case for the *Regional conditions for the development of the cluster* and *cluster management*. In the remaining two sub-areas- *Authorities' policy* and *Institutional milieu* – the least active clusters rated the potential for growth in a much less positive way, and this resulted in mean values that were markedly different from the other cluster groups. It is particularly pertinent to *the Institutional milieu*, where the mean for the least active clusters was 4.59, for active clusters the mean was 6.72, and for the most active the mean was 7.06.

The results for the least active clusters in undertaking projects in the area of *Cluster growth potential* suggests to some extent an entitlement mentality. The low level of project activity is coupled with a low assessment of the assistance from the supporting institutions and authorities' policy, accompanied by a relatively high self-assessment in relation to the *Cluster management* sub-area. However, carrying out a project/enterprise within a cluster needs not be always done out of public funding. Even if the authorities' policy was indeed unfavourable, it does not indicate a lack of possibilities to carry out project directed towards the development of the cluster with the help of the members of the cluster. The coordinators of the least active clusters should thus be recommended to be more persistent in the cluster development processes and be more involved both personally and by the members of the cluster in all types of ideas for project and their realisation.

## 8.1. Regional conditions

The sub-area *Regional Conditions* for cluster development is described by 4 indicators: *Potential, natural resources, local community's economic traditions; Availability and mobility of highly qualified employees; Region's ability to attract investment (attractive investment opportunities, municipal infrastructure); and Openness of the local/regional community to co-operation* (entrepreneurs, enterprise related institutions, etc.).

In each of these indicators, the benchmarking indicators obtained the highest value of 10, indicating that the leader/leaders of the group of clusters in this study estimate the growth potential of their clusters very highly.

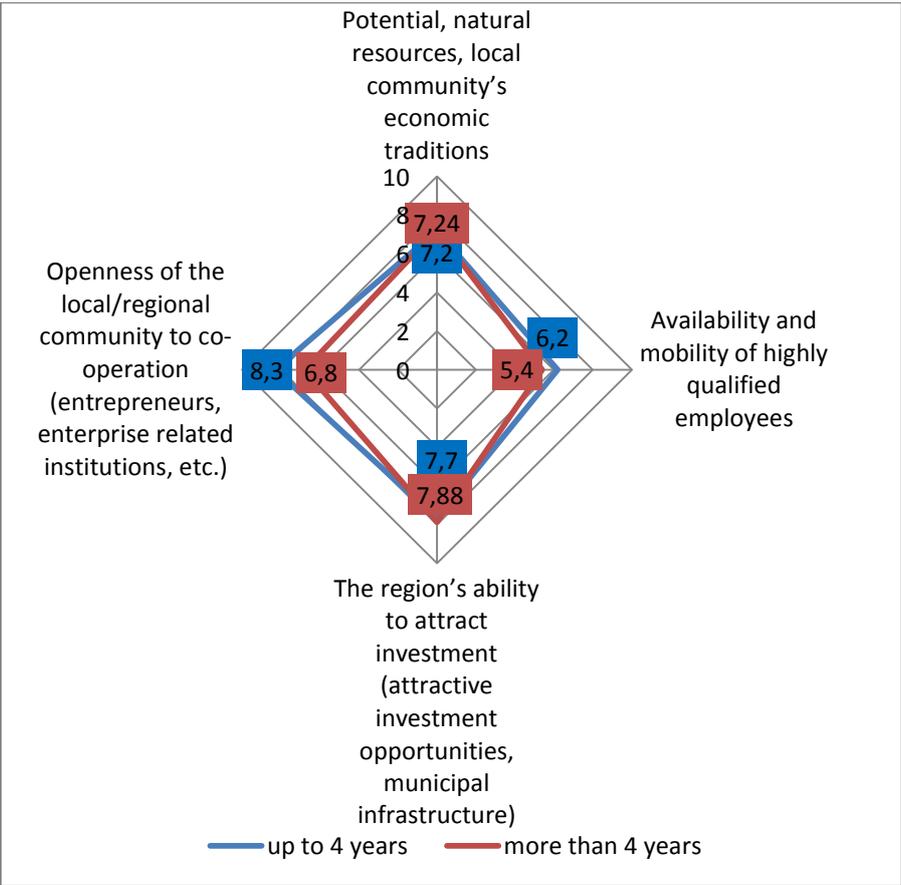
When taking into account only the mean values that describe only the average clusters, the highest growth potential is perceived to be in the *Region's ability to attract investment (attractive investment opportunities, municipal infrastructure)*. The mean for this indicator was 7.83.

The only slightly lower evaluation was for two other indicators: *Potential, natural resources, local community's economic traditions*, and *Openness of the local/regional community to co-operation (entrepreneurs, enterprise related institutions, etc.)*. The mean value for these two indicators was the same - 7.23.

The least potential in supporting the development processes of the clusters was definitely considered to be in the *Availability and mobility of highly qualified employees*. The mean for this indicator was only 5.63, and its value was lower than other means by 35.5%.

The above again shows a development problem known to the clusters and generally to growing new businesses and entrepreneurs directed toward development – the problem of highly qualified personnel and their low mobility. The shortages of qualified employees should be treated as a main, if not the most important, barrier in the clusters development in Poland.

**Chart 116. Mean and benchmark values in the sub-area of *Regional Conditions* in relation to the cluster’s age**



Source: Developed based on the results of research among the coordinators of 35 clusters.

Hence, it is recommended to take dual-track measures towards limiting this apparent barrier for development.

First of all, the clusters should create their own ideas and projects for preparing highly qualified employees for their own needs. It is worth applying best practices in this respect.

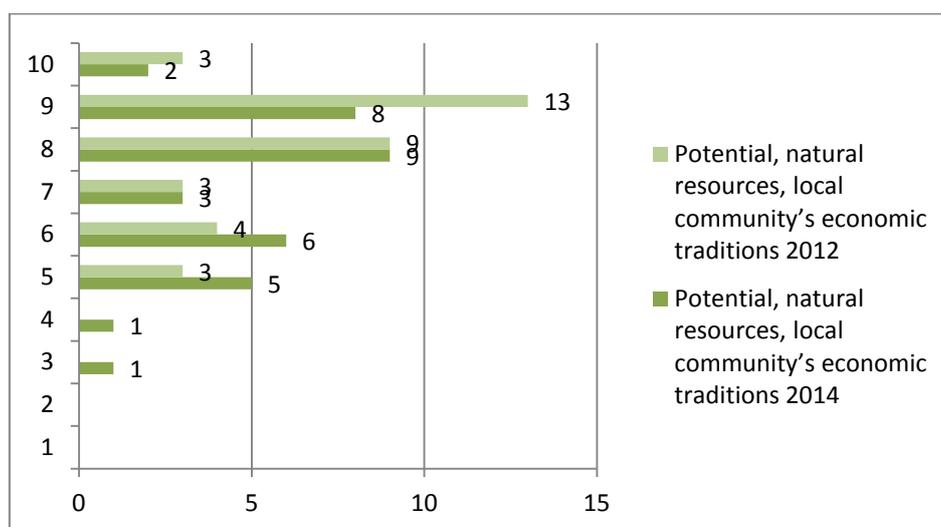
In parallel, the authorities should modify the educational system at the vocational, technical and college level to fit the needs of clusters. In this case, the process of adapting the educational offer needs to be considered on an on-going basis, since clusters generate ever-changing needs in terms of qualifications and the competence of personnel.

The public authorities at all levels responsible for the educational system should treat clusters as an important partner in the process of shaping the directions of education and teaching methods, in order to ensure the possibility to shape these competences in the course of education that are needed by the clusters. Within this scope, the public authorities should encourage schools and higher education institutions to cooperate directly with the clusters so that they become partners in dual education for educational institutions.

Chart 117 shows the evaluation of the *Potential, natural resources, local community's economic traditions* comparing the results of 2012 and 2014. The data contained in the chart suggests a decrease in the rating in 2014 in relation to 2012. Thus, the clusters are now more sceptical about receiving substantial support from the regional environment related to natural resources or economic traditions. The number of clusters with maximum value dropped by 1, and the number of clusters decreased (from 13 to 5) that rated the analysed indicator on the scale of 9.

These high results were related to positive replies in 7 or 8 cases to questions such as the following: *Is the cluster's business industry related to the dominant industry of the region? Is the industry represented by the cluster included in the regional innovation strategy? Is the industry represented by the cluster also the regions' smart specialization? Is the industry represented by the clusters related to the traditions of the region dating back 50-100 years? Does the cluster use the natural recourses of the region? Could the cluster function in another region with a similar success? Do vocational and college-level educational institutions have majors related to the cluster's business industry? Is the cluster's industry to some extent participating in promoting the region or is part of its trademark?*

**Chart 117. The evaluation of the *Potential, natural resources, economic traditions of the local community* - a comparison of research in 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2012 and 2014.

The mean value of this indicator, as shown above, was 7.23 in 2014, and almost at 8 (7.97) in 2012, which reveals the previously mentioned decrease in the assessment. The mean from 2014 indicates that the clusters gave positive answers only to 5 out of 8 questions quoted above. Taking into account that a considerable part of a region's description included in the questions in this study cannot change in relation of a given clusters, this decrease in the rating can be attributed to the presently continuing process of establishing the regions' *smart specialization* and related update for regional innovation strategy. It seems that some clusters feel their core industries are not appropriately included in defining the regional specialisations. However, the clusters can and should play an important role in the processes of defining and development of regional specialisations. It is important that the regional public authorities treat clusters as a partner in the process of establishing and developing regional smart specialisations. Both processes need to be treated as continuous and should take into account the dynamics of economic changes, while clusters should be key partners of the public authorities in this respect. It would be well worthwhile to use the good cluster practice – *Optoklaster* –for this purpose.

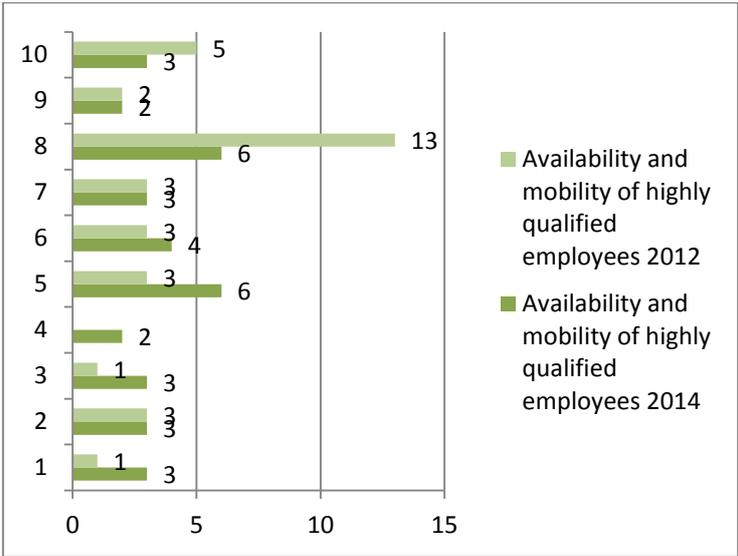
**Good Practice 19. The interest of the public authorities in the activities of the clusters, facilitating access for the clusters members to partial financial support for their endeavours.**

	<p style="text-align: center;"><b>Optoklaster –Mazovian Cluster for Photonic Innovative Technologies</b></p>
<p><b>Aim: To increase the interest of public authorities in the activities undertaken by the cluster, facilitating the access for the members of the cluster to the partial financial support of their ventures.</b></p> <p>The coordinator of the Cluster continually monitors the processes of strategic planning at the national, regional level, or the level of the capital city of Warsaw. The monitoring identifies situations in which personal involvement is advisable for the cluster’s representative (the Coordinator), as well as representatives of academia and business related to the clusters with decision-making authorities in order to emphasise the significance of photonics as a field of science as well as its economic dimension. In the analysed case, the measures taken resulted in the inclusion of photonics in the list of specialisations of the Ministry of Science and Higher Education.</p> <p><b>Result: The realisation of the described action taken allows an effective response of the cluster’s representatives to the emerging opportunities and threats related to, e.g. inclusion of the industry in which the clusters is active in the list of specialisations supported in the future by public funds.</b></p>	

The evaluations of the availability and mobility of highly qualified employees in the current study edition was, similarly to the indicator described above, slightly lower in relation to the year 2012. The number of clusters with the highest assessment dropped from 5 to 3, and for the 8-point assessment—from 13 clusters to 6 clusters (Chart 118).

It should be pointed out that the two clusters that had 10 points unequivocally agreed with the following statement: *“In the region, the supply of employees exceeds the demand for them. The access to highly qualified workers is not at all a problem.”* Thus, an advantageous situation like this occurs rarely in the group of 35 clusters.

**Chart 118. The evaluation of the *Availability and mobility of highly qualified employees* –a comparison of research results in the years 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2012 and 2014.

The mean for all the clusters was at 5.63, while the mean for 2012 was 6.74, which according to the adopted system indicates the agreement of the coordinator with the following statement: *“There is a shortage of highly qualified employees, but employees can be easily found in the region.”* This statement, which can be assumed to describe the majority of clusters, indicates that the process of developing competences particularly for the new employees in practice occurs within the companies.

The above results are not very optimistic and indicate a need to take measures by the enterprises, as well as their milieu, public authorities, and supporting institutions. However, the ineffectiveness of the hitherto measures taken at the level of public authorities, labour market institutions, and educational institutions within the scope with adapting the educational system and continuous education to the needs of the enterprises, makes it necessary for the clusters to take up the role of liaison between the educational institutions and businesses. One can describe this role for the clusters as becoming the “brokers of competences” on behalf of the cluster’s entities. The task of the cluster would be to identify the competences needed by the members on an on-going basis and organise the process of their formation in partnership with the public authorities, labour market institutions, and potential future employees as part of moulding the educational system.

Significant problems in accessing highly qualified employees have made some of the clusters turn to youth in an attempt to increase the chances of gaining suitable employees in the future. A good example of this is the approach of the Lower Silesian Renewable Energy Cluster.

**Good Practice 20. Raising the interest among the youth in technical education corresponding to the profile of the cluster.**



**Lower Silesian Renewable Energy Cluster**

**Aim: Raising the interest among the youth in technical education corresponding to the profile of the cluster.**

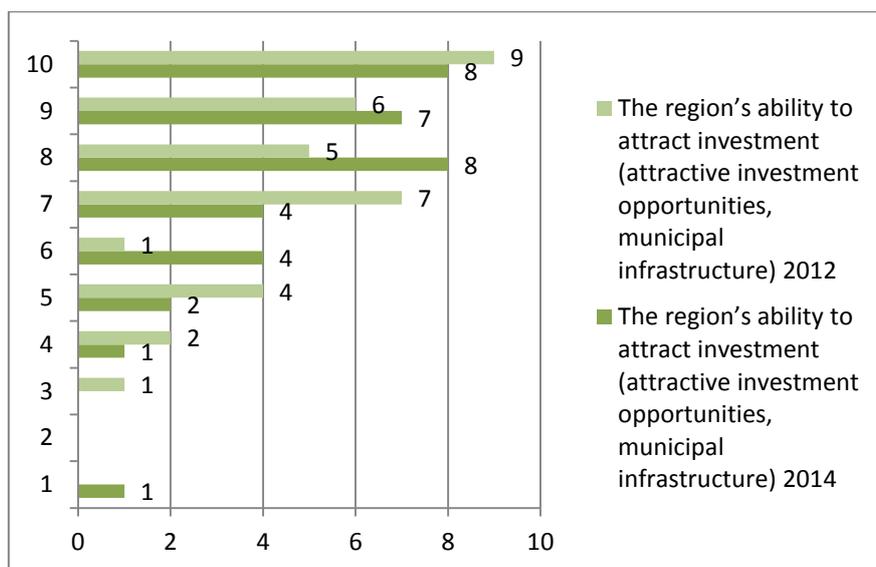
One of the members of the cluster is the School Complex and Educational Centres in Bielawa. It is the first school in Central-Eastern Europe that introduced into the curriculum “Renewable energy systems’ technician” and started the first pilot year of studies in this profession. The cluster participated in reviewing the curriculum and assisted in implementing it. Moreover, a core curriculum was developed and the profession has been included in the Ministry of Education profession list. It is worth emphasising that the school has its own laboratories of a unique character. These laboratories are made available to the Wrocław University of Technology, which serves them not only for research and development but also for teaching (The university opened postgraduate studies “Renewable Energy System”). Thanks to the high quality of teaching and available educational and research infrastructure, the school promotes professions related to the renewable energy and consequently satisfies the present and future needs of the cluster members.

**Result: Ensuring long-term influx of young personnel for the enterprises functioning within the cluster.**

Chart 119 shows the results of the evaluation for 2012 and 2014 of the investment attractiveness of the region in which a given cluster is active. Based on the analysis of the number of above average ratings given by the coordinators, the investment attractiveness of the region in which a given cluster is rooted has moderately increased. The mean values confirm this with the mean for all clusters being 7.83 in 2014, while it had reached 7.71 in the year 2012. The value of this, but also the previous edition, means that the clusters agree with the statement “*The region has an attractive investment offer, but it is poorly promoted.*” In the assessment of the majority of clusters, their regions are attractive investment-wise, but too little effort is expended on promoting these assets. This interpretation may stir some doubts, since the authorities of the various regions in Poland have recently intensified regional promotion. However, it seems that there is a difference between promoting a region as a generally good place for enterprise and promoting specific, more precisely defined assets for investment connected with the specificity of industries in which the clusters are active. This aspect of promotion seems undervalued.

It should be remembered that according to the “Porter’s diamond” concept, the investor is attracted to the access to specialised local resources. Thus, the promotion of investment assets should include the specificity of related industries in which the region has a competitive advantage. These related industries are clusters; therefore, it should be suggested to the public authorities that the promotional efforts include clusters connected to the key industries for the region. In addition, the clusters themselves should actively participate in promotional activities of their regions.

**Chart 119. The evaluation of the *Attractiveness of the region for investment* – a comparison of results from 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2012 and 2014.

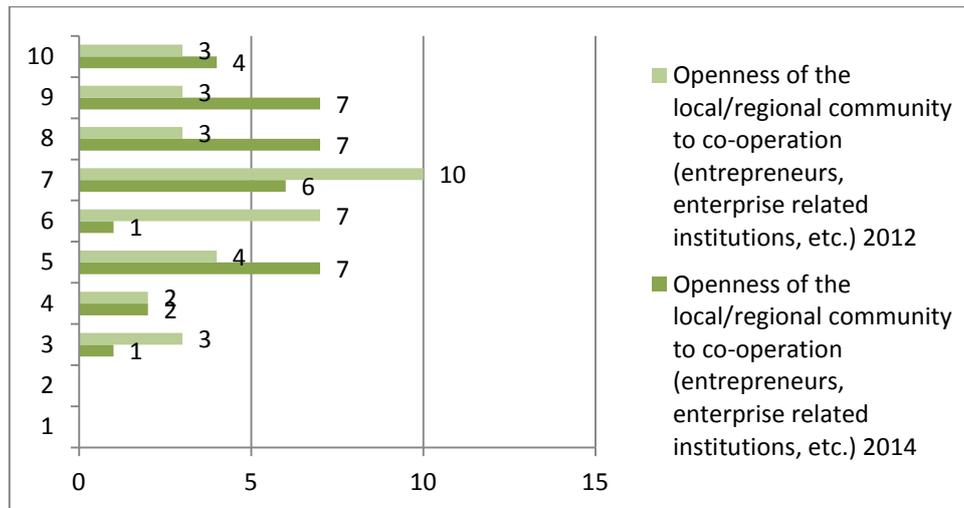
The next indicator with the sub-area of *Regional Conditions* referred largely to the evaluation of the social capital closest to the cluster. The coordinators in their assessment of the *Openness of the local/regional community to co-operation* had to answer the following questions: *Is the openness of the entrepreneur milieu in the region high? Does this openness support the development of the cluster?*

The number of assessments above the average, particularly above 7.0, increased significantly in 2014 in relation to 2012. Thus, the clusters perceive positive changes around them in respect to the openness to cooperation.

The mean for the studies group was 7.22 in 2014, while the mean for 2012 was 6.57, which according to the adopted methodology indicates a majority agreement with the following statement: *“A great deal of involvement of business support institutions in the establishing of cooperation among entrepreneurs. They initiate joint projects and ventures.”*

The improvement in the openness of the local population is an optimistic change for the clusters which can mean in the future an acceleration of cooperation between a cluster and the support institution, a cluster and new entity in the cluster (or an entity interested in joining the cluster), a cluster and the local/regional government, and most of all – a cluster and a finance institution. In all cases, it may translate into lowering transaction costs resulting in an increase of the clusters’ effectiveness. It should be emphasised that the clusters themselves have a significant, if not decisive, influence on changing the attitudes in the local and regional milieus. It is the creation and development of clusters, and the successes of the clusters’ initiatives by giving a good example build trust for economic cooperation and more broadly for social cooperation. Clusters should be perceived as the key and very valuable element of building the social capital in Poland. The improvement in the openness should be used to support more networks of cooperation, including other cluster initiatives, the influence of which goes far beyond specific aspects of joint efforts in specific industries. It should be remembered that the social capital built by all clusters is considered a key factor in economic and social development at present.

**Chart 120. The evaluation of the *Openness of the local/regional community to cooperation* –a comparison of results of the study from 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2012 and 2014.

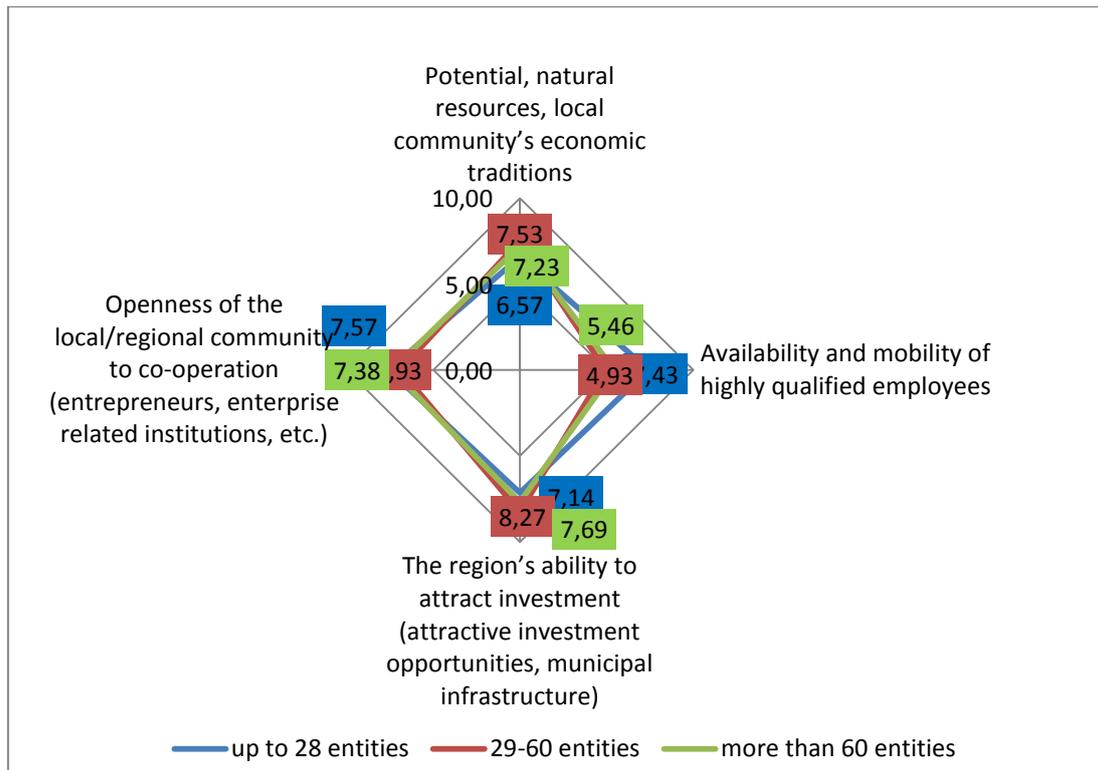
The evaluation of the sub-area *Regional Conditions* varied greatly depending on the size of the clusters.

The evaluations of the biggest clusters that include more than 60 entities placed them at the moderate level in relation to the smallest clusters and the medium clusters. Medium clusters gave the highest assessment for the *Potential, natural resources, local economic traditions,* and the *Investment attractiveness of the region*. In the former, the mean for these clusters was 7.53, and 8.27 in the latter. At the same time, medium clusters gave the lowest rating to the *Availability and mobility of highly qualified employees* (mean value 4.93), and the *Openness of the local/regional community to co-operation* (mean value 6.93). These indicators received a higher rating from the smallest clusters. The mean for *Availability and mobility of highly qualified employees* for the smallest clusters was 7.43, while the *Openness of the local/regional community to co-operation* was 7.57.

This high rating of access to highly qualified personnel by the smallest clusters should be interpreted in view of smaller number of employees needed, and thus the possibility of an easier recruitment of a small number of highly qualified employees.

The relatively poor evaluation of the regional conditions by the biggest clusters (above 60 entities) suggest that their quick development in some cases did not take into account the logic of industry connections in the region or the created chains of values related to the main industry.

**Chart 121. Mean values for the sub-area *Regional conditions* in relation to the size of the cluster.**

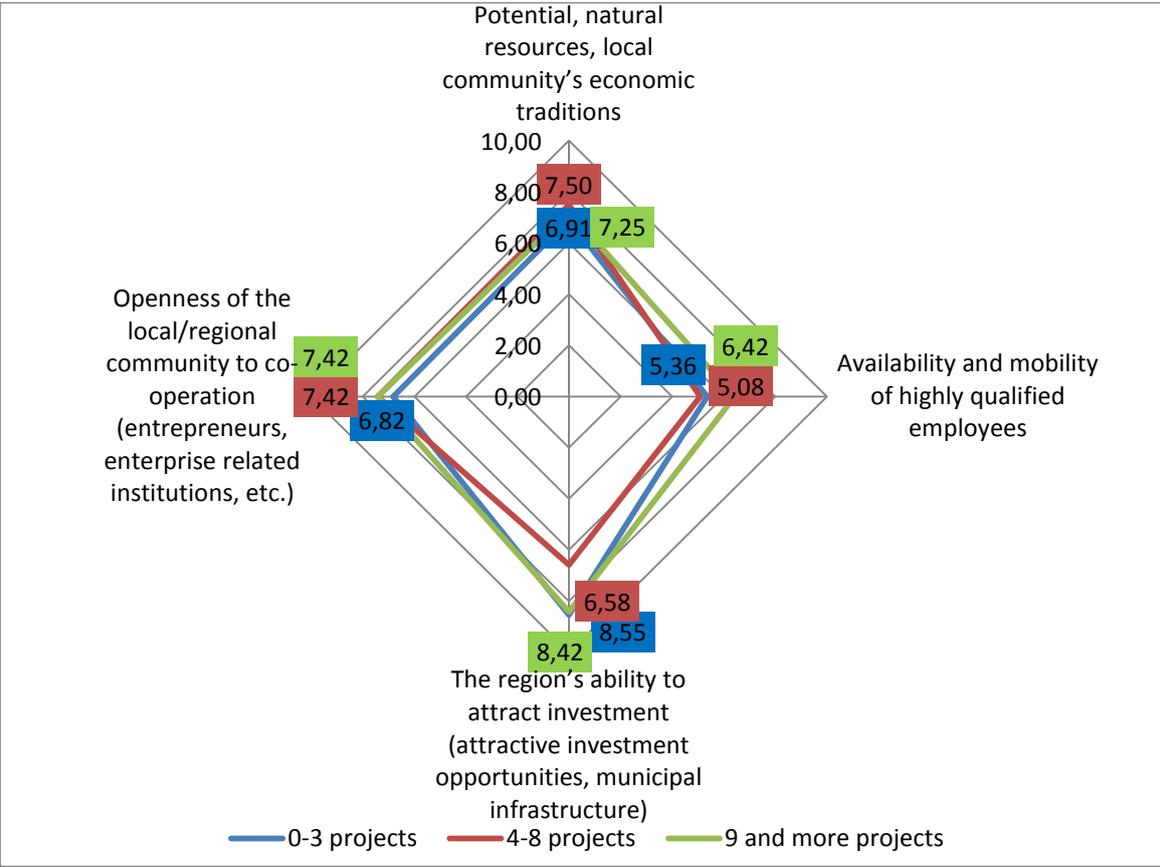


Source: Developed based on the results of research among the coordinators of 35 clusters

Chart 122 shows mean values obtained by the clusters within the sub-area of *Regional conditions for the cluster development* depending on the number of realised projects. There is a strong differentiation of the assessments. The most active clusters (more than 10 projects) gave the highest evaluation in this sub-area for the *Availability and mobility of highly qualified employees* (mean value at 6.42). It is worth noting that this aspect was evaluated much less positively by clusters with low or medium activity. Thus, it is possible that realising projects in some way solves the problem of the availability of highly qualified personnel.

For the sub-area of *Openness of the local/regional community to co-operation*, the most active clusters were at the same level as the moderately active clusters with the average 7.42. The openness of the community is the least favourably assessed by the least active clusters in terms of realised projects. It can be concluded that the openness increases in the case of the clusters being active and realise many projects. This can be tied with the earlier conclusions about the role of clusters in the building of social capital, and that the more active they are, the more projects they realise the better they fulfil this role. Naturally, there is another interpretation possible: In a less favourable environment, it is more difficult to realise projects and to be active. However, even if this latter interpretation had some validity, it does not change the key conclusion that clusters should be maximally active in order to change attitudes in their environment. The mean in this case is 7.50. At the same time, clusters with moderate activity gave the lowest rating for the availability of highly qualified personnel in the region (5.08) and the investment attractiveness of the region in which they function (6.58).

**Chart 122. Mean values for the sub-area of *Regional conditions* in relation to number of realised projects.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

**8.2. Public authorities’ policy supporting cluster development**

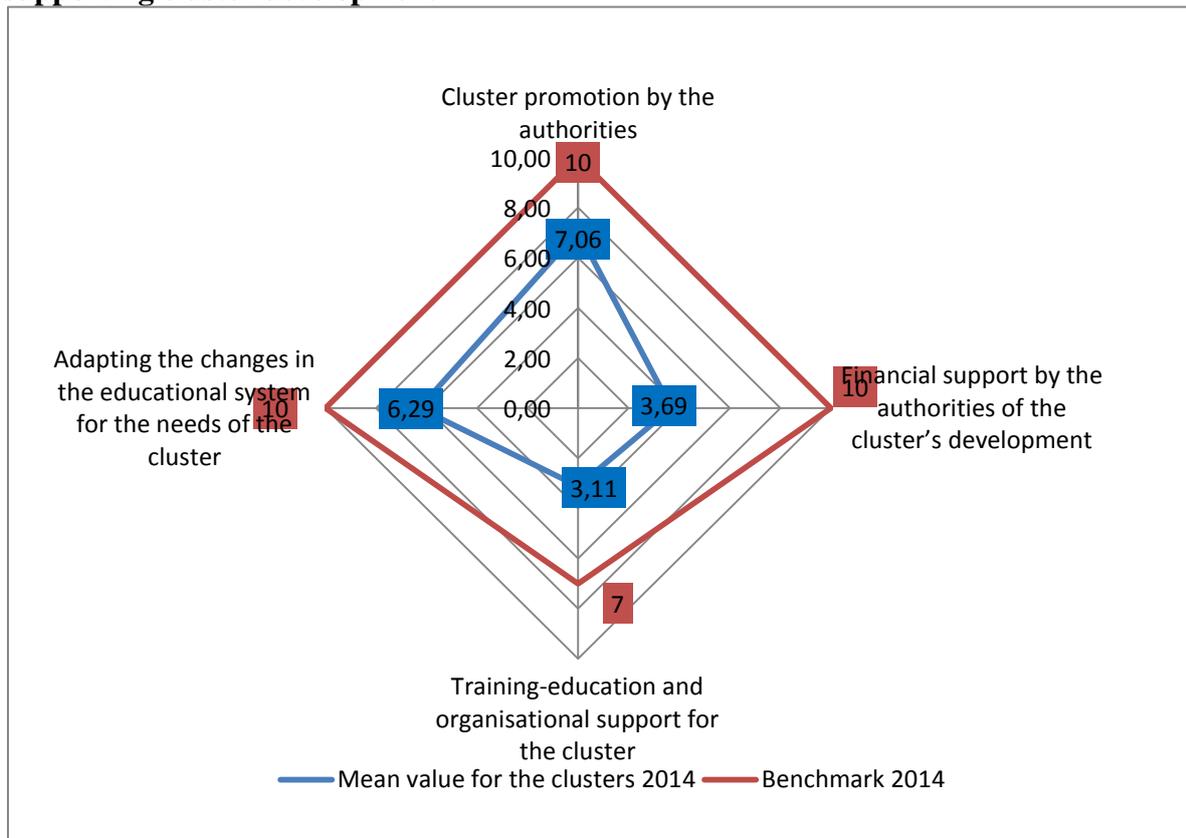
In the sub-area of *Public authorities’ policy supporting cluster development*, the best situation is for the indicator of the *Cluster promotion by the authorities*, with the benchmark at the highest level, the mean for the group was 7.06.

A slightly lower rating was obtained for the indicator related to adapting changes in the educational system to the cluster’s needs. In this case, the benchmark as also 10.00, while the mean was 6.29.

However, the assessment of the activity of public authorities for the cluster’s development was less favourable. Although the benchmark for the *Financial support by the authorities of the cluster development* reached maximum values, and the mean at a mere 3.69 verifies the general opinion among the clusters about the financial support of the public authorities. Even worse was the considered the *Training-education and organisational support for the cluster*. The benchmark was at 7.0, and the mean for the group in the study was 3.11.

The biggest difference between the benchmark and the mean value occurred for the *Financial support by the authorities of the cluster development*, while the least pronounced differentiation was the *Cluster promotion by the authorities*.

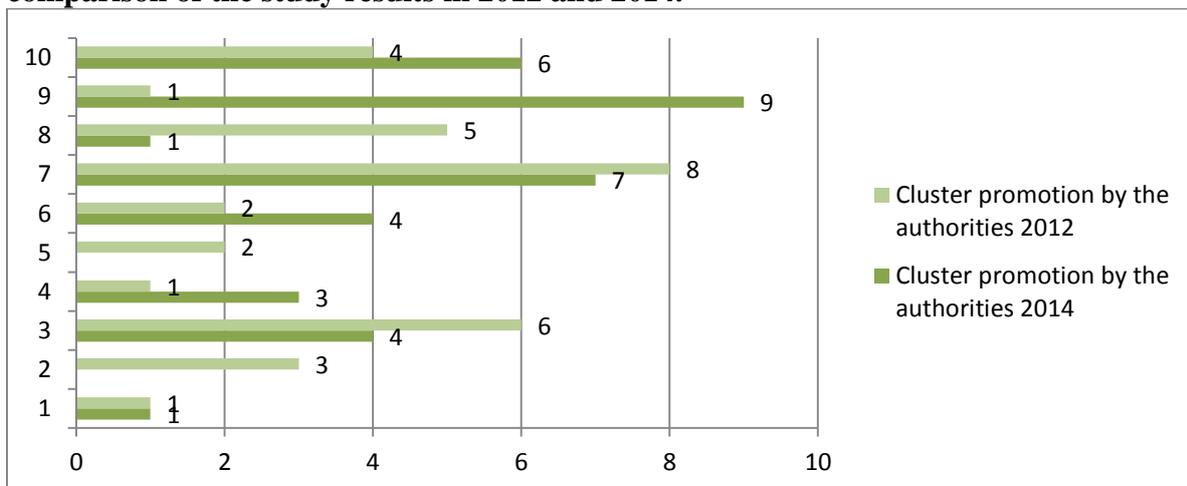
**Chart 123. Mean value and benchmark in the sub-area of Public authorities' policy supporting cluster development**



Source: Developed based on the results of research among the coordinators of 35 clusters.

The number of the highest rating evaluations (9-10 points) for the *Cluster promotion by the public authorities* (15) given by the clusters in 2014 greatly exceeded the number of similar ratings given by the clusters in 2012 (5) (Chart 124).

**Chart 124. The evaluation of the *Cluster promotion by the public authorities* and the comparison of the study results in 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2012 and 2014.

The rating of 9-10 means that the clusters had the opportunity during the years 2012-2014 to benefit from at least 6 or 7 forms of promotion by the public authorities, such as the

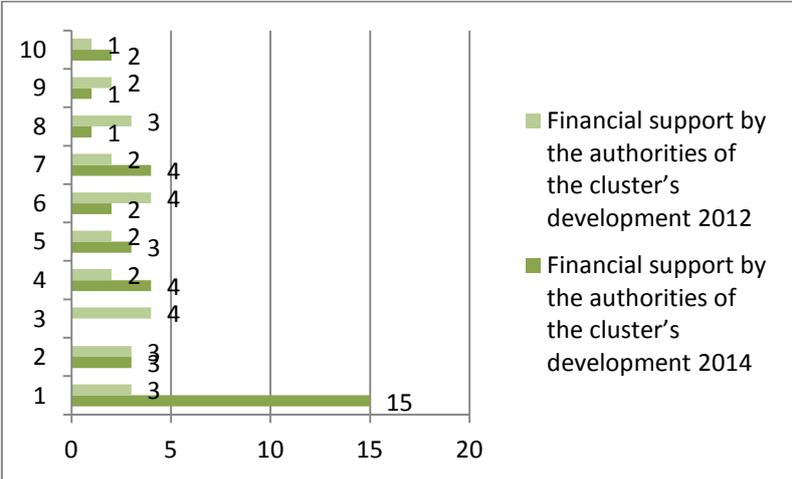
following: invitations to conferences and important meeting as speakers or members; invitations to participate in developing documents for regional strategies, e.g. Regional Innovation Strategy; organisation of visits in the cluster, promotion of the cluster in promotional publications for the region; cluster promotion on Internet pages; the promotion of member achievement and lobbying at home and abroad. Due to the character of activities included in the indicator under discussion, the earlier conclusion concerning the need to use clusters for external promotion of investment attractiveness of the region is not undermined.

The mean value for the group in 2014 was about 7 points, which means that on average the clusters benefited from 5 of the above-mentioned forms of promotion of the cluster by the public authorities. The mean value for the investigated group in 2012 was 5.6, which means that, on average, the clusters benefited from four of the above-mentioned forms of cluster promotion by the public authorities.

These results show an improvement in the satisfaction of the clusters in the study from the activity of the public authorities in relation to the promotion of the cluster in the last 2 years. Clusters become increasingly recognised by the public authorities as an element of the regional institutional infrastructure that aids development. Public authorities should be encouraged in their promotion of clusters as their regional partner in dialogue.

Chart 125 shows the evaluation of the financial support for cluster growth by the public authorities in 2012 and 2014. In this case, the coordinators were asked whether, according to them, public authorities support the cluster financially. The maximum rating (10) meant that all the financial needs of the clusters are provided, while a rating of 1 meant that the local authorities do not support the clusters financially (supported in the beginning). The majority of clusters (22 out of 35) rated the financial support as below the average (5.0), most often giving it a rating of 1.

**Chart 125. The evaluation for the *Financial support of clusters development by public authorities* – comparison of research results in 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2012 and 2014.

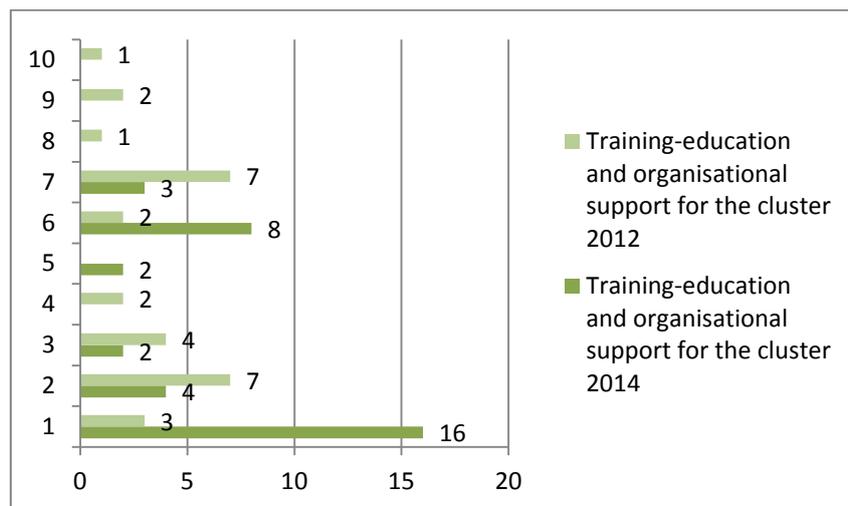
The mean value for all the clusters reached the level of 3.68 in the year 2014, while the mean value in 2012 was 4.08, which approximate the clusters to the statement: “*The support is small, but allows an office to function and to undertake occasional initiatives.*” The previously discussed issue of stratification of the clusters in relation of the financial support they receive should be recalled here. This problem was also discussed at more length in the analysis of the area of *Cluster Resources*. In the present context, one may venture to say that

the differentiation of the support by the public authorities for various clusters need not be seen as negative, provided it is offered on clear and transparent terms for all clusters.

Public authorities at the central, as well as regional/local level should develop guidelines for supporting clusters in which they will not only define the manner of the support but also the criteria for awarding it. Clusters should be aware which endeavours will be supported by the public authorities. A suitable starting point for implementing clusters policy should be including clusters as social partners in developing guidelines for cluster policies and financial support instruments. The experience of OPTOKLASTER that was presented earlier is a good example of best practice in gaining the interest of the public authorities' in the activity of the clusters that also has potential for future financial support (the quoted above Best Practice 19).

The evaluation of the assistance in training/education and organisation by the public authorities presented in Chart 126 are very similar to the previously shown indicator. None of the clusters gave the maximum rating, while 3 clusters gave 7 points and agreed with the statement “*Training packages adapted for the needs of the cluster coordinator and the members are available. The scope and quality are good.*” However, almost half of the clusters (16 out of 35) gave the minimum rating for the support of the public authorities claiming there in their case there is no training/education and organisation support from the public authorities for the coordinator or for the members of the cluster.

**Chart 126. The evaluation of the *Training /education and organisation support from the public authorities for the cluster in 2012 and 2014.***



Source: Developed based on the results of research among the cluster coordinators in 2012 and 2014.

The mean value of the clusters' ratings was 3.11, which means that clusters notice the basic training packages for the coordinators and information packages for the members rather than the scope and the quality does not fulfil the needs of the clusters. An analysis of the responses concerning the training-consulting support for the clusters, apart from the presented exceptions, emphatically supports the earlier conclusion about the general inadequacy of the measures taken by the labour market institutions and educational and training institutions within the scope of advancing the competences expected by the enterprises and clusters.

Naturally, an offer better suited for the clusters can be recommended here, but it seems that it would be more effective for the clusters to take on an active role of a coordinator in activities related to training for clusters needs, that is to take on the role of the previously mentioned “competence broker.” Clusters should not passively wait for the training support, but should come forward with initiatives and become an important partner for labour market

and educational institutions. It is worth noting that it is the clusters that bring together businesses – the key recipient of future support in improving employees’ qualifications realised in the model termed “demand model.”

Some of the clusters by actively participate in adapting training to clusters’ needs, as exemplified by the Bydgoszcz Industrial Cluster that sees the need for adapting to the cluster’s needs to both continuous education and foundational training.

### **Good Practice 21. Personnel training for the needs of the cluster’s members**



**BYDGOSKI KLASTER PRZEMYSŁOWY**  
**BYDGOSZCZ INDUSTRIAL CLUSTER**

Bydgoszcz Industrial Cluster

#### **Aim: Personnel training for the cluster’s members**

In the area of cluster’s activity, the supply of qualified personnel at the middle level is smaller than the companies’ demand. It is related to the lack of modifications in educational options. The cluster established intensive cooperation with the local government in order to set up in the region study opportunities in the fields related to those of the members’ in the cluster. Thanks to the clusters efforts, a class on-demand was opened in one of the vocational and technical schools dedicated to tool making and processing industry. The students in this class have the opportunity to conduct their job practice in the companies belonging to the cluster, they receive a scholarship, which presently is financed by the Municipal Office of Bydgoszcz and is to be financed by the cluster in the future. The cluster also established an award for the best student. The cluster has become very involved in promoting vocational learning by visiting middle schools in Bydgoszcz and by presenting the parents and the students with what the work in this industry looks like and what the earning potential is offered by the companies.

The clusters cooperate closely with the Continual Education Centre, which trains workers taking into account the personnel needs of the cluster members. The cluster members have equipped the centre with injection pumps, the purchase of which was beyond the means of the Centre (the cost of one pump is around 10,000 euros). Thanks to this initiative the Centre can train unemployed people as injection pump setters, and these people will have a chance to find employment at one of the cluster’s enterprises.

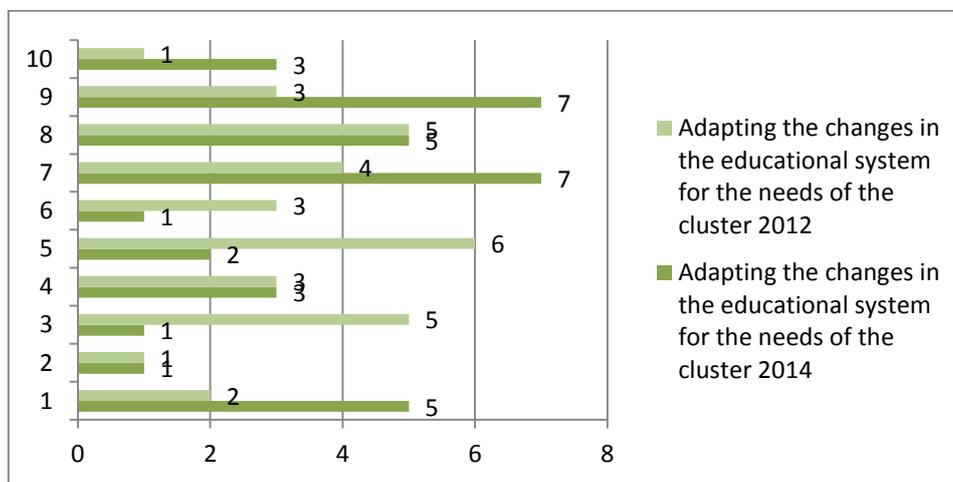
Moreover, within the scope of cooperation with technical schools, together with Electric-Energy Technical School the clusters applied to the Ministry of National Education (with the Ministry of Economy as an intermediary) to open a class profile: “Cooling and Air-Conditioning.” This application was accepted, and in 2015/2016 technical school students will commence studying in this profile.

**Result: Adjusting educational options to the needs of the regional economy, and thus ensuring access to qualified personnel for the members of the cluster.**

The evaluation of the last indicator – the *Policy of the public authorities for the cluster development* for the year 2012 and 2014 is presented in Chart 128. The analysis of the data indicates a significant increase in positive evaluations with 7–10 ratings for the *Changes in the educational system for the needs of the cluster* in the year 2014, in relation to 2012. It is the highest rating indicator in the sub-area.

The mean value for 2014 was 6.29 and represented a positive response to the question: *Have there been changes/adaptations made in the educational system in vocational and college level in the region?* Thus, the mean value was higher than in 2012 when it was 5.26. It means that the clusters notice the progress in the public authorities' efforts in this respect. In general, the value of the mean in this edition indicates that the clusters recognise the existence of cooperation between the cluster and the vocational schools in the region, which consists in consultations about the educational specialties and the scope of studies. To sum up, one can conclude that there have been positive changes in relation to adapting the vocational education offer in the regions to the needs of the clusters. It is an exceptionally positive fact. However, an overall assessment of this adaptation is average. The schools and their supervising bodies should be encouraged to further develop their adaptation to the needs of the clusters.

**Chart 127. The evaluation of adapting the changes in the *Educational system for the needs of the cluster* - a comparison of the results from 2012 and 2014.**



Source: Developed based on the results of research among the coordinators of the clusters in 2012 and 2014.

However, the scope of cooperation of the cluster with educational institutions should be definitely enlarged, and not only with vocational schools but also with universities within the concept of the “cluster as a competences broker.” Moreover, the cooperation between the clusters and vocational schools, but also colleges, should not be limited to consulting educational specialties. Clusters should become partners in the very teaching process. They can participate in dual education system together with vocational schools, where part of curriculum takes place in the company. They can be partners in “Practical Study Profile,” which is now possible and promoted by the Ministry of Science and Higher Education in the amendment to the Law of Higher Education that came into force on October 1, 2014.

Within the scope of vocational education, it is well worth looking at the experience of Aviation Valley Cluster, which has been using “best practice” for a long time.

**Good Practice 22. The development of knowledge and competences in the cluster.**



**AVIATION VALLEY**

Aviation Valley Cluster

**Aim: To develop knowledge and competences in the cluster**  
 Thanks to the creation of the Operator Training Centre (CEKSO) in the Aviation Valley,

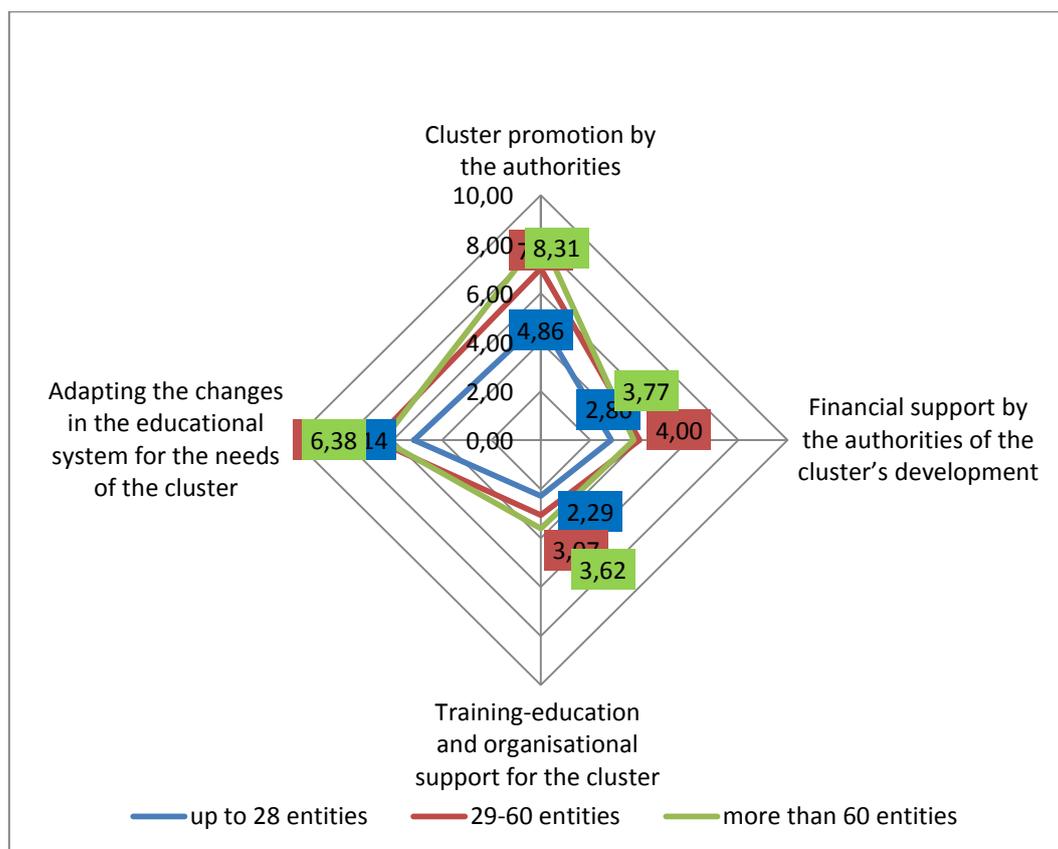
which provides middle level technical specialists for the aviation industry, a new undertaking, CEKSO 2, was carried out. The project “Modernisation of the vocational training offer in relationship to the regional labour market” is carried out jointly by the Marshal Office of the Podkarpackie Voivodeship with its official partner Aviation Valley. Five key member companies in the cluster signed letters of intent concerning conducting a series of training and coaching for the teachers and apprenticeships for the students from technical high schools. Their purpose is to increase the knowledge and competence of the teaching staff who will train future personnel of the cluster on the modern equipment purchased for the educational institutions CEKSO. At the same time, the cluster coordinator with its key members participate in study visits (e.g. to Germany) to highly regarded training centres for the aviation industry in Europe in order to learn about the best practices that could also be applied in Poland. Thanks to these projects, the Podkarpackie Voivodeship is developing a network of training centres that provide education of the highest quality at global level, where training can take place in conditions maximally similar to those in the aviation industry.

**Result: Permanent increase in the quality of practical education in production technology, modernising didactic basis for the needs of the local and regional labour market in modern technologies, the implementation of new technologies in vocational education, increasing professional mobility of graduates and possibility of professional preparation of the students for the external examination that certifies their professional qualifications.**

A cross-sectional analysis of the sub-area *Policy of Public authorities for the development of clusters* shows that the largest clusters gave the highest rating for the *Promotion of the clusters by the public authorities* (8.31) and the *Training/educational and organisational support for the cluster* in comparison to the other two groups. However, the mean value of the rating for the latter was much lower and was only 3.62 (Chart 128). The smallest clusters gave the lowest ratings in the activity of public authorities and their support of cluster development in all four indicators, in particular, they gave very low ratings in comparison to the other two groups for the *Promotion of clusters by public authorities* – the mean value for the largest clusters was 8.31, the mean value for medium clusters was 7.00, while the mean value for the small clusters was 4.86. The scope of support and an inclusion of different types of clusters should be incorporated in the into the “cluster policy” at the regional and central level.

It is worth noting here that the large clusters are better able to secure for themselves the training-educational support that they rated the highest. In the remaining two indicators, the highest rating was given by the medium clusters, where the mean value for the medium clusters for the *Financial support by public authorities for the cluster development* indicator was 4.00, while for the *Adjustment of changes in the educational system for the Needs of the cluster* indicator was 6.73.

**Chart 128. Mean values for the sub-area of *Policies of public authorities for clusters development* in relation to cluster size.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

Interesting observations come from an analysis of data presented in Chart 130 with a cross-section of clusters' level of activity (according to the number of realised projects). It turns out that the least active clusters rated the financial support for the development of the cluster the highest. The mean value for the least active clusters was 4.09. The lowest rating came from the most active clusters, and the mean value was 3.25. This surprising result can only be explained by significant differences in expectations. It appears that the most active clusters have also the highest requirements about the access to financing; therefore, they are more critical in their evaluations.

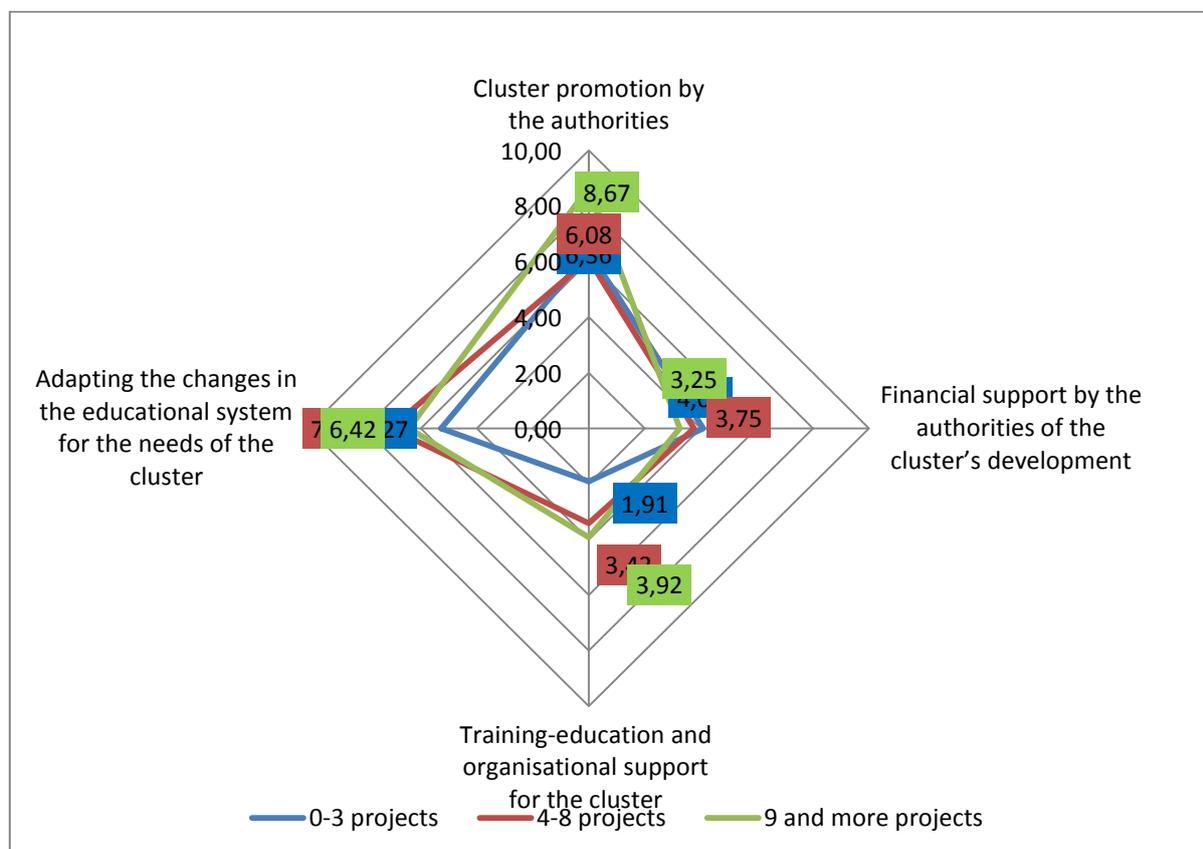
Moreover, the most active clusters, in comparison to medium-active and least active clusters - just as was the case with the larger clusters in comparison with medium and small clusters - gave the highest rating to the promotion of the clusters by the public authorities and training-educational and organisational support. The mean value for the former was 8.67, and for the latter, it was 3.92.

This confirms an earlier conclusion that active clusters change their environment; in this context, they influence the attitudes of public authorities within the scope of their engagement in cluster promotion. The higher rating for training-educational support is not surprising in the most active clusters, since it transpires in various parts of this Report that clusters' projects are frequently connected with education.

The fourth indicator in the sub-area was rated the highest by the medium clusters. The mean value for the indicator *Adaptation of Changes in the Educational System for the Cluster's Needs* was 7.08. There are significant differences in the opinions among the clusters concerning the clusters' promotion and training/educational and organisational support. These

differences coincide with the divisions of clusters into large and small and more and less active.

**Chart 129. Mean values in the sub-area of *Public authorities' policy supporting cluster development* in relation to the realised projects.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

### 8.3. Associated institutions

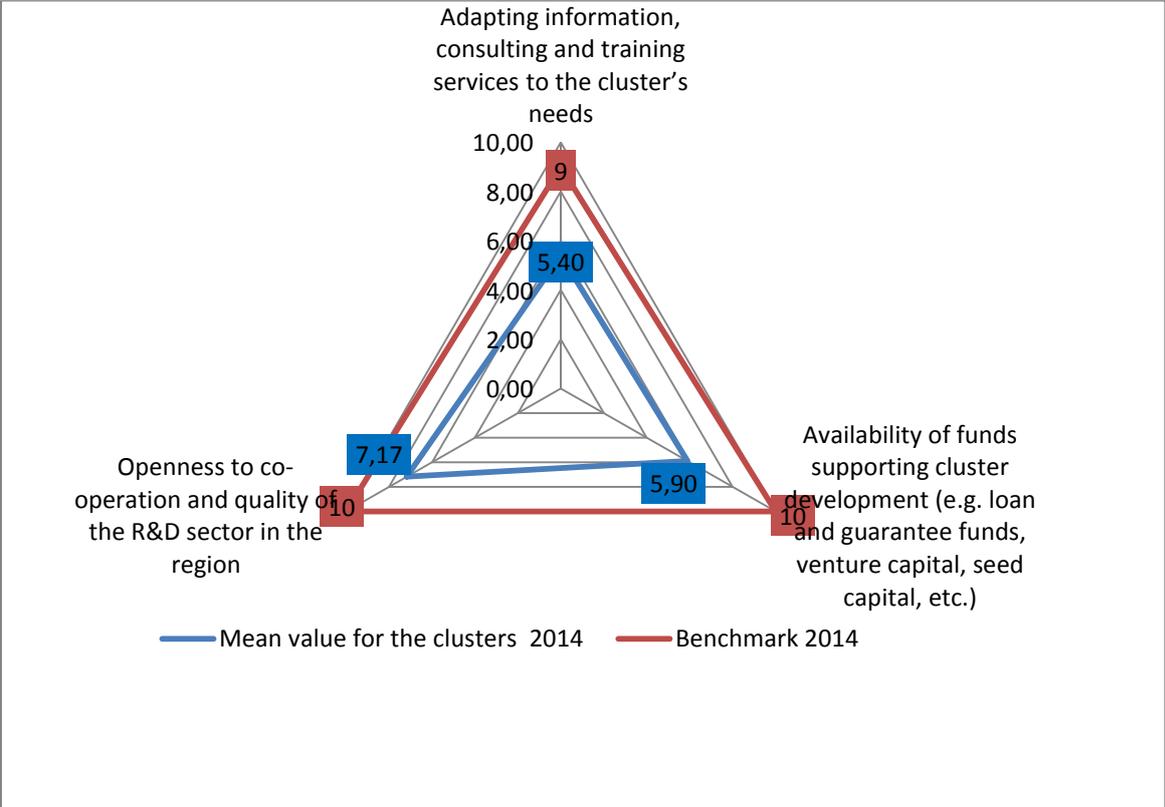
The sub-area *Associated institutions* was analysed with the aid of three indicators: the *Adapting information, consulting and training services to the cluster needs*; the *Availability of funds supporting cluster development* (e.g. loan and guarantee funds, venture capital, seed capital, etc.); and the *Openness to co-operation and quality of the R&D sector in the region*.

Chart 131 presents benchmark and mean values for this sub-area. The best situation in the institutional milieu, according to the coordinators, is in the *Openness to co-operation and quality of the R&D sector in the region*. With the benchmark at the highest level, the mean value was the highest in comparison to other indicators and was 7.17. A little less favourable rating was given for the *Availability of funds supporting cluster development*, where the benchmark was also at 10, but the mean value was only 5.90.

The lowest rating in the whole sub-area was for the *Adapting information, consulting and training services to the cluster's needs* indicator. The benchmark value reached 9, while the mean value was 5.40. The low level of satisfaction from educational services has already been discussed here and in view of this result is not surprising.

The greatest stratification in the group under investigation in the sub-area the *Institutional milieu for cluster development* was in *availability of funds supporting cluster development*.

**Chart 130. Benchmark and mean value in the sub-area *Associated institutions***



Source: Developed based on the results of research among the coordinators of 35 clusters.

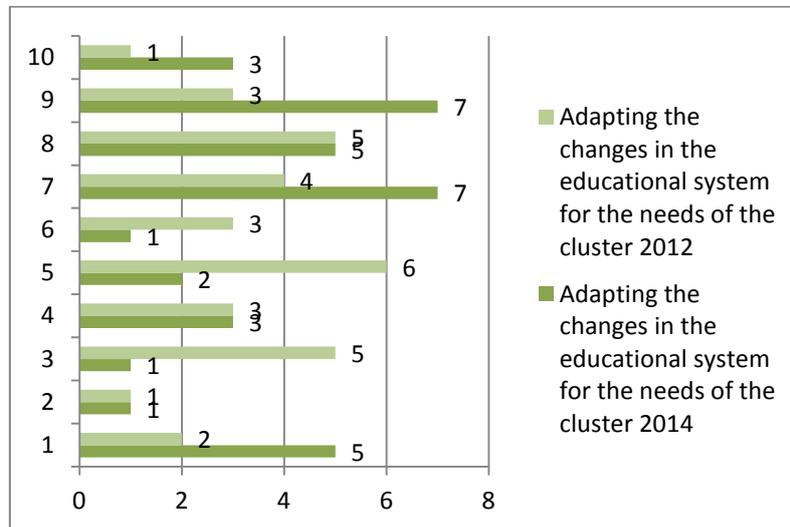
Chart 132 shows the ratings for adapting information, consulting and training services to the cluster’s needs in 2014 and 2012. The largest increase in the ratings in relation to 2014 can be observed for ratings 8, 5 and 2. The mean value for the ratings of the *Adapting Information, Consulting and Training Services to the Cluster’s Needs* indicator was 5.40 in 2014 and 5.15 in 2012. It means that the changes in this respect were minor when it comes to the extent of adjustments by the business milieu institutions to the actual needs of the cluster in the last 2 years.

The mean value for 2014 and 2012 being at about 5 means that in reality only some of the consulting-training-information services are tailored to the needs of the cluster members and the industry they represent, and their scope covers only a fraction of the companies’ needs.

One cannot conclude that there have been positive changes in adapting consulting and training services to the cluster’s needs. The degree of changes is still insufficient and requires improvement. In the context of these issues, one needs to revisit the previously introduced concept of the cluster as a “broker of competences.” This idea includes an active cooperation of the cluster with consulting and training institutions. It is the cluster coordinators who should be best informed about the needs of their members regarding training, particularly the enterprises, and they should become a valuable partner for labour market institutions and educational institutions. With this approach, they can design highly specialised projects jointly with enterprises that can be very specialised and at the same time efficiently delivered through pooling training needs of several entities. It should be noted, that at this stage, it is not about general training for large numbers of employees, but specialised and exclusive programs often taught by foreign experts, which is why participation in expensive training outside of the country should be taken into account. In these cases, the efforts should not only

be limited within a cluster, but, to increase the effectiveness, clusters that share the industry should form agreements jointly to assign a larger number of their employees for training.

**Chart 131. The evaluation of the *Adapting information, consulting and training services to the cluster's needs* - comparison of the year 2012 and 2014**



Source: Developed based on the results of research among the cluster coordinators in 2012 and 2014.

In contrast to hitherto analysed evaluations of indicators for the entire area of *Cluster growth potential*, the ratings have considerably improved for the *Availability of funds supporting cluster development* indicator in 2014 in comparison to 2012. The improvement shows not only in the increase of very high ratings (8-10) but also in the increase of overall mean value for the clusters, which grew from 3.85 in 2012 to 5.9 in 2014 (the increase of almost 53.3%). Thus, the clusters verify the improvement of funding accessibility, but they also stress the necessity of having to fulfil a number of excessive criteria, according to them, and point out the tedium of bureaucracy.

Taking into account these positive trends, that is, the growing awareness and potential of the clusters for greater participation in clusters projects and greater involvement of financial resources, emphasis should be put on further development of financial instruments that support cluster and cluster structure development. This challenge is particularly directed at the government at the regional and local level.

**Chart 132. The Evaluation of the Availability of funds supporting cluster development – a comparison of results in 2012 and 2014.**



Source: Developed based on the results of research among the cluster coordinators in 2012 and 2014.

To a lesser extent, there was an improvement in the indicator of *Openness to co-operation and the quality of the R&D sector in the region* (Chart 133). In the case under discussion, the mean value for 2014 was 7.17 and corresponded to the positive response to the question whether the science sector and R&D institutions are ready and open to cooperation with the cluster. This mean increased from 6.31 in 2012, i.e. by 13.63%. The clusters declare positive experiences and significant effects in cooperation with the science sector. Some of the clusters have already carried out joint projects with the science sector and R&D institutions in the region. In the context of innovative challenges that face Polish economy, the opinions of positive changes in the cooperation with the science sector are very promising. They are moreover, consistent with the increase in the spending on R&D in innovativeness expenses noted above. It appears that the clusters have begun to fill in the missing role of a link between enterprises and science institutions, and indeed the clusters appear to be an optimal solution for this function. The problems noted not only in Poland but also in other European countries in ensuring cooperation between science and business allow looking with hope at the possibility of the clusters filling the gap. Clusters should be encouraged to fully engage in organising cooperation with the science sector. Best practice in this respect is exemplified by the Aviation Valley Cluster.

**Good Practice 23. The development of knowledge and innovative technologies in aviation industry through cooperation of the representatives of science and business in the areas of R&D.**



Aviation Valley

**Aim: to develop knowledge and innovative technologies in the aviation industry through cooperation of the representatives of science and business in the areas of R&D.**

The Association of the Aviation Industry Entrepreneurs “Aviation Valley” in cooperation with other associations of aviation companies that represent the Polish Aeronautical Technology Platform was the initiator and a signatory of an agreement with the National Centre for Research and Development concerning the establishment at a national level of

a sector programme for aeronautics INNOLOT.

It is one of two preliminary sector programmes of the National Centre for Research and Development created in cooperation with the Ministry of Science and Higher Education the creation of which is to intensify the growth of R&D in strategic sectors of Polish economy. Its main goal is to support the development of aviation technologies and increasing competitiveness in production companies concentrated mainly in the Aviation Valley and the Wielkopolska Aviation Cluster.

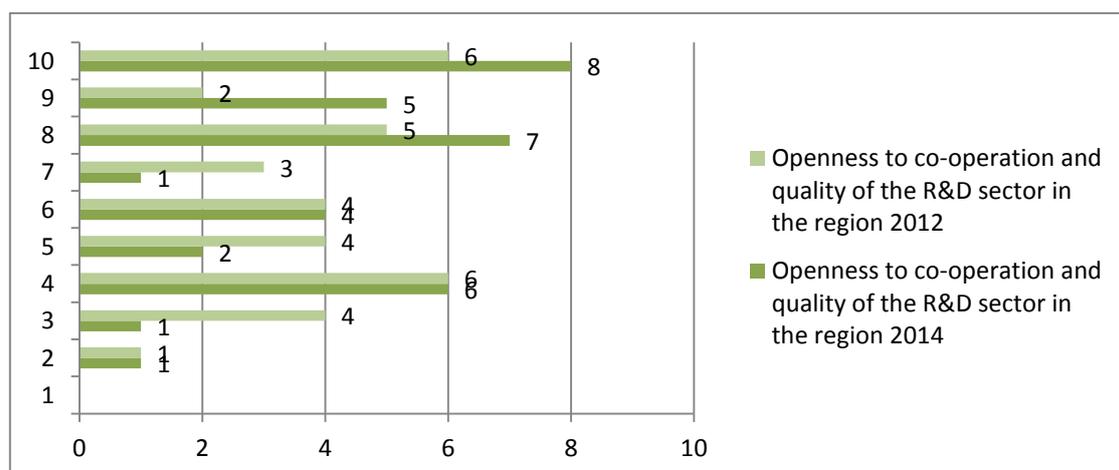
The particular aims are the following:

- To increase the percentage of end-products in Polish aviation industry;
- To increase the participation of the Ministry of Treasury in developing new technologies for aviation;
- To build lasting connections (in the form of agreement on cooperation, research contracts, joint applications for Polish or European financing) between the industry and research institutions; and,
- To increase Technology Readiness Level developed by research institutions.

The programme, prepared similarly to the European JTI Clean Sky, takes into account the achievements and solutions of its European original and the guidelines agreed to in the Polish Aeronautics Strategic Research Agenda developed by the Polish Aeronautical Technology Platform (PPTL). An undisputable success is integrating around this project the members of PPTL from all of Poland including a considerable numbers of small and medium enterprises form aviation industry.

**Result: Integrations and development of cooperation among representatives in business and science within the framework of R&D for aviation industry, development or national innovative technologies and knew knowledge in this field, increase of innovativeness in Polish economy.**

**Chart 133. The evaluation of the *Openness to co-operation and the quality of the R&D sector in the region* –a comparison of research from 2012 and 2014.**



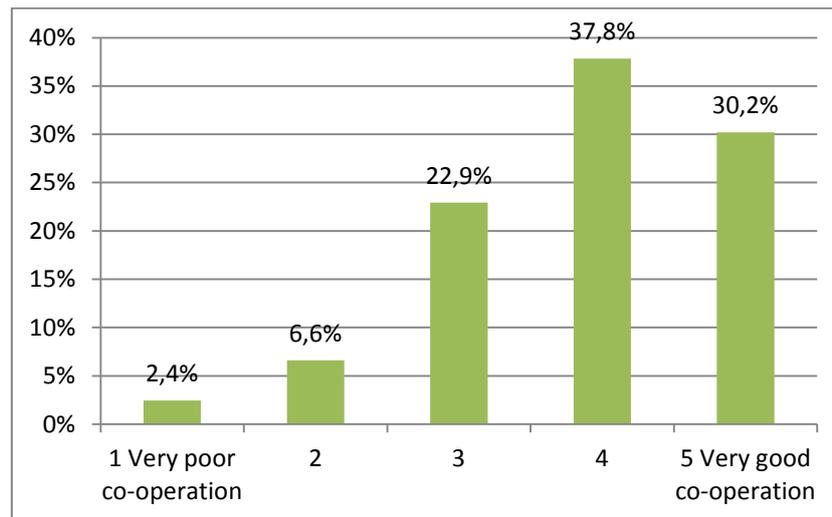
Source: Developed based on the results of research among the cluster coordinators in 2012 and 2014.

In the context of the evaluation of cooperation with the science sector, it is worth looking at the results of the opinion polls of cluster members. First of all, they asked whether they cooperate with research institutions. Out of the 470 responses received, 288 entities confirmed

the existence of such cooperation. Those respondents were asked to evaluate the quality of cooperation with research institutions (Chart 134, question No. 30). Out of those who cooperated, 68% rated this cooperation as good and very good. The average level of cooperation was declared by 22.9% cooperating entities. Poor and very poor cooperation was indicated by 9% of 288 entities.

The above results confirm high ratings of the coordinators concerning the development of cooperation between clusters and research institutions. Cluster members additionally declare the high quality of science sector.

**Chart 134. The evaluation of the *Quality of cooperation with science institutions***

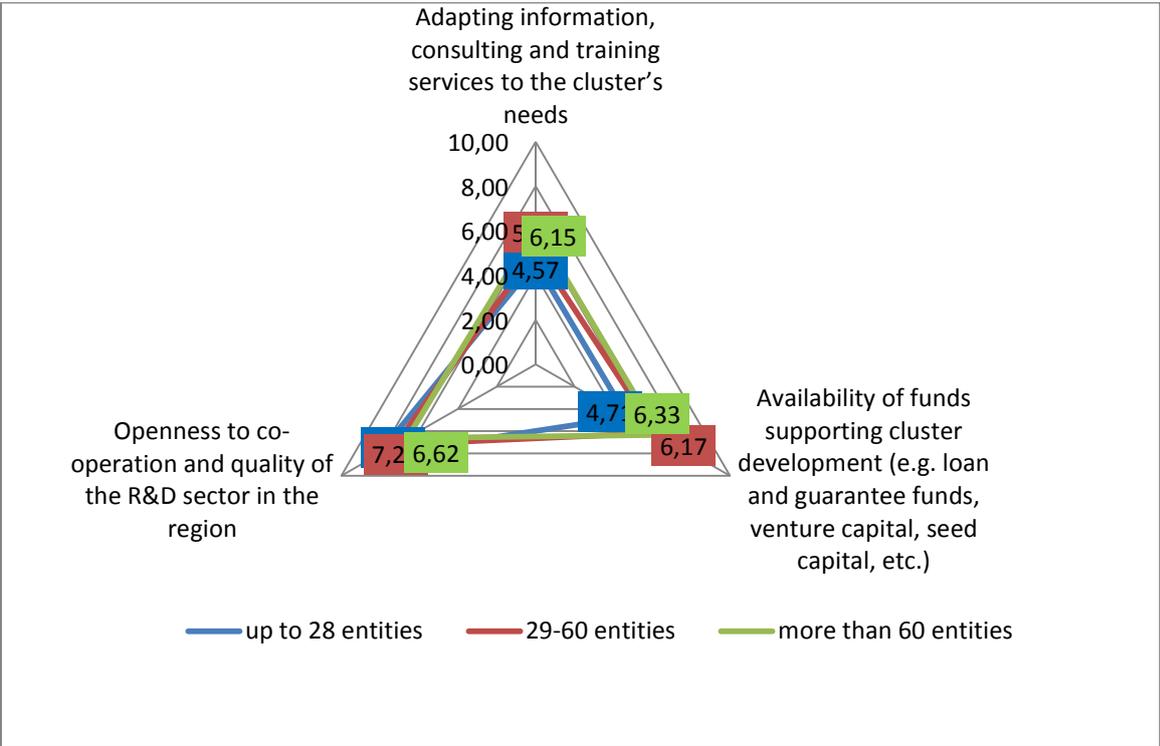


Source: Developed based on the questionnaires CAWI/CATI from members of 35 clusters; N= 288.

On the one hand, it can be concluded that the clusters already play an important role in connecting the world of business and the world of science, based on the analysis of the cluster members' responses to the question whether the membership in the clusters influenced the entity to enter into cooperation with a scientific institution. There were 70 affirmative responses. However, many of the cluster members do not yet cooperate with scientific institutions, the role of the clusters – in which they already feel comfortable - will be coordinating cooperation with research institutions.

In the configuration of cluster size, the evaluations of the *Institutional milieu for cluster development* showed a lot of variation (Chart 135). For two indicators, the correlation is typical: The larger the cluster, the higher the evaluation of the milieu (or perhaps rather, the higher the evaluation of the readiness of the milieu to adapt to the cluster). This is true for the *Adapting information, consulting and training services to the cluster's needs* and the *Availability of funds supporting the cluster development*. However, it is interesting to see a reverse situation for the *Openness to co-operation and the quality of the R&D sector in the region*. The highest rating for this indicator was given by the smallest (8.14), and the second highest rating was by the medium clusters (7.20), while the largest clusters gave the lowest rating (6.26). It might be concluded that large clusters have the biggest problems with the openness to cooperation of the science sector and R&D in the regions. It seems this may be caused by an easier coordination for a smaller number of entities and their more homogenous needs in R&D. Thus, the processes of coordination with research institutions, particularly in large clusters, should be improved. Following experience in other countries is beneficial here, because there is insufficient experience of such cooperation in Poland.

**Chart 135. Mean values of the evaluations in the sub-area *Associated institutions* in relation to the size of the cluster.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

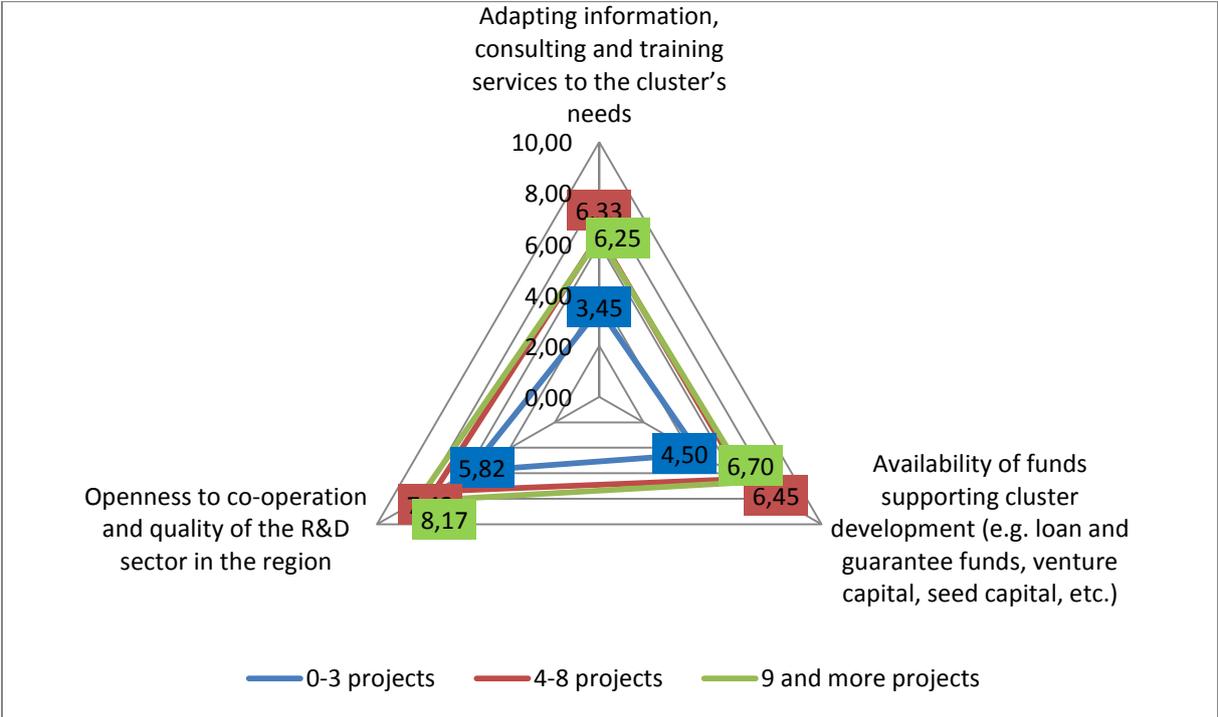
The cross-sectional analysis for the sub-area *Associated institutions* in relation to cluster activity (the number of realised projects) shows a marked distance in the ratings between the most active and active clusters, on the one hand, and the least active, on the other, in all three indicators describing the sub-area.

While the difference between the first two groups did not exceed 0.8, the difference between the rating of the least active clusters and the lowest rating of active clusters was up to 2.80 (Chart 136).

The *Openness to co-operation and the quality of the R&D in the region* was rated the highest by the most active clusters with a mean value at 8.17. The most active clusters also gave the highest rating to the *Availability of funds supporting cluster development*, but the mean value was much lower for this indicator than for the previous one and was 6.70.

Clusters realising 4-8 projects are the most satisfied with the degree of adjustment of information and consulting and training services to the cluster's needs. The mean value here was at 6.33. Doubtless, this strong correlation between the evaluation of the quality and the degree of the activity of the cluster shows that, following previous suggestions, the environment can be and is influenced by the clusters themselves through their activity. Active clusters change attitudes in the research, finance, and educational institutions.

**Chart 136. Mean values for the *Associated institutions* in relation to the number of realised projects.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

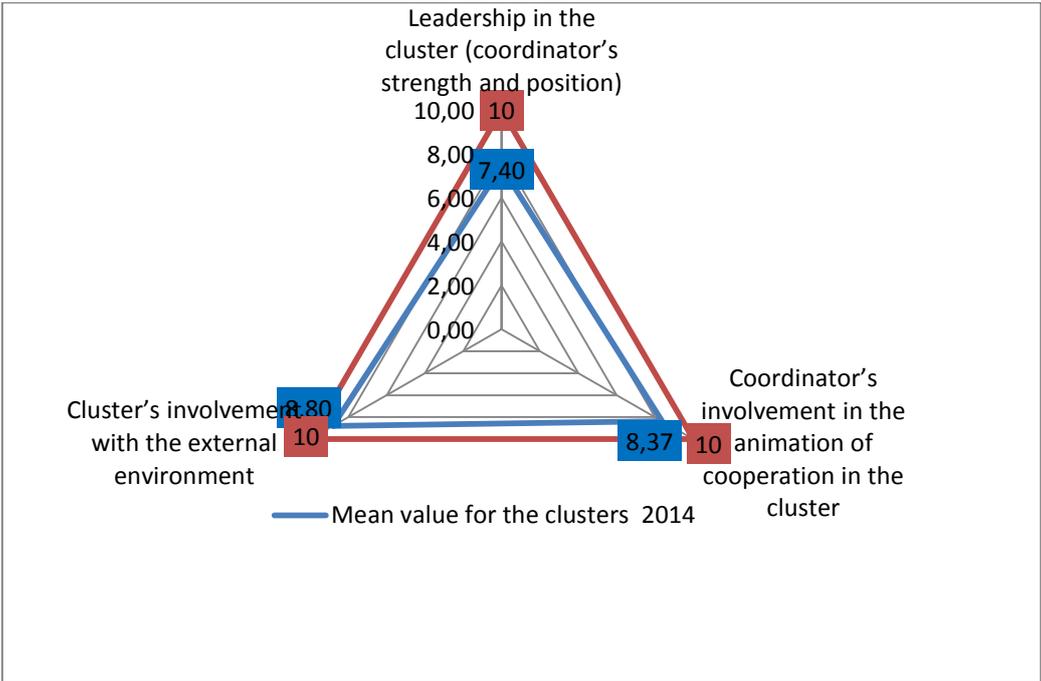
**8.4. Cluster management**

The sub area of *Cluster management* described by three indicators: *Leadership in the cluster (strength and position) of the coordinator*; *Coordinator's involvement in the animation of cooperation in the cluster*; and *Cluster's involvement with the external environment*.

The best situation is in the *Cluster's involvement with the external environment* indicator, where the benchmark is at the highest level (as it is in the other two indicators) and the mean value for all the clusters was 8.80 (Chart 137).

Right behind the positive evaluation for the cluster's involvement was placed *Coordinator's involvement in the animation of cooperation in the cluster*, which received the mean value of 8.37. The lowest rating was given to the *Leadership in the cluster (strength and position) of the coordinator* with the mean value of 7.40. The responses of the coordinators imply that their high involvement in the clusters does not translate into a strong position in the cluster.

**Chart 137. Benchmark and mean value in the *Cluster leadership* sub-area**

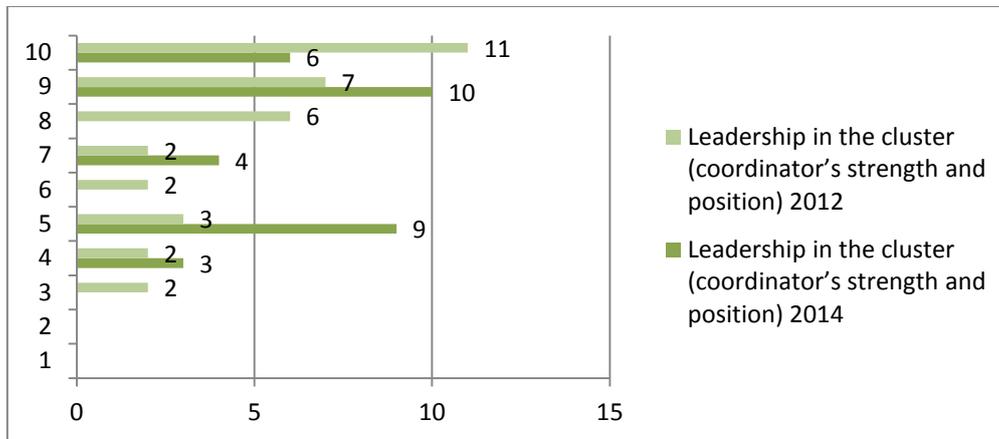


Source: Developed based on the results of research among the coordinators of 35 clusters.

The analysis of ratings for strength and position of the coordinator in 2012 and 2014 mostly shows a decrease of the number of maximum ratings (10) and an increase of ratings at the level of 9, 7, and 5. It suggests a slight weakening of the coordinators' position in the last 2 years. Mean values confirm this: In 2012, the mean value was 7.88, and dropped to 7.40 in 2014, thus decreasing by 6.1%.

The mean value in 2014 shows that the coordinator's position is strong in the region but not very strong in the clusters in relation to its enterprises. It creates a significant problem in clusters management process, since it makes it difficult to implement coordinator's ideas or motivate the members in relation to decisions and actions already agreed to. Perhaps this reveals a key problem related not only to clusters coordination but to cluster development in general. Without strong leadership, clusters will not be able to undertake many pro-development tasks. It is not practicable to solve every issue by discussion and consensus. When a clusters grows, this mode of decision-making leads to eventual dwindling any activity in the cluster. In the management process, it needs to be understood what the source of authority of the manager is in relation to those that are managed. In business, this source can be the ability to control resources or formal power; however, in clusters, the primary source of power must come from leadership. At this stage, there is insufficient data to determine how leadership in the clusters comes into being, whether the coordinator has to be a leader, whether these functions can be separated, or how to strengthen leadership in the clusters. At this stage, it is clear that more light needs to be shed on these problems before any specific recommendations can be provided, which means more research is needed concerning leadership in the clusters. On a short-term basis, it would worthwhile to conduct leadership training and ensure the exchange of experiences among the coordinators in this respect.

**Chart 138. The evaluation of the *Coordinator's leadership in the cluster (strength and position)* – a comparison of results from 2012 and 2014.**

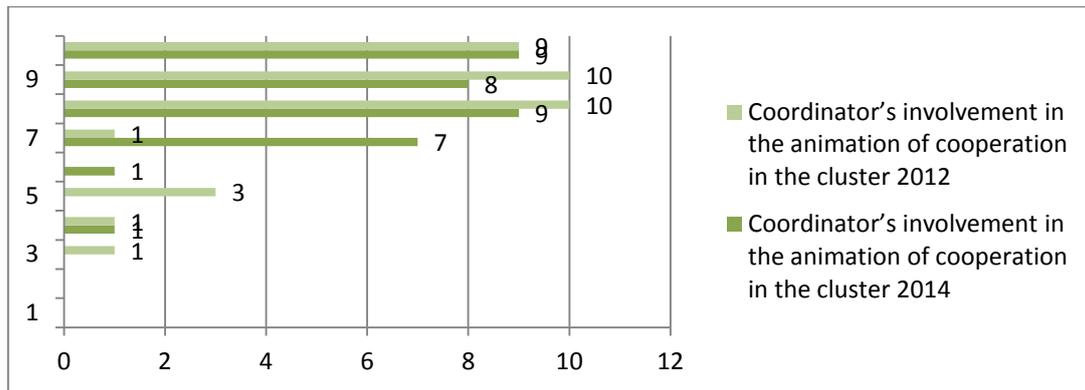


Source: Developed based on the results of research among the cluster coordinators in 2012 and 2014.

Chart 139 presents the results of cluster evaluations concerning the *Coordinator's involvement in the animation of cooperation within the cluster*. Cluster activity was verified by indicating which of the following activities were carried out by the coordinator in a given cluster: *Creating ideas, Missions, Aims; Organising meetings; Actively introducing and including new members of the cluster; Motivating to cooperate – organising teams; Suggesting ideas for joint projects; Managing conflict situations, Solving conflicts; Promoting ideas and aims among cluster members, Presentations, Internal training; Coordinating negotiation for joint orders or channels of distributions; Issuing internal memoranda, ensuring quick and efficient flow of information within the clusters*, or other forms of activity.

An analysis of the structure of evaluations for both editions produces unambiguous results in relation to the changes in ratings during 2012-2014. However, with the help of mean values for the clusters participating in the study in both editions, it can be concluded that there is no noteworthy change in the evaluations. The mean value for 2012 was 8.25, and it increased only by 1.4% to reach 8.37 in two years. This mean value indicates that on average a coordinator applied eight of the above-mentioned instruments for developing cooperation within the cluster.

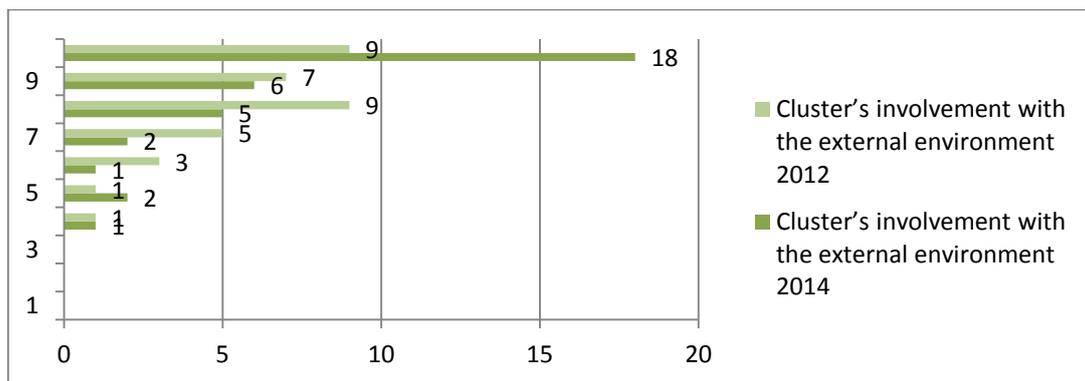
**Chart 139. The evaluation of the *Coordinator's involvement in the animation of cooperation in the cluster* – a comparison of 2012 and 2014 results.**



Source: Developed based on the results of research among the cluster coordinators in 2012 and 2014.

The analysis of evaluations for the *Cluster's involvement in the external environment* indicates a relatively greater involvement of the clusters in cooperation with the environment than in the internal activities described above. At the same time, this activity tends to increase, being higher in 2014 than in 2012 (Chart 140). In particular, the number of coordinators increased who gave maximum ratings for the activities in this indicator.

**Chart 140. Evaluations for the *Cluster's involvement in the external environment* – a comparison of results for 2012 and 2014.**



Source: Developed based on the results of research among the cluster coordinators in 2012 and 2014.

The evaluation corresponds to the statement that, in the last two years, the cluster engaged in 10 out of 11 of the following or additional activities: The cluster's ideas and aims in the environment were promoted; New members were included; The clusters – its members and their achievements were promoted; The cluster was represented at meetings outside the cluster; lobbying was conducted for the cluster; The cluster was active in the press in the form of interviews providing information about events; The clusters cooperated internationally with other clusters; International trade cooperation was initiated for the members of the cluster; Support and cooperation was achieved with R&D environment and science sector; Research laboratories were sought for the needs of the cluster, and cooperation was established; and, Contracts and agreements were negotiated with institutions outside the cluster.

The mean value for the investigated clusters in 2014 was 8.8, while it was 8.2 in 2012. It means that, on average, there were approximately 9 activities undertaken for the purpose of extending the relationship of the clusters with the environment. The involvement outside of the clusters is very positive particularly that it tends to increase.

The coordinators' positive opinions of the internal and external activities are in fact a form of self-evaluation; therefore, it is necessary to verify them from the viewpoint of the cluster members. It is also interesting to see how the cluster members evaluate the leadership of the coordinator where the coordinator expressed scepticism on the subject. Cluster entities were asked to select the entity that is the most active in the cluster. In 73% of the responses (451 out of 618), the coordinator was indicated, and 8.0 % of the responses pointed to a different entity, while 21.9% was not able to definitely point out a leader in respect to involvement.

Moreover, the members of the clusters we asked to evaluate the involvement of the coordinator in various dimensions of activities. The mean value results for the whole study population are included in Table 6 (question No. 4). It should be stressed that all the dimensions of cluster activity were rated above 3.0.

The highest ratings were obtained in the *Coordinator's involvement in the stimulation of cooperation within the cluster (organising meetings, conferences, information exchange)* and the *Coordinator involvement in securing public funds for cluster development*. The mean value for both of these indicators was 4.0. Coordinator activity for cluster cooperation with public authorities including local government (3.99) and in cluster promotion (3.94) was at a similar level.

The three lowest rated dimensions of coordinator activity are worth mentioning. Out of all the dimensions, coordinator involvement in stimulating investments in cluster enterprises received the lowest rating with a mean value of 3.46. Not much better ratings were obtained for stimulating research and development and supporting innovativeness of the cluster. The mean value for these was 3.58 for the former and 3.69 for the latter.

Particularly important here is the relatively low evaluation of the coordinator's involvement in R&D and innovativeness. It would be beneficial to see this low rating as an expression of interest of cluster members in these areas.

Taking into account that it is necessary for the clusters to search for ways to increase the competitiveness of the cluster and its members on domestic and foreign markets, the low evaluation of the activity presented above is not optimistic.

Therefore, it would be justified for the coordinators to re-examine their involvement in various dimensions of activities in favour of R&D and innovativeness. This will probably require closer cooperation with the R&D and science institutions that are already active in the cluster and also searching for new sources of cooperation.

**Table 7. Mean values for coordinator involvement in different dimensions of cluster activity.**

No.	Dimension of activity	Mean
1.	Coordinator involvement in the stimulation of cooperation within the cluster (organising meetings, conferences, information exchange)	4.00
2.	Coordinator involvement in securing public funds for cluster development	4.00
3.	Coordinator involvement in initiating cooperation with public authorities including local government	3.99
4.	Coordinator involvement in cluster and cluster member promotion	3.94
5.	Coordinator involvement in initiating cooperation of enterprises with science sector inside and outside the cluster.	3.87
6.	Coordinator involvement in business expansion in domestic and foreign markets (providing information, participating in domestic trade fairs)	3.83
7.	Coordinator involvement in training, human resource development and organisation of cluster members	3.77
8.	Coordinator involvement in business expansion in foreign markets, e.g. organising trade mission, providing information, participation in foreign trade fairs)	3.77
9.	Coordinator involvement in supporting innovativeness of cluster member enterprises	3.69

10.	Coordinator involvement in stimulating research and development for cluster member enterprises	3.58
11.	Coordinator involvement in stimulating growth of investments in cluster enterprises	3.46

Source: Developed based on CAWI/CATI questionnaires with members of 35 clusters; N=543

The data contained in Chart 141 constitute an important source of information for a cluster coordinator concerning the scope and direction of future management processes which present the expectation of the members towards the cluster. The results are presented in two groups of members – more active and less active.

In every variant of expectations, the entities that realise 4 and more projects (active) have expectations, on average, 15% higher towards the cluster and ultimately towards the coordinator than do the less active clusters (0-3 projects).

Active clusters primarily expect an increase in securing public funds for cluster development (71.1% of the investigated group), an intensification efforts for cluster and cluster member promotion and R&D for cluster member enterprises both inside and outside the cluster, where they also emphasise the role of better support of innovativeness of enterprises belonging to the cluster (in both cases 66.3%).

The entities that are not very active, on the other hand, primarily expect intensification in cluster and cluster member promotion (59.6% of the studied group) and greater stimulation of cooperation within the cluster (organising meetings, conferences, and information exchange), 54.3%, and an increase in involvement and securing public funds for cluster development.

It seems that the expectations of the more active cluster members correspond more to the challenges that face the core enterprises of every cluster. Concerning the necessity of increasing innovation and competitiveness, R&D cooperation appears to be the key prerequisite to the development of clusters and their members. The slightly divergent expectations of the members, particularly the more traditional expectations of the less active members may significantly hinder cluster management, particularly when there are leadership issues as was discussed above. In this situation, it may be needed to verify the cluster members from the point of view of their real involvement and readiness to engage in the key projects of the cluster. Best practice of the INTERIZON cluster is a recommended example here for verifying membership.

#### **Good Practice 24. Updating the number of cluster members *de facto* involved in cluster issues.**



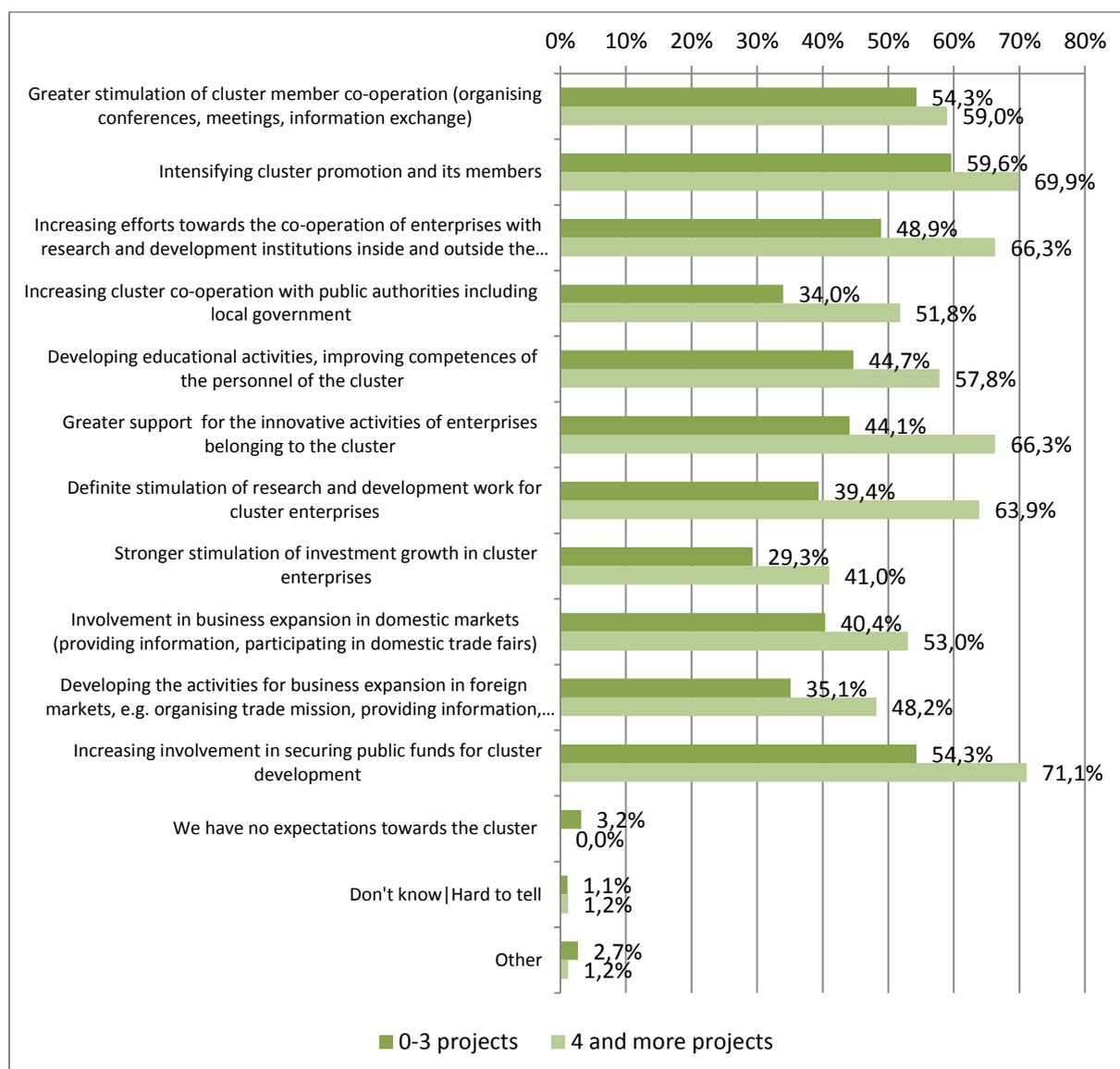
#### **INTERIZON Cluster**

##### **Aim: updating the number of members *de facto* involved in cluster issues.**

During the 2013 strategy update, the cluster decided to analyse the level of activity of all members and remove those members that did not become involved in any way in cluster activities. This measure is necessary particularly for large clusters who want to develop based on the potential and involvement of their members. Letting go of the inactive members helps the management and realisation of joint projects. It can also act in the future as a motivator for the remaining members.

**Result: More efficient cluster management and more transparent division of responsibilities and roles in the cluster. Increasing motivation in the cluster for cooperation among the members.**

**Chart 141. Expectations towards the cluster by its member entities**

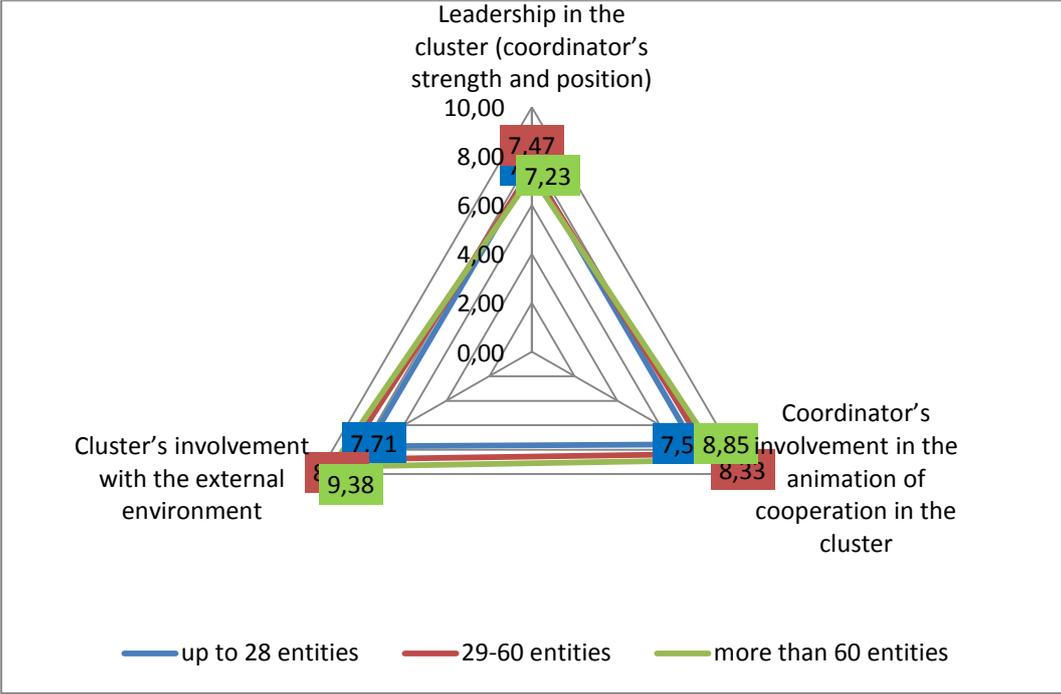


Source: Developed based on questionnaires CAWI/CATI with members of 35 clusters; **N=271**; **N<sub>0-3 projects</sub>=188**; **N<sub>4 and more projects</sub>=83**.

In the entire sub-area of *Cluster management*, the clusters size shows small stratification among clusters (Chart 142). It turns out that the coordinator's position is the strongest in small clusters and weakest in the largest clusters. For small clusters the *Cluster leadership (coordinator strength and position)* had the mean value of 7.57, for medium – 7.47, and for large – 7.23. This only confirms the importance of understanding how the leadership in large clusters is formed, which were shown to have better results in many examples in this Report. However, in order to maintain these results and improve on them, the problem of leadership needs to be solved.

Large clusters gave the highest evaluation, in relation to the two other groups, to the *Cluster's involvement with the external environment* with the mean value of 9.38 and the *Coordinator's involvement in the animation of cooperation within the cluster* with the mean value of 8.85. This appears according to expectations.

**Chart 142. Mean values in the sub-area of *Cluster management* in relation to cluster size.**



Source: Developed based on the results of research among the coordinators of 35 clusters.

**8.5. Summary of the *Cluster growth potential* area in 2014**

It can be concluded that, based on mean values of benchmark of the area *Cluster growth potential*, the situation in the clusters in the last two years has not changed significantly. In their regions, the clusters encounter very diverse attitudes in regional government. It appears there is a lack of full understanding in some regions of the role that clusters may play in promoting regional development.

The results of the least active clusters in carrying out projects while taking into account the results in the sub areas suggest a degree of entitlement mentality towards their environment. Their low activity in cluster projects is discounted by insufficient support and public authorities' policies, while at the same time they declare relatively high self-evaluation in the *Cluster management* sub-area.

It appears that some of the clusters have an impression of insufficient inclusion of their leading industries in establishing regional specialisations, although clusters can and should play an important role in the processes for determining and developing regional specialisations.

According to most clusters, the regions in which they are enrooted are attractive for investments, but too little effort is spent on promoting their assets.

Clusters also have a significant, if not decisive, influence on the attitude changes in the local and regional environments. It is the establishment, development, and successes of clusters by giving a good example that build confidence in economic and social cooperation. Clusters should be seen as the valuable key element of building social capital in Poland.

The relatively low evaluations of regional conditions by the large clusters may suggest that their quick development, in some cases, did not take into account the logic of industry connections in the region or the created chains of values related to the main industry.

The evaluation of the regional and local environment is more favourable from the clusters that are more active and realise many projects.

Clusters are increasingly more often perceived by the public authorities as an element of regional institutional infrastructure that enhances development. There is a strong diversification of the clusters concerning financial support.

There is a noticeable inefficiency in the labour market sector and training and educational institutions concerning forming competences expected by enterprises and clusters. However, positive changes are taking place pertaining to adapting the educational offer in the regions to the needs of clusters. This is a very positive development.

There is no evidence that training and consulting services have undergone positive changes in adapting their services to the clusters' needs. The degree of adjustment is insufficient and requires improvement.

There have also been positive results in cooperation with the science sector. The clusters have the greatest problem with the openness of the science and R&D sector in their region.

External and internal activity of the coordinators should be viewed very positively, particularly that ratings of the former tend to grow.

A central problem in cluster management concerns leadership.

There are somewhat conflicting expectations of the clusters members regarding the directions of development, particularly the cross-section of the less and more active members, which can make the management of the clusters significantly more difficult.

## **8.6. Changing trends in the *Cluster growth potential* area in 2010-2014**

An analysis of the data presented in Chart 144, which contains mean values of the indicators describing by the *Regional conditions* for 2010, 2012, and 2014, indicates a decline.

This is confirmed by the values of the synthesised indicator for each year. In 2010, the mean value of the synthesised indicator was 5.51, and it then increased to 7.31 in 2012, to drop in 2014 below the level from 2010, down to 5.04.

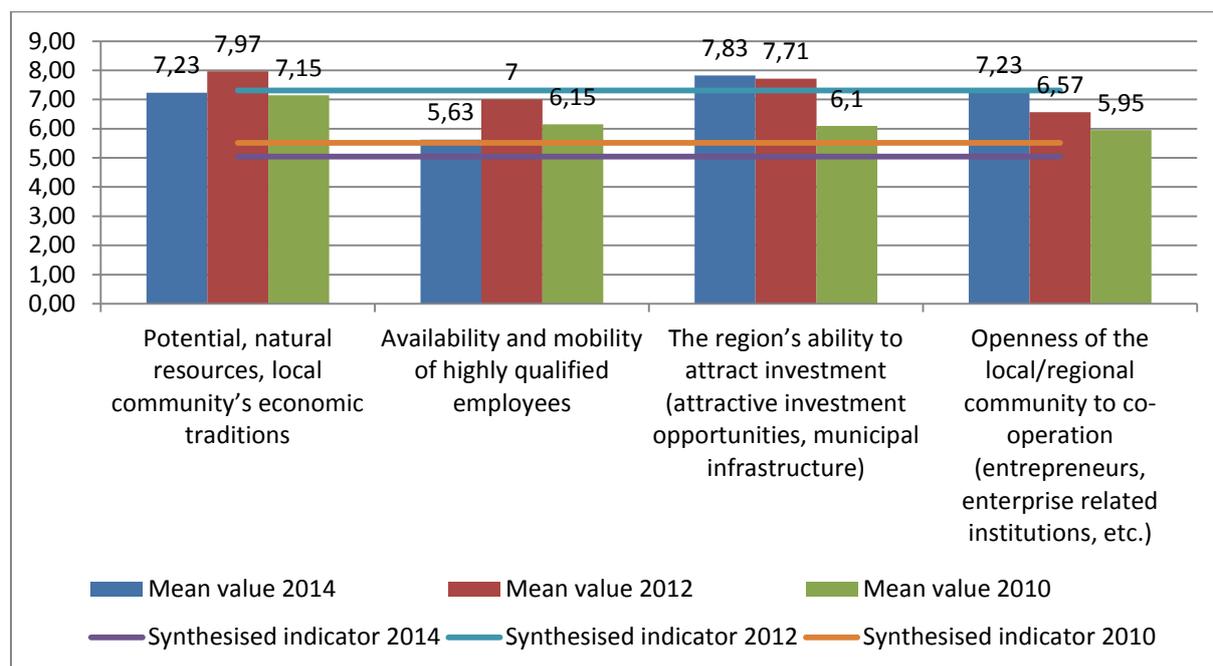
In spite of this, there are two indicators that show a continuous increase in the last four years. This is the case for the investment attractiveness and the openness of the local/regional community. For the former indicator, the mean value from 2010 to 2014 increased by 28.36%, from 6.1 in 2010, to 7.83 in 2014. The mean value in 2014 increased in relation to 2012 only by 1.56%, from the level of 7.71.

The increases in the mean value in the *Openness of the regional/local environment to cooperation* indicator are more proportional than in the previous case. The average in 2012 increased by 10.42% to the level of 6.57 from 5.95. Then, in 2012-2014, it increased by another 10.04% to the level of 7.23. The cumulated increase for the analysed indicator was then 20.46% for the period of 2010–2014.

For the *Potential, natural resources, and economic traditions of the local environment* in 2014, there was an increase of the mean value (7.23) in relation to 2010 (7.15), but decreased in relation to 2012 (7.97).

The situation is much worse for the *Availability and mobility of highly Qualified personnel* where the decrease in mean value was the greatest. The mean value for 2014 was 5.43, which is only 77.57% of the mean value in 2012 (7.0) and 91.54% of the mean value in 2010 (6.15). Within regional conditions, the availability of competent employees has become the biggest challenge, and ensuring access for the clusters to highly qualified employees should be the focus of future activities of the clusters, as discussed earlier.

**Chart 143. A comparison of the *Regional conditions* sub-area in 2010, 2012 and 2014**



Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

In contrast to the previous sub-area, the sub-area of *Public authorities' policy supporting cluster development* shows a perceptible increase. The synthesized indicator grows consistently from 3.69 in 2010, to 4.67 in 2012, up to 5.04 in 2014.

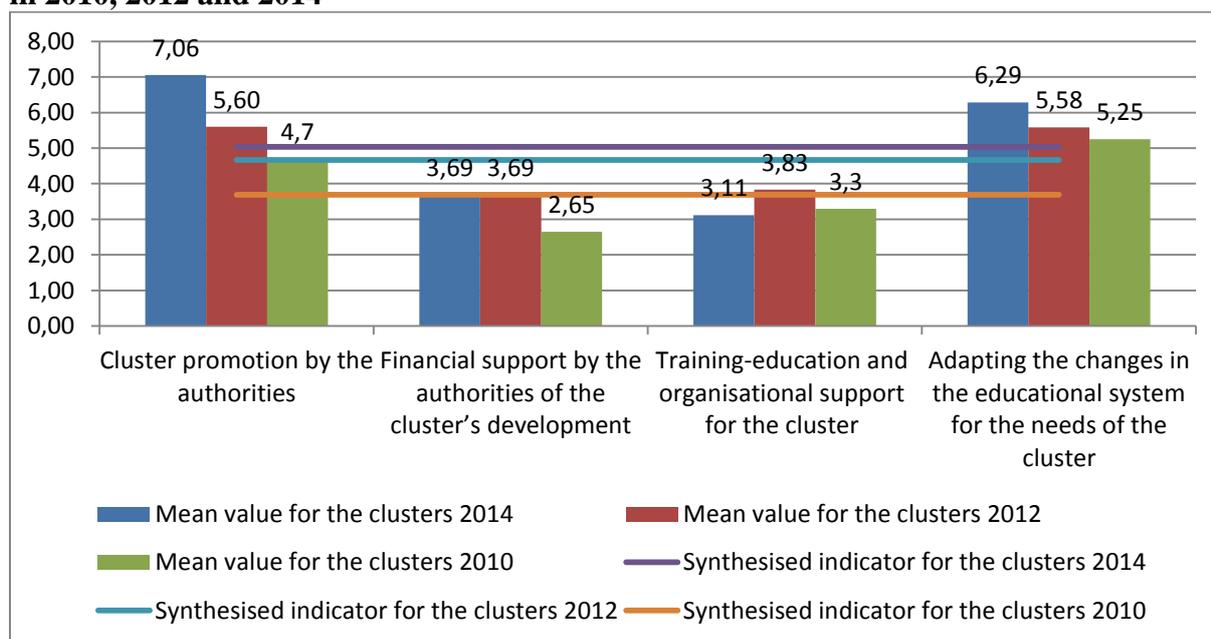
This result was definitely influenced the most by a large increase in positive evaluations by the coordinators of the *Cluster promotion by the public authorities*. During 2010-2014, the mean value for this indicator increased from 4.70 to 7.06, i.e., by as much as 50.02%. In 2012, the mean value was at 5.60.

A less intensive but very important improvement from the cluster development viewpoint was noted in the *Modifications in the education system for the cluster needs*. During the four-year period, the mean value increased from 5.25 in 2010, to 5.58 in 2012, to 6.29 in 2014. Thus, the overall increase in mean value was 19.81.

In the third indicator for the *Public authorities' policy supporting cluster development*, namely the *Financial support by the authorities of the cluster development*, the increase of the mean value from 2.65 in 2010 to 3.69 in 2012 was came support a stop and the mean valued in 2014 was the same as in 2012.

Only for the *Training-education and organisational support for the clusters* indicator, there has been a decrease in the mean value in 2014 not only in relation to 2012, but also to 2010. The mean value was 3.11 in 2014, it was 3.83 in 2012, and it was 3.30 in 2010. Again, the focus of attention is on the issue of personnel competence and the need of concentrated effort by the clusters to reverse this negative trend.

**Chart 144. The results of the *Public authorities' supporting cluster development* sub-area in 2010, 2012 and 2014**



Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

Chart 145 presents a comparison of cluster results for the *Associated institutions* sub-area for 2010, 2012 and 2014.

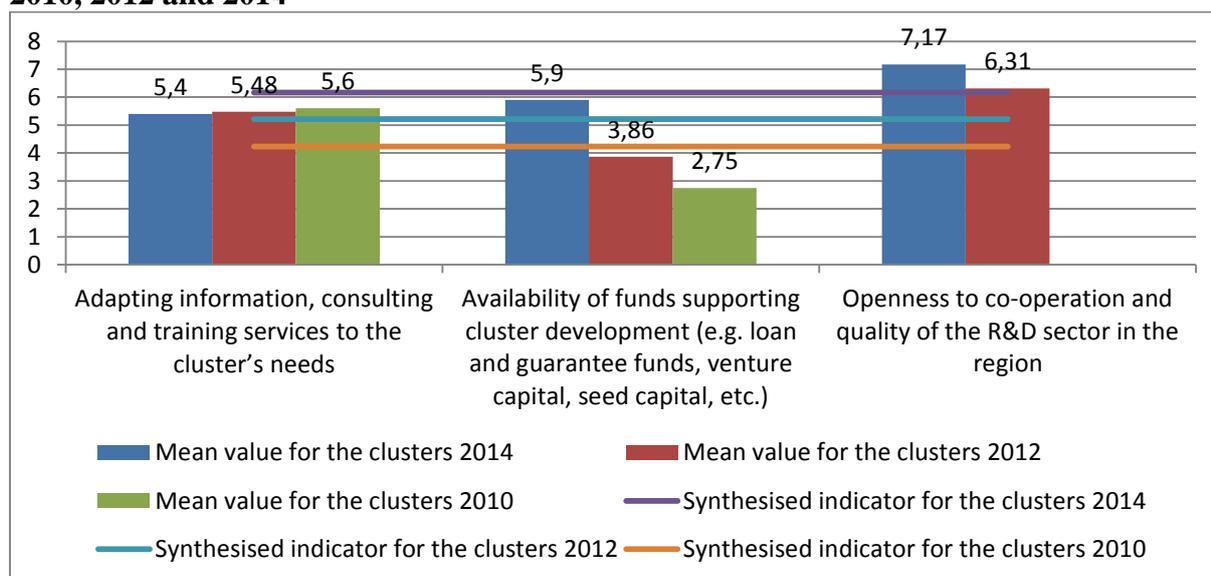
Based on the synthesised indicator, the third sub-area of *Cluster growth potential* shows a positive trend in the institutional milieu and its support for the clusters. The synthesised indicator increased during the period of 2010 and 2012 from 4.23 to 5.22, and in 2014, the synthesised indicator was 6.17.

The greatest degree in positive changes in the institutional milieu from the point of view of the clusters' needs was observed in the *Availability of funds supporting the development of the cluster*. The mean value for this indicator grew from barely 2.73 to 3.86 in 2012, to reach a high of 5.90 in 2014. The combined increase for the 2010–2014 period was as much as 114.5%.

For the *Openness to co-operation and the quality of the R&D sector in the region* indicator, the changes can be analysed only for the 2012–2014 period, since this indicator was not included in the benchmarking analyses in the 2010 edition. The mean value in 2014 increased by 13.62%, from 6.31 in the year 2012 to 7.17.

There was also a slight negative trend in the *Institutional milieu for cluster development* sub-area. It occurred in the *Adapting consulting and training services to the cluster's needs* indicator. The mean value has been consistently dropping from 5.60 in 2010, down to 5.48 in 2012, and again to 5.40 in 2014. The negative changes are not extensive; however, if one considers the increase of the clusters' needs, particularly those with large development dynamics, they are significant. All the previous observations about the need for clusters to engage in the process of ensuring the proper competences find yet another confirmation here.

**Chart 145. A comparison of cluster results for the *Associated institutions* sub-area in 2010, 2012 and 2014**



Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

The last sub-area the *Cluster management* shows the largest mean values out of all the analysed sub-areas of the *Cluster growth potential* area. The synthesised indicator for 2010-2014 increased from 6.38 in the year 2010 to 8.19 in 2014, having increased in 2012 to 8.02.

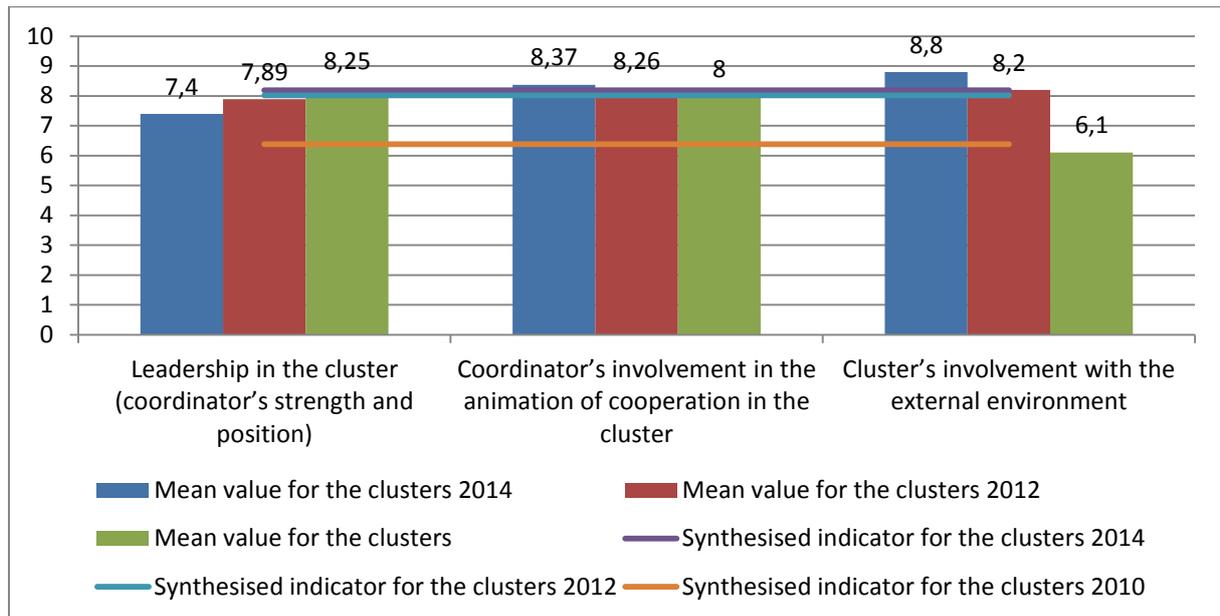
For two indicators describing this sub-area, there was an improvement and an increase of the mean values for the study group of clusters, and one noted a decrease.

The greatest increase in the mean value cluster occurred in the *Cluster's Involvement with the External Environment* indicator, where the mean value of 6.10 in 2010 increased to 8.20 in 2012, to eventually reach 8.80 in 2014. Thus, the increase of the mean value for this indicator was 44.26% for the period of 2010-2014.

For the *Coordinator activity for animating cluster cooperation* indicator, the increase in the mean value was only 4.6%.

In the third indicator, there was a decrease of the strength and position of the cluster coordinator. The decrease of the *Cluster leadership (strength and position)* indicator in the 2010-2014 period was by 10.3%. This is a continuous trend, since, in 2012, the mean value for the clusters in 2012 dropped to 7.89. This trend shows that a central issue in the area of cluster management is presently the problem of cluster leadership. The earlier conclusions are sustained concerning the need to analyse this matter and to provide a short-term support for the coordinators through education and sharing experience.

**Chart 146. A comparison of cluster results in the 2010-2014 period for the *Cluster management* sub-area.**



Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

## 9. Cluster evaluation by cluster members

### 9.1. Cluster management

Since the experience of cluster functioning in Poland is still limited, the evaluation of cluster management is reduced to the evaluation of the degree of activity and the results of this activity of the coordinator's.

This area of evaluation has been discussed in the Report in relation to the *Cluster growth potential*<sup>12</sup> in the context of contrasting self-evaluations of cluster coordinators in the *Cluster management* sub-area with the member evaluations.

However, it is worthwhile to extend the analysis of the cluster member evaluation by variables not included in the benchmarking indicators. First of all, it should be noted that cluster's members in 451 cases out of 618 (73% of study group) consider the coordinator as the most active entity in the cluster (question No. 5a). Therefore, in over 25% cases, it can be stated that the coordinators are not their leaders. This does not have to be seen only in negative light. Perhaps in some clusters, a specific management model is forming in which the leadership function is separated from the function of coordinating activity. The situation is quite conceivable where strong leadership comes from one of the members, while the organisational aspect is ceded to the coordinator. However, proper management would require very close cooperation between the leader and the coordinator and a relatively high activity from the leader. There is a real danger of conflicts between the coordinator and the leader, which may be exacerbated in case of the leader's insufficient daily involvement. These results confirm the previous findings related to the leadership issues in the clusters and the need to further look into this situation.

The most important indications of cluster activity according to the ratings of the cluster members were the following (on the rating scale from 1 – poor, to 5 – very good): coordinator activity in animating cooperation of cluster members (organising meetings, conferences, information exchange) (4.0); coordinator activity in securing support from public funds for cluster development (4.0); coordinator activity in initiating cooperation with public authorities including local government (3.99); and, coordinator activity in cluster and cluster member promotion (3.94).

The lowest ratings of coordinator activity were the following: the stimulation growth of investments in cluster enterprises (3.46), stimulation research and development for cluster enterprises (3.58), and support for innovativeness of cluster member enterprises (3.69). These results strongly support the previous findings concerning the limited focus on pro-innovative cluster projects including research and development. Moreover, the opinions of the members are not entirely positive in regards to the coordinators' activities in stimulating investment growth. This can be seen as an indication that at least some of the cluster members expect this as role of the coordinator. This should be considered positive, as evidence of preference for undertaking joint pro-development actions, which can be used by the coordinators for the cluster management process.

The above observations were formulated based on the opinions of all cluster members. It is worthwhile to examine the same aspects from the point of view of groups of entities according to the number of projects undertaken within cluster activities. Two groups were formed – less active (0–3 projects) and active (4 and more projects). The results of the evaluations of these two groups are presented in Chart 147.

The distribution of responses clearly indicates that active enterprises evaluate coordinator activity much more positively in the eleven analysed aspects. The differences in good and

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<sup>12</sup>See: section 8.4. Cluster management in this report.

very good ratings are usually 18%, reaching as much as 30%. Active entities (4 and more projects) appreciate the coordinator activity the most concerning the initiation of cooperation with the public authorities, including local government. Altogether the good and very good ratings reached 91%, including 64.1% very good rating in the study group. Moreover, active entities rated very highly coordinator activity in animating cooperation within the cluster (87.9%), securing public funding for cluster development (87.7%) and cluster promotion (85.3%).

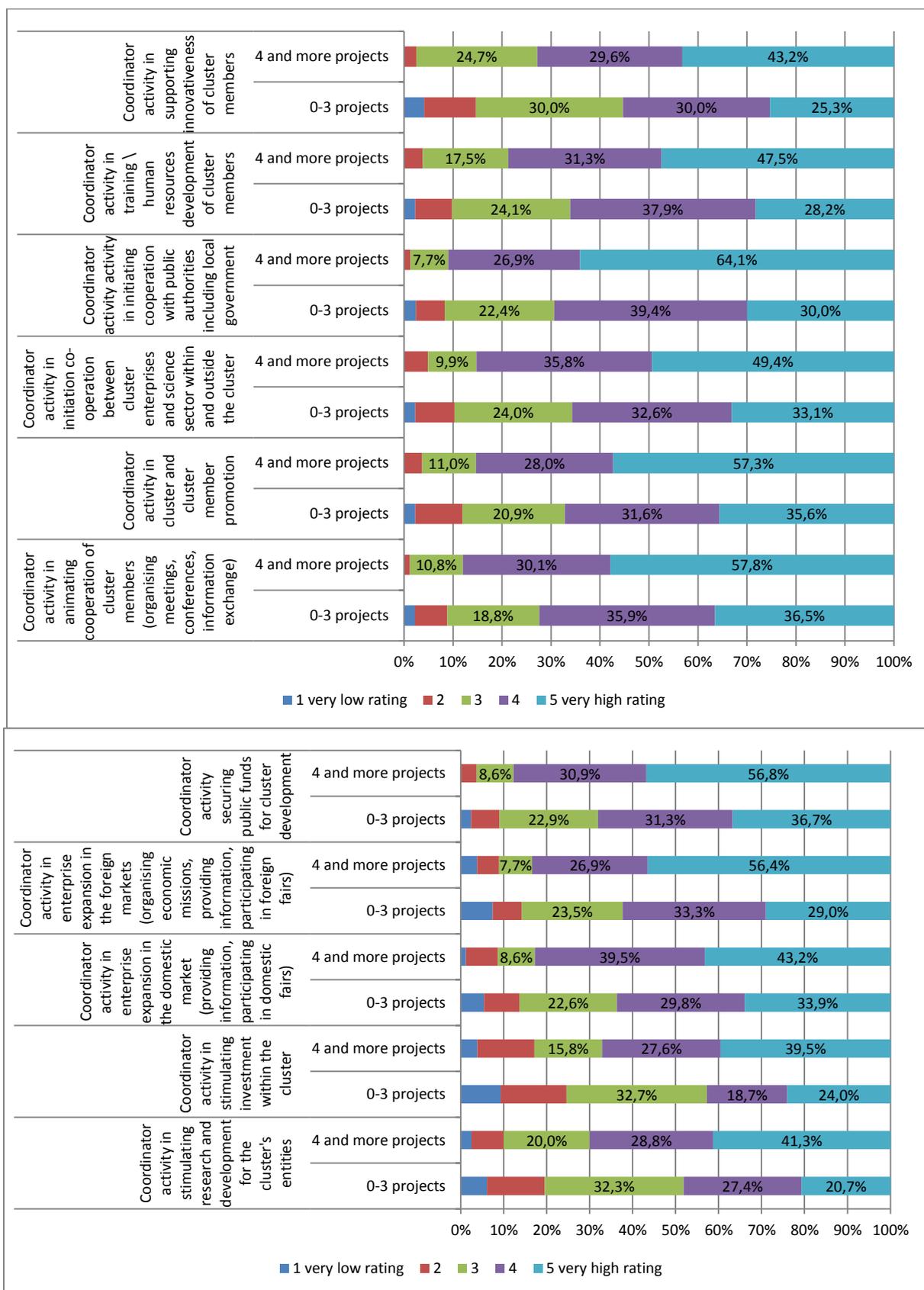
The above results can be interpreted as indicating that the more active members evaluate coordinator activity more positively. However, in terms of cause and effect, more convincing is the opposite relation, namely that coordinators, by enabling the members to participate in a larger number of projects, are evaluated more positively by those members. This conclusion may seem obvious, but it undoubtedly confirms that members are not satisfied by merely being formal structure members. Rather they expect greater activity within jointly realised pro-development projects.

Active cluster members gave relatively low ratings for the coordinators activity in the stimulation of investment growth in cluster enterprises (67.1% of total 4 and 5 ratings) and in the area of stimulating R&D work (70.1% positive ratings).

For these last two dimensions of coordinator activity, less active entities are in agreement with active entities. They also rated these coordinator activities at a lowest level. The low evaluations of coordinator activity in innovation and research and development by the most active members who participate in a large number of projects again confirm the previous conclusion that the focus of the clusters in this respect is insufficient. These low evaluations can also be interpreted as an expression of interest by the cluster members in undertaking pro-innovative projects with a cluster.

In view of the above, it is apparent that there is a need for greater involvement of the clusters in R&D work, which can be achieved by increasing the co-operation with the existing research institutions within the cluster and by acquiring new ones.

**Chart 147. The evaluation of coordinator activity by cluster members within different dimensions in relation to the number of realised projects.**

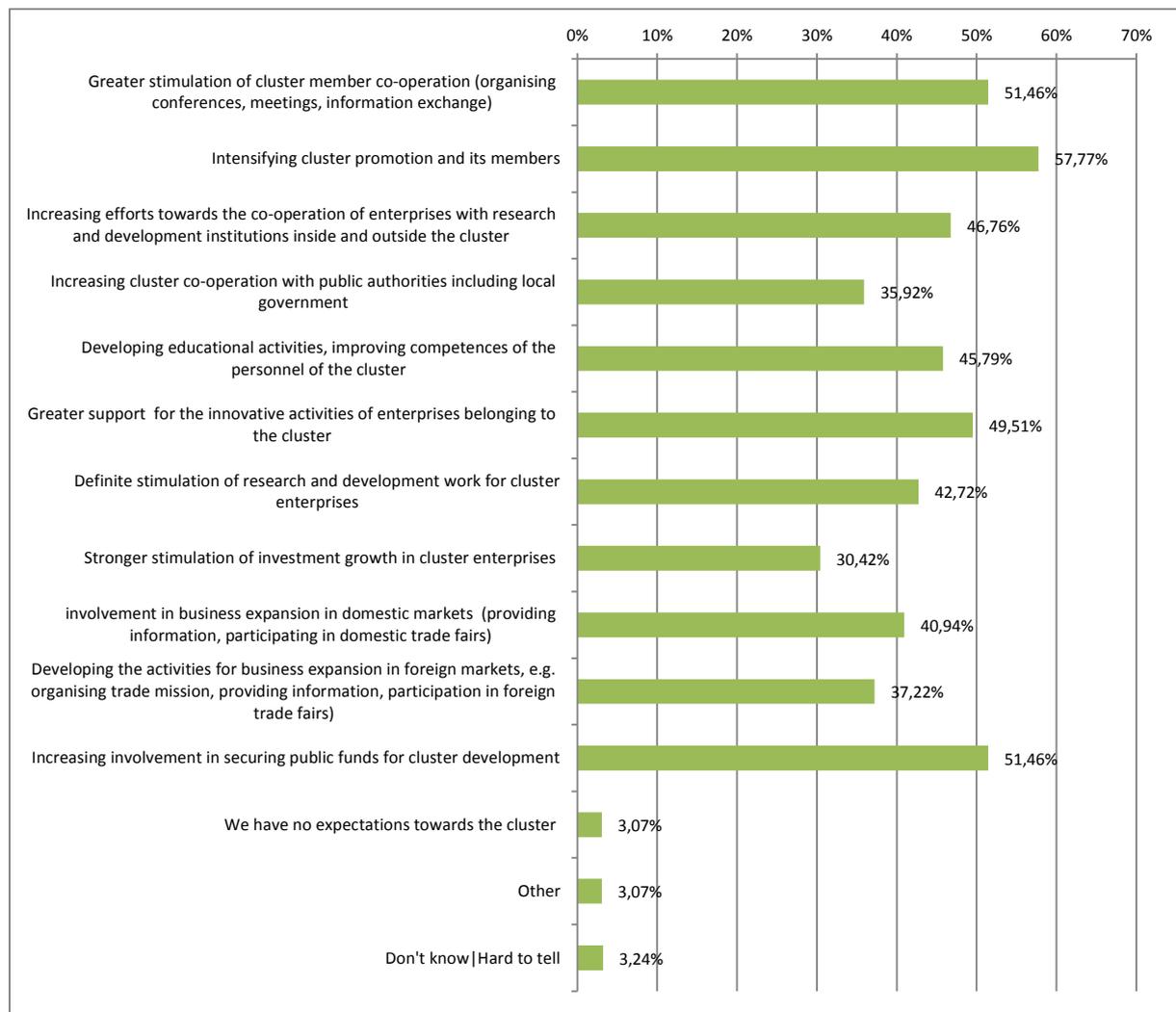


Source: Developed based on CAWI/CATI questionnaires for members 35 clusters; N=248; N0-3 projects=170; N4 and more projects=78.

The analysis of member expectations towards their cluster may certainly constitute an important source of information for the coordinator in regards to the direction and scope of future management processes in the cluster in order to be able to meet the expectations, particularly in view of the evaluations of coordinator activity.

Cluster entities primarily expect intensification of cluster and cluster member promotion 57.67% indications (Chart 148/question No. 46). Next, they expect a greater involvement in stimulating cooperation within the cluster and the intensification of efforts to secure public funding for cluster development. Both of these are at 51.37%.

**Chart 148. Expectations towards the cluster from member entities**



Source: Developed based on CAWI/CATI questionnaire with 35 cluster members. N=618.

As the fourth place, cluster members declared the necessity to increase efforts by the coordinator in supporting innovative activities of the cluster enterprises (49.43%). Thus, a relatively low position of innovativeness is not surprising and can be explained by the insufficient previous involvement and the lack of knowledge and expectations concerning the ability of the cluster to influence innovativeness. The most often selected expectations coincide with the previous experiences and are to a large extent their extrapolation. Taking all this into account, the position given to innovativeness by cluster members to the pro-innovative activities should be considered high and seen as positive. This underscoring of pro-innovativeness of the clusters manifests itself even more in the responses of the participants

realising a larger number of projects. They expect an increase of activity in acquiring public funding for cluster development (71.1% of the study group). Then, as in the general cluster population, they expect cluster promotion (69.9%) and an increase in the efforts towards the cooperation of enterprises with R&D institutions within the cluster as well as outside the cluster. They also emphasise the role of greater support, if innovativeness of enterprises (in both cases 66.3%).

It appears that the expectations of the more active cluster members correspond to a greater extent to the challenges that are faced by the enterprises that are the core of the cluster than those of the members of the whole cluster study group. The necessity to increase the innovativeness and competitiveness of clusters, through cooperation with R&D, are the key conditions for cluster development, which was emphasised earlier in the Report.

The evaluation of various dimensions of coordinator activity is positive, particularly by the entities that realise a larger number of cluster projects. On the other hand, this group has much higher expectations towards the coordinators. It seems that relatively high evaluations of the coordinator activity are a result of only recently emerging specific expectations of the members related to their cluster. Up until now, merely the creation of a cluster structure and acquiring external funding and cluster promotion were sufficient. Moreover, the high level of expectations concerning future tasks, including pro-innovation, suggests that the expectations towards effective cluster management will continue to increase rapidly. Hence, the steps suggested earlier in the Report should be taken, including supporting leadership as a management model. An element of advancing management that will be a challenge for the coordinator is the consideration for the varied needs of the cluster members, which will necessitate differentiation of levels and areas of activity of individual members in cluster activity.

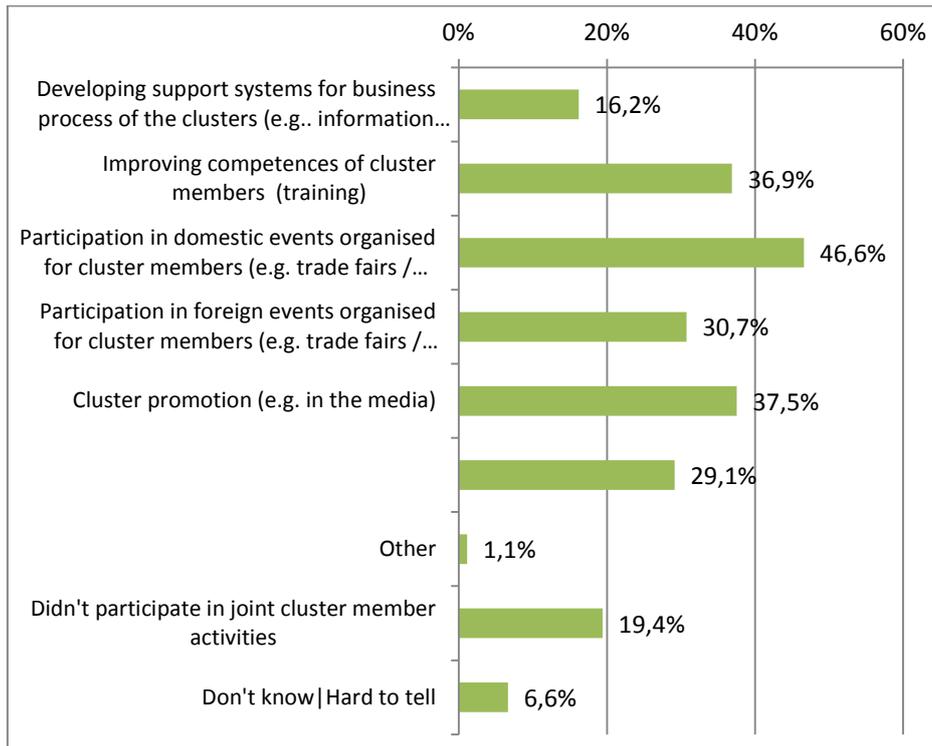
## **9.2. Joint undertakings**

In relation to the reported needs to increase the efforts of the coordinators towards stimulating R&D and innovative work among the cluster entities, it is important to examine once again the responses to the question concerning whether they participated in joint endeavours realised by cluster members that consisted in developing a new or significantly modified product or service. Positive responses were given by 37% of the entities (228 out of 618). As it turned out in the elaboration of the question, for 65.4% of those who answered affirmatively, the joint endeavour was related to R&D; and more than half of them (51.4% or 76 out of 148) were carried out in cooperation with partners outside the clusters. For twenty entities, the partner was outside of Poland. The participation of entities in joint projects related to developing new products may already be considered significant, although there is still a lot of room for further development of activity, particularly if the need for R&D projects is taken into account.

Cluster members were asked to answer a broad question in what type of cluster activity they participated jointly with other members. The responses are shown in Chart 149 (question No. 14).

There were no joint endeavours reported in which more than 50% of the members participated. The greatest number of members carrying out joint projects applies to relatively simple forms of cooperation, such as participating in economic events in Poland. This type of joint activities was reported by 46.6% of entities. Considering the broadness of the question, which includes participating in conferences or trade fairs, the participation of less than half of the members may be considered as negative. Next, the participants reported having cluster promotion (37.5%) and personnel competence development of cluster members (36.9%).

**Chart 149. Joint undertakings of cluster members**



Source: Developed based on CAWI/CATI questionnaires with 35 cluster members; N= 618.

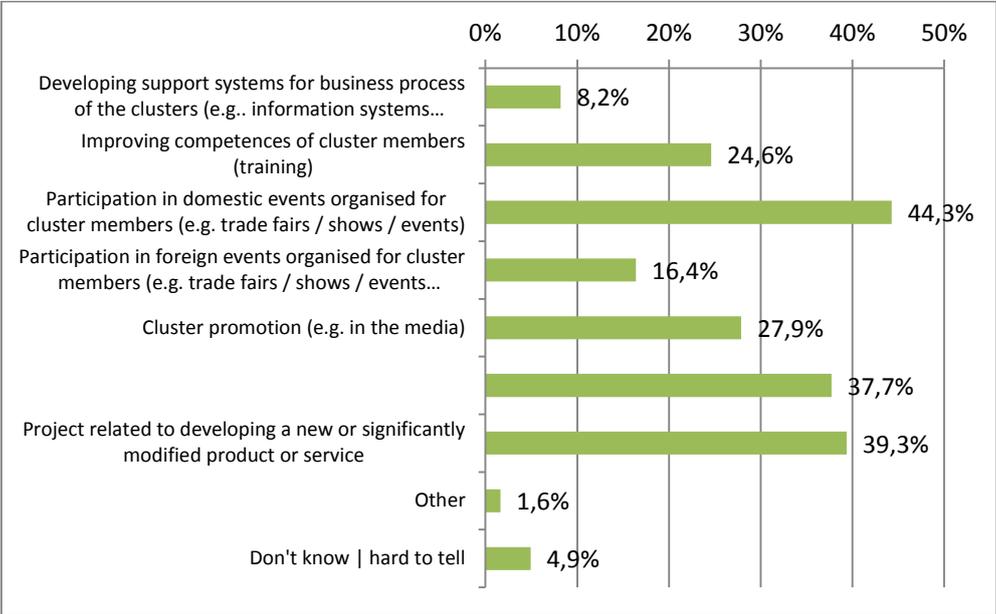
Only 16.2% of the participants pointed to the type of joint endeavours that can be described as business process support systems. It reveals an insufficient involvement of cluster members in the activities that directly increase the competitiveness of the enterprise, which is the essence of clusters, and points to the still existing deficiencies in cluster management. This last statement is strongly supported by the fact that one fourth of the respondents were not able to confirm participation in any type of joint activities (the portion of responses “did not participate” and “don’t know/hard to tell”). No doubt, this indicates a management flaw and perhaps a need for verification of cluster members concerning their readiness to engage in joint cluster activities.

Cluster entities were asked to indicate the number of joint activities in which they had participated since the beginning of their cluster membership (question No. 15). The number of instances was 2,181. It needs to be stressed here that the number of participants that answered that question was 295. The greatest declared number was 120 for a single case, and the smallest was 0 in three cases. The mean value for jointly realised endeavours was 7.39. This certainly confirms a high degree of diversity among cluster members in respect to participating in joint activities. The question whether at least one of the joint projects was co-financed from public sources (programmes including foreign) was answered in affirmative by 57.6% entities out of 469 respondents (question No. 15a). Only 25.6% of cases reported that the financing came from the private resources of the cluster members. It should be pointed out that, so far, the pro-development activity of the clusters has been to a large extent financed by public funding, including foreign.

61 entities answered in the affirmative (question 15c) to the question concerning which of the indicated activities was financed exclusively by private funding. It is worth examining how the private funds were allocated. The largest portion of private funding was spend on economic events in Poland (44.3% of indications– 27 entities); however, a close second was activity strictly related to the promotion of innovativeness, namely, developing new or

significantly modified products (39.3% – 24 entities). Creating and developing cluster structures and their organisation (37.7% – 23 entities) was also significant. It is apparent that there is shift in stress for privately financed projects in favour of pro-innovative activities, particularly related to the development of new products.

**Chart 150. Joint undertakings financed from private funds**



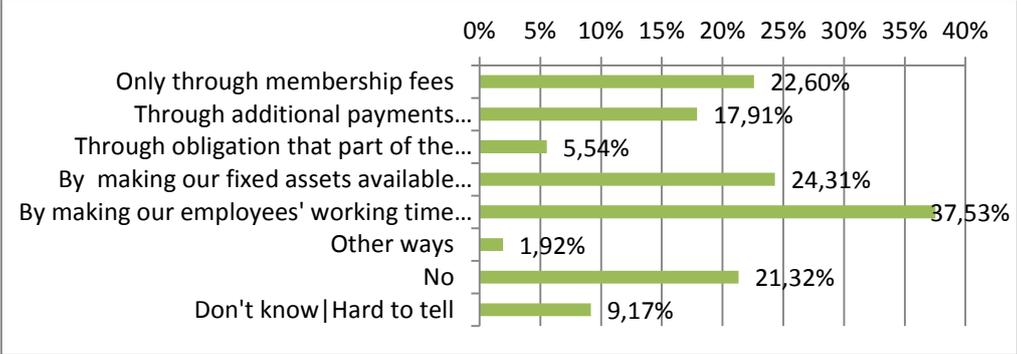
Source: Developed based on CAWI/CATI questionnaire with 35 cluster members; N= 61.

Cluster entities were also asked whether they participated financially or through their own non-monetary contribution in their joint endeavours. The responses to this question are included in Chart 152 (question No. 16).

In the study group of clusters, 22.60% reported that their input into the activities was limited to paying membership fees. Cluster entities also reported paying additional sums, apart for membership fees (17.91%), and that they agreed to contribute to the cluster part of the profits resulting from the projects (5.54).

In the remaining cases, non-monetary input took on various forms. In nearly 38% of the cases it was contributing their employees’ working time to the cluster project. The next most popular non-monetary contribution was making available project material resources for the cluster (such as means of transport, equipment, etc.) (24.31%).

**Chart 151. Financial participation or own non-monetary contribution in the cluster**



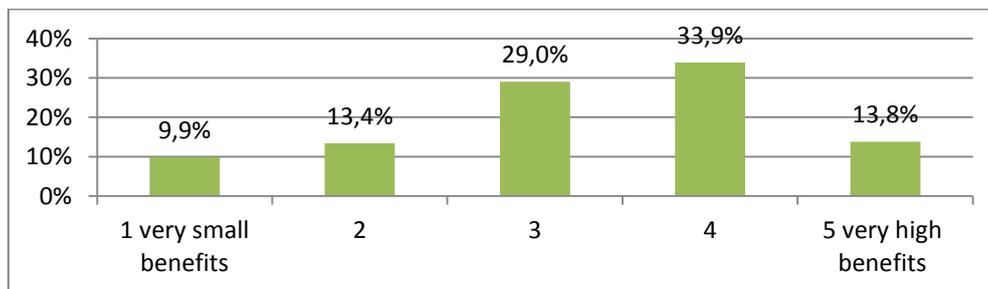
Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N= 469.

In isolated cases, there was also other forms of financial input indicated, for example, financial support, special purpose payment, *de minimis* aid, and their own work and time contribution. The responses concerning the participation in the expenses of jointly carried out projects show a great variety of forms of participation. They create possibilities of flexible adaptation of the form of participation to the needs of specific projects and capacities of participants.

Taking into account only the projects that were carried out in the last two years, the entities realising joint projects altogether cooperated directly with 292 cluster members. In sixteen cases, it was only with one entity, while a leader worked in parallel with 63 other entities. The average number of entities cooperating in a project was 6 (6.07 to be exact) (question No. 17). This result, when compared to a much higher number entities in an average size a cluster, clearly shows that certain projects are realised within a small set interested parties. This should not be seen as negative but as an expression of a natural need to come together to work on specific projects among strongly motivated and interested partners, as has been discussed earlier in this Report.

The entities that carry out any joint projects were asked to evaluate the benefits they received from participating in those joint project. For 47.7% of the study group, the benefits from carrying out joint projects were considered either large or very large (Chart 152/question No. 18). For another 29%, the benefits were at a moderate level. Small and insignificant benefits were reported by altogether 23.4% of the investigated cluster members. The mean value for investigated entities was 3.29. The evaluation of the benefits of joint endeavours appears less positive than, for example, the evaluation of coordinator activity. This may lead to the conclusion that the types of projects that are carried out do not sufficiently translate into an increase in the competitiveness of specific entities, i.e. the cluster. This conjecture would be consistent with earlier statements concerning the insufficient focus on pro-innovative projects or related to market expansion.

**Chart 152. The evaluation of benefits gained by participation in joint project/projects**



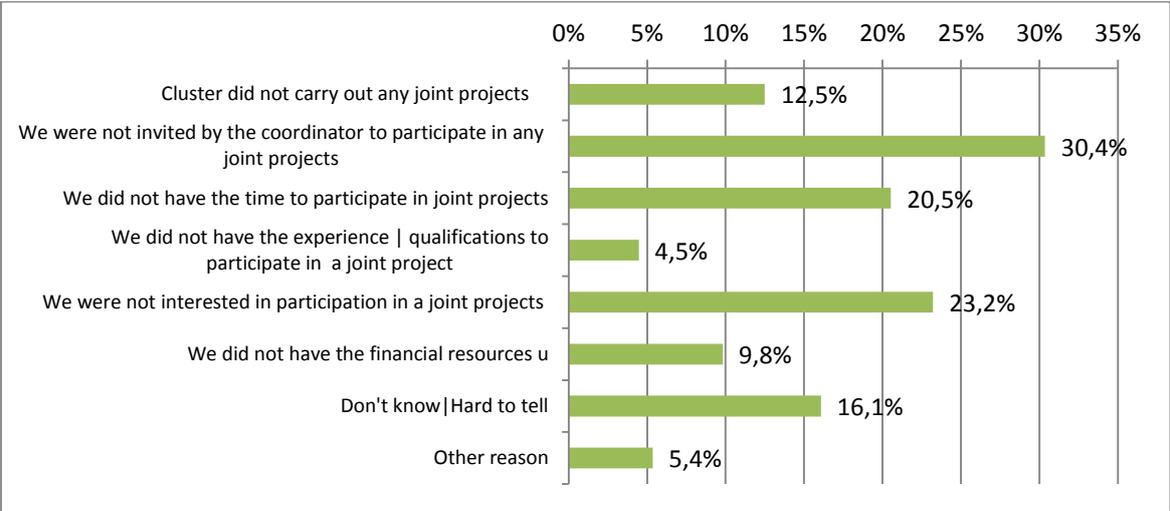
Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=434.

In a sense, the nature of the analysis of cluster involvement in joint projects included a general evaluation of the cluster engagement with the assumed coordinator in relation to carrying out joint endeavours (question No. 19). Out of 561 entities that answered that question, 51% rated cluster's efforts as good and very good. Moderate satisfaction with cluster activity in carrying out joint projects was reported by 27.3% of the entities. Small and very small activity of the cluster in joint projects was reported by 21.8% of the entities. The mean value for a single cluster concerning joint projects was 3.37.

In view of the above, this average, if not a negative evaluation of the benefits from joint endeavours and the high evaluation for coordinator activity in this respect should be interpreted as an insufficient suitability of the projects for the needs of the clusters as measured by specific benefits.

Another noticeable flaw is the lack of member participation in joint projects. Among 618 entities, there were 112 cluster members that never took part in any joint cluster projects. The causes of this state of affairs (Chart 153/question No. nr 20) are worth examining. For 30.4% of these entities, the reason for non-participation was a lack of invitation from the coordinator. Next, 23% of the entities were not interested in participating in joint projects, while another 20.5% reported insufficient time for joint projects. For 12.5% of the entities, the reason for non-participation was very mundane, namely, there were no joint projects carried out in the cluster. Another 9.8% justified it by the insufficiency of their own funds, while 4.5% reported their insufficient qualifications and inexperience. Lastly, as much as 16.1% did not provide any specific reasons for their non-participation.

**Chart 153. Reasons for non-participation of cluster members in joint projects.**



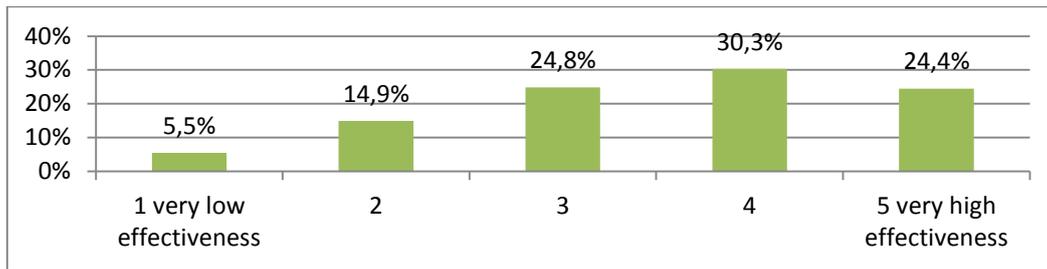
Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; multiple choice question; N=112.

This relatively high percentage of cluster members that did not participate in any joint projects indicates flaws in the management of at least some of the clusters. Moreover, the responses concerning the causes of such a state also allow further reaching conclusions. It is apparent that some cluster members are not interested at all in any specific cooperation within the cluster, which should point to verifying the membership of members in relation to their readiness for actual involvement in joint activities. It appears we are dealing in Poland with a margin of merely formal membership in the clusters. The presence of such members may create difficulties in management and carrying out joint projects. However, as noted above, the clusters must ensure that the range of projects is adapted to the varied needs and capabilities of the cluster members.

**9.3. Shared resources**

When analysing the opinions of cluster members concerning cluster resources, one cannot overlook the question of cluster effectiveness in securing public funding (e.g. from EU funds), which is effective in ensuring the supply of resources for projects in various areas of cluster development (question No. 21). Good and very good ratings were given by 54.7% of investigated entities (Chart 154). According to 24.8% of the entities, the efficiency of the cluster in acquiring external funding was moderate. Low and very low efficiency was reported by only 20.4% of cluster members.

**Chart 154. The evaluation of cluster efficiency in securing public funding.**



Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=495.

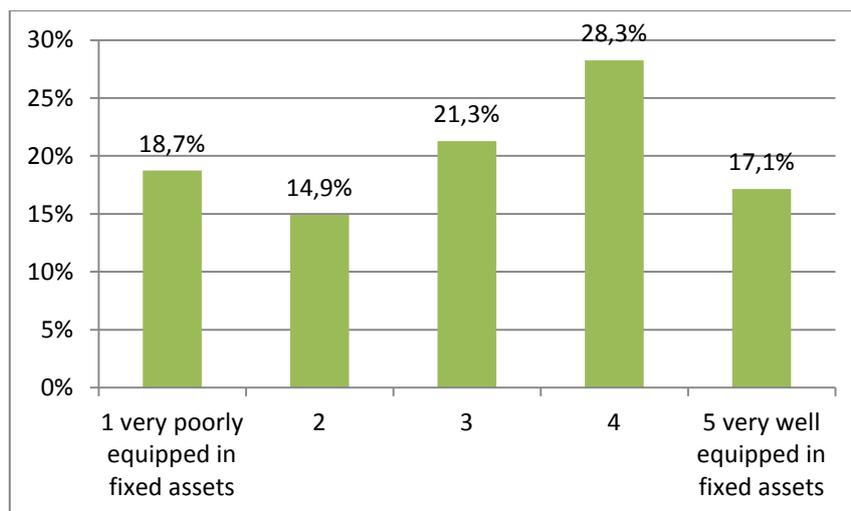
Member opinions about the coordinator's efficiency in acquiring public funding are favourable. On the one hand, this is very positive, because it implies the coordinator's effective performance. However, on the other hand, it appears to be a manifestation of cluster perception as an effective instrument in securing support funds. It needs to be emphasised that this may draw away from the fundamental role of the clusters, i.e. the ability to influence innovativeness and competitiveness as a result of enterprises from different sectors working together. Public funding is helpful in this respect, but it should not be treated as a goal in itself.

Member opinions concerning common resources in this study concerned mainly fixed assets, intangible assets in the cluster.

First of all, members were asked to evaluate the total of fixed assets in their cluster (meant as a sum of all fixed assets of the cluster members). The results of these evaluations are presented in Chart 155 (question No. 24).

According to 45.4% (out of 315 respondents) of the members, the fixed assets of the clusters were rated as good and very good. Conversely, 33.6% of other cluster members gave "poor" and "very poor" ratings. The entities that reported moderate satisfaction constituted 21.3% of the respondents. The mean value was 3.1.

**Chart 155. The evaluation of the fixed assets of the cluster**



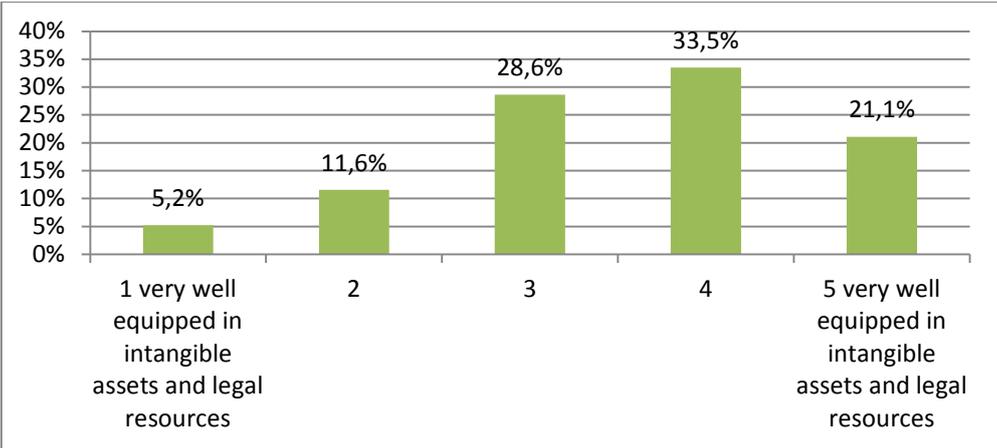
Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=315.

The evaluation of the fixed assets is in fact an evaluation of the potential of all the members. An improvement in this respect may be achieved through investment and by

acquiring new members, and the efforts can be undertaken for a long- or medium-term, but the effectiveness of the current cluster management is measured by the mutual access to these assets by the members. The evaluation of the access to the cluster assets by the members was relatively positive (question No. 24a). Nearly 53% of the study group (306) rated the degree of accessibility to the cluster's fixed assets as good or very good. 19.6% of the study group. For 27.4% of the study group, the accessibility of fixed assets in the cluster is difficult or very difficult. The mean value for all members is 3.18. This result should be viewed as very positive considering objective difficulties in making assets mutually accessible. Moreover, considering the high level of mistrust in Poland that is apparent in sociological research, this result should be viewed more as a projection of expectations rather than an actual level of accessibility of fixed assets among the partners in the cluster. Nonetheless, this result is a strong indicator for the directions of improvement in cluster management.

Chart 156 presents the evaluation of cluster intangible assets by cluster members (question No. 25). Good and very good ratings were given by 54.6% out of 346 of the cluster member entities that replied to this question. Moderate ratings for intangible assets were given by 28.6% entities. Only 16.8% of the study group evaluated the resources as weak and very weak. The mean value of availability of intangible assets to members of a cluster was 3.54.

**Chart 156. The evaluation of availability of intangible assets to members of a cluster**



Source: Developed based on CAWI/CATI questionnaires from 35 cluster members. N=346.

Similarly to fixed assets, the availability of intangible assets for members of a cluster is of particular importance from the point of view of cluster management.

Out of 350 entities, 54.6% reported that intangible assets were very easily available or easily available. For 25.4% of the respondents, the availability of these elements of cluster infrastructure was sufficient (question 25a). At the same time, 20% of the study group reported difficult and very difficult access to intangible assets. The mean value was 3.47.

The conclusions from the responses about the accessibility of intangible assets may be treated as analogous to the responses concerning fixed assets. When discussing either of these resources, the interpretation of the results should be done with caution, and it needs to be emphasised that the percentage of the responses and their structure show a limited awareness of the respondents and a difficulty in perceiving their cluster as a uniform economic organism capable of using all of its resources in competing on the market. The high ratings concerning access, as mentioned above, also should be interpreted here as a projection of expectations rather than an actual situation. Cluster members think that the cluster should be managed in such a way which would give all its members access to fixed and tangible assets to the

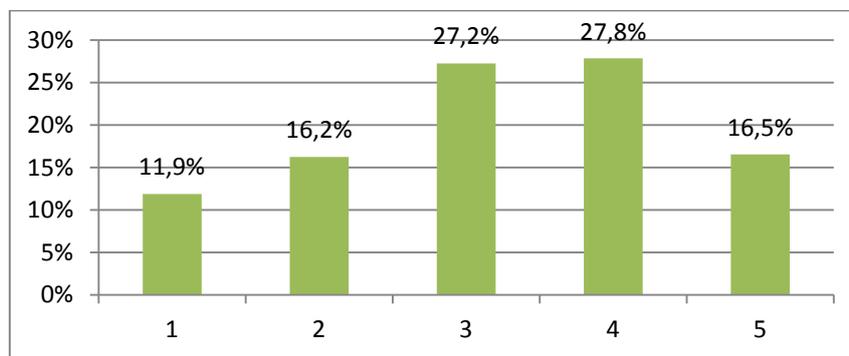
greatest possible extent. This is a positive challenge for the coordinators in their cluster management.

#### 9.4. The cooperation of cluster members with science units and research institutes

Among the questions about the cooperation of cluster members with science institutions and research institutes, the entities in the study group were first asked to evaluate the participation of research units that belong to their cluster in the functioning of the cluster (Chart 157/ question No. nr 26).

According to 44.3% out of 345 respondents, the degree of involvement of science institutions and research institutes in the cluster is high or very high. For 27.2% of entities, this involvement is at a satisfactory level.

**Chart 157. The evaluation of cluster's research units' participation in the functioning of the cluster**



Source: Developed based on CAWI/CATI questionnaires from 35 cluster members. N=345.

Dissatisfaction (low and very low rating) with the involvement was expressed by 28.1% of cluster members. The mean value for all the entities is 3.21. In view of the earlier benchmarking analysis, this result should be considered relatively high, since the observed involvements of the clusters in pro-innovative activities were not highly concentrated, including R&D. Rather, the responses indicate their moderately positive rating for the role of research units in the functioning of the clusters as such. This is confirmed in the opinions of the respondents about initiating co-operation with research institutions which are presented below.

The cluster members were asked to respond to the question on whether their cluster membership influenced their intensification in cooperation with research institutions. An affirmative response was given by 112 out of 264 entities that had worked with research institutions previously (42.4%). 38.6% of the entities in this group gave a negative answer, while 18.6% were not able to state the correlation between their membership in the cluster and the intensification of cooperation with research institutions

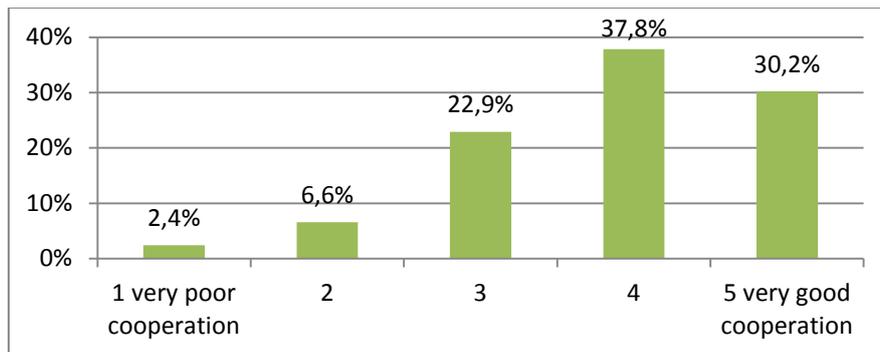
The next question was whether cluster membership influenced establishing cooperation with new research units (question No. 28), and the affirmative response was given by 37.9% of respondents. Negative responses were given by 42%, and "difficult to tell" – 20.1. The scope of the intensification of cooperation with research institutions turned out to be significant but still insufficient. Based on the above results, the clusters to some extent contributed to the intensification of cooperation between the entities and research units and, to a lesser extent, to establishing new ties with research units.

In the structure of research units cooperating with cluster entities, higher education institutions are dominant. Out of the 297 entities that responded affirmatively to the question

about cooperation, 256 cooperate with higher education institutions, 148 cooperate with research institutes, and with Polish Academy of Sciences (PAN) - 65.

Out of 288 entities that work with research institutions, as much as 60% rates the quality of their cooperation as high or very high (question No. 30). For 22.9%, the quality of cooperation is satisfactory. Only for 9% of the study group was the cooperation with research institutions unsatisfactory, and its quality was rated as poor or very. The mean value for the study group was 3.87.

**Chart 158. The evaluation of the quality of cooperation with research institutions**



Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=288.

The responses about cooperation with research institutions may be considered definitely positive and it is very encouraging that Polish research institutions have good potential from the viewpoint of the cluster needs. The issue is rather ensuring that cooperation is established and intensified, which should continue to be the hope of the clusters.

### 9.5. Cluster importance for the development of its members

The significance of clusters in the development of a cluster entity is multifaceted and may be analysed from the point of view of finances and markets. These aspects were included in the cluster benchmarking 2014 edition in the questions for cluster entities discussed below.

Cluster entities were asked 12 questions in which they were to evaluate the influence of their membership in their cluster on a given aspect of the entity's functioning and development. The mean values for different aspects are presented in Table 7.

It should be emphasised that the mean values for all cases did not exceed the average level of 3.0.

The highest, though still moderate, influence of cluster membership was assigned to R&D activity. The mean value for this aspect of development was 2.52. Second in order was the positive influence of the cluster membership on the increase of the innovativeness of the company's solutions (the mean was 2.40). The top 5 of the highest evaluation of the cluster's influence were the following: introducing new or significantly modified services in the market (2.35), strengthening the position in the main market (2.30), and introducing a significant change to the company's marketing strategy (2.26).

The lowest mean values were below 2.0, indicating insignificant cluster influence on the developmental processes of clusters members. The lowest noticeable influence was reported for aspects in the following order: the influence of cluster membership on profit increase (1.88), the influence of cluster membership on sales increase (1.89), the influence of cluster membership on export (1.92), and introducing another product/service into international markets (1.92).

**Table 8** The importance of cluster membership for different aspects of enterprise development

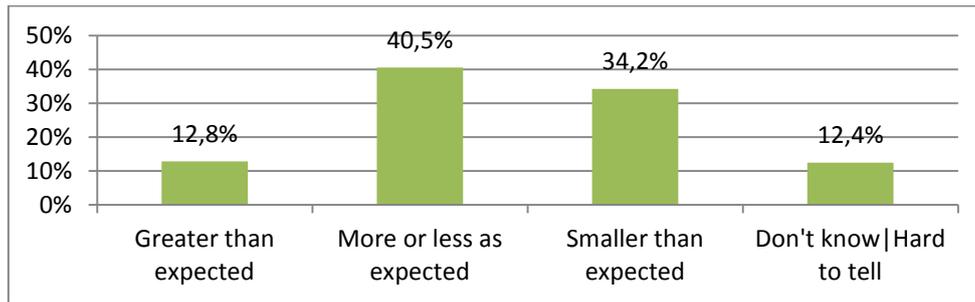
No.	Indicator	Mean value
1.	The influence on research and development	2.52
2.	The influence on the increase of innovativeness of the company's solutions	2.40
3.	Introducing new or significantly modified services	2.35
4.	Strengthening the position in the main market	2.30
5.	Introducing significant changes to the company's marketing strategy	2.26
6.	Gaining new international markets	2.19
7.	Significant modification or introduction of new production processes for products or services, e.g. by purchasing machines, production lines.	2.17
8.	Introducing significant organisational changes e.g. new management techniques	2.15
9.	Introducing another product/service into international markets	1.92
10.	The influence of cluster membership on export sales	1.92
11.	The influence of cluster membership on sales increase	1.89
12.	The influence of cluster membership on profit increase	1.88

Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=357.

These results concerning the influence of the cluster on various aspects of enterprise development primarily show that the general evaluation of the influence is relatively low and practically does not go beyond the middle of the rating scale. It is interesting that the highest ratings were given for the influence on R&D, innovativeness, and domestic and foreign market expansion. On the one hand, this influence coincides with the theoretical model of cluster roles in the economy. On the other, it is worth noting that the earlier analyses indicated an insufficient focus on cluster enterprise/projects in these areas. However, these two statements are not exclusive. There is influence, albeit still moderate on the functioning of enterprises, that goes beyond specific projects and derive from mutual contacts among the members. The discussed aspects of cluster influence on enterprise development should be increased with conscious endeavours within cluster initiatives.

This relatively moderate influence of the clusters in cluster entities was confirmed in the responses to the next question. All the entities were asked to indicate the extent of benefits of being a cluster member. For 12.18% out of 618 entities, the benefits were greater than expected. The clusters fully satisfied the expectations of the members in the opinion of 40.5% entities. For 34.2% of investigated entities, the benefits were smaller than expected. Altogether 12.4% of the members were not able to indicate their level of satisfaction in relation to the expected benefits of cluster membership (Chart 159).

**Chart 159. The evaluation of cluster membership**

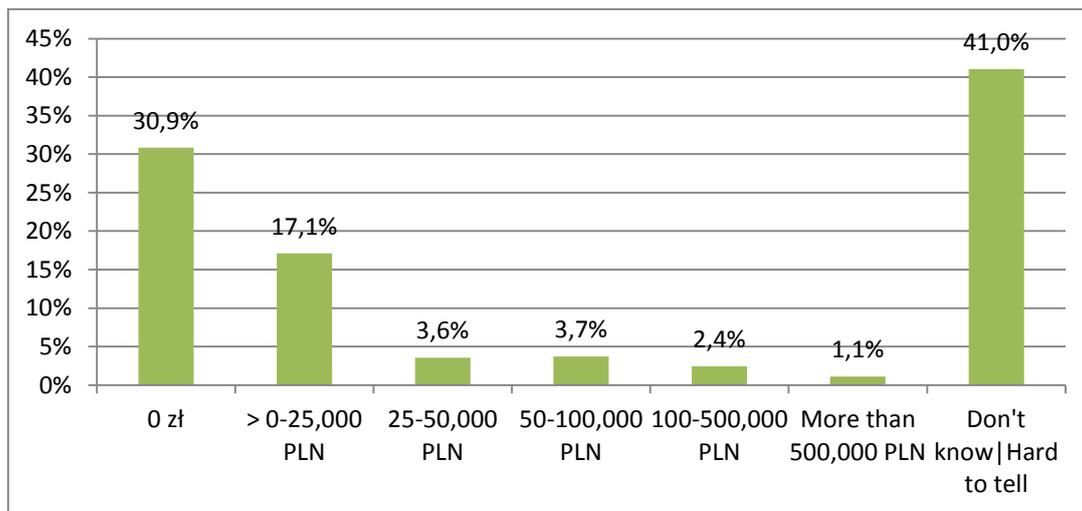


Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=618.

All members were also asked to estimate how much the entity benefits financially per year from being a cluster member. According to 30.9% out of 618 entities received zero benefits. Another 41% was not able to give an estimate of the benefits.

For 17.1%, the financial annual benefits of cluster membership were estimated as being between 0-25,000 zlotys. Next, 3.6% of entities declared benefits between 25,000 and 50,000 PLN. Further on the list were the following: 3.7% for the 50,000-100,000 PLN range, 2.4% for the 100,000 - 500,000 PLN range, and 1.1% of the entities above 500,000 PLN (Chart 160).

**Chart 160. Estimation of financial benefits of cluster membership**



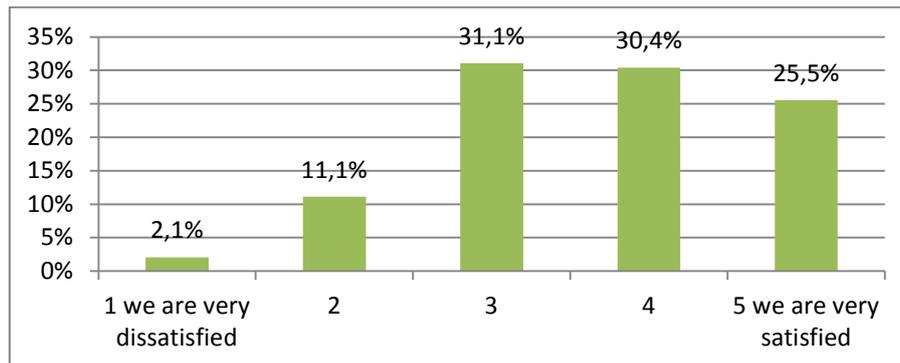
Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=618.

Naturally, the question concerning financial benefits of cluster membership had to pose difficulties for the respondent and precise estimates should not be expected. However, it needs to be emphasised that over 30% estimated this influence at zero, and another 41% was unable to answer the question. The responses to this questions show that the previous indications of the positive cluster influence on the functioning of the members should be treated with caution. The question about financial results is even more justified if, according to the previous conclusions, the members should more extensively participate in the expenses of cluster functioning. It seems that the responses confirm the previous conclusions that the coordinator needs to provide specific services for the cluster members. However, they also show a need for a greater awareness of cluster members in terms of received benefits including financial.

In view of the indicated areas of greatest cluster influence on member development and the estimates of benefits, it is justifiable to re-examine the overall satisfaction of being a cluster member (Chart 161).

The results show that 55.9% of cluster members in the study group are satisfied and very satisfied with their functioning within their cluster. A group of 31.3% respondents appears to be uncertain in their evaluation of the advantages and disadvantages of functioning within the cluster. Being dissatisfied and very dissatisfied was declared by 13.2% of respondents. The mean value for all the entities was 3.66.

**Chart 161. The evaluation of the cluster membership satisfaction**

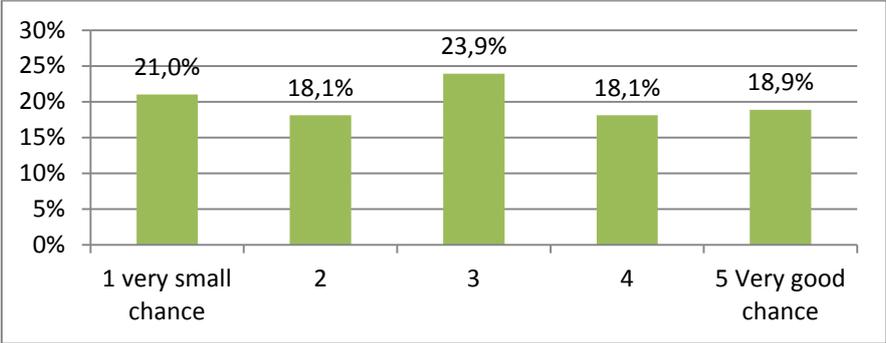


Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=576.

The results concerning general satisfaction from being a cluster member are to some extent optimistic. However, it is important to remember that over 40% of the members were not unequivocally satisfied with being a member. This fact coupled with the financial benefits results point to the conclusion that a very limited number of members perceive solid justification and benefits of being in a cluster. A large number of members probably do not discern strong advantages in being a member, but they do not bear the greater part of expenses either. The presence and the role of these members are uncertain. A large number of the "undecided" members are a challenge for cluster management. If these entities do not become more involved in the cluster, it should be expected that their frustration will increase and their presence in the cluster cannot be counted in future.

The last question was related to the future of the cluster, namely, what changes there are for its functioning in 2017 without support from public funding. The mean value for this question is 2.96, indicating moderate optimism of cluster members concerning further development of the cluster based on self-financing (Chart 162). A good chance and very good chance of functioning without public funding was expected by only 37% of cluster members. Simultaneously, 39.1% of the study group declared a small and very small chance of functioning without external funding.

**Chart 162. The evaluation of chances of cluster functioning in 2017 without public funding**



Source: Developed based on CAWI/CATI questionnaires from 35 cluster members; N=519.

The results related to the possibility of the clusters' functioning without public support confirm the previous conclusions that a large number of cluster members do not yet perceive the solid benefits of functioning within their cluster in terms of competitiveness, innovative expansion on the market, and eventual financial benefits. If the cluster does not provide these benefits for the members, their estimation of the cluster's ability to function without the support of public funding is pessimistic. On the other hand, almost 40% of cluster members already perceive the type of benefits that may guarantee the functioning of the cluster without the public funding. Considering the short period of cluster existence, this result should be considered positive and an indicator of the direction of cluster development.

## 10. Summary of cluster development trends in Poland in 2010-2014

A summary of trends in cluster changes for the 2010–2014 period divided into areas, sub-areas and indicators are contained in Table 9. Each section (area, sub-area, indicator) contains an assigned mean value based on the study results, while arrows indicate the direction of changes in each parameter in relation to the year 2012 and 2010. The green arrow indicates an increase in the mean, a red arrow indicates a decrease, and a white arrow indicates no change in the period indicated.

**Table 9. The trends in areas/sub-areas/indicators of cluster changes in Poland in 2014 in reference to 2012 and 2010**

AREAS/Sub-areas/Indicators		Mean value in 2014	Change in relation to 2012	Change in relation to 2010
<b>CLUSTER RESOURCES</b>		<b>3.24</b>		
<b>Human resources and cluster know-how</b>		<b>2.17</b>		
	Total employment in cluster core entities	0.91		
	The number of people administering the cluster (as an equivalent of a full-time employment)	2.63		
	The number of entities in the cluster (enterprises, R&D sector, supporting institution)	3.63		
	The number of employees in the R&D sector in the core of the cluster	0.88		
<b>Financial resources</b>		<b>1.50</b>		
	The share of own resources (e.g. member fees) in the total budget of the cluster	2.97		
	External financial resources secured for cluster projects in the last 2 years	0.51		
	Cluster budget per cluster member participating in its financing	0.53		
<b>Cluster infrastructure resources</b>		<b>6.05</b>		
	Availability of offices and conference rooms for cluster needs	8.34		

	Availability of laboratories for cluster members	5.43		
	Prevalence of information and telecommunication technologies in the cluster's internal communication (e.g. internet)	4.20		
<b>CLUSTER PROCESSES</b>		<b>5.01</b>		
<b>MARKET ACTIVITY</b>		<b>2.5</b>		
	Joint supply - joint orders	1.54		
	Joint channels of distribution	2.03		
	Joint market offer prepared by the cluster for external clients	3.97		
<b>Marketing and PR</b>		<b>6.22</b>		
	Joint activities for cluster promotion (folder, brochures, advertising in the media)	7.62		
	Joint fair and show activities of the cluster	4.31		
	Joint visual identification system (e.g. common logo, colour scheme, paper with letterhead)	6.71		
<b>Communication in the cluster</b>		<b>6.64</b>		
	Regular meeting among cluster entities (including team building events)	7.43		
	Variety of instruments, techniques and forms of communication	6.34		
	Effectiveness and efficiency in information and knowledge exchange	5.00		
	The degree of informal information and knowledge exchange among cluster members	7.80		
<b>Knowledge and innovation creation</b>		<b>4.68</b>		
	Cooperation in innovative products and technologies development	5.0		

	Cooperation in organisational and marketing innovation	33.4		
	Joint training, workshops, conferences, study visits (personnel education)	5.63		
<b>Cluster results</b>		<b>1.78</b>		
<b>Human resources development</b>		<b>1.92</b>		
	The growth of employment in entities within the cluster core in the last 2 years	1.03		
	The number of joint training events organised in the cluster in the last 2 years	0.82		
	The number of cluster sponsored participants in external training, conferences, study visits, economic missions in the last two years (investment in competences)	2.91		
<b>The improvement of competitiveness of the cluster (position in the market)</b>		<b>1.65</b>		
	The number of new cluster members in the last 2 years (entities attracted to the cluster)	2.03		
	The number of start-ups and/or spin-offs in the cluster	1.09		
	The number of joint research in the cluster in the last 2 years, including projects co-financed by the EU funding	1.67		no data available
<b>The improvement of cluster innovativeness</b>		<b>2.25</b>		
	The number of innovations developed or purchased including legally protected innovations introduced in the cluster in the last 2 years	0.58		
	The share of R&D cost in the innovative activities expenses in the last 2 years	5.64		
	The number of cluster companies that implemented innovations in the last 2 years	1.89		no data available
<b>Cluster internationalisation</b>		<b>1.84</b>		
	The number of foreign markets (countries) with the presence of the cluster enterprises	2.48		
	The share of export in the product sale structure of cluster core	3.55		

	The number of formal contracts for cooperation of the cluster with foreign entities	0.46		
	The number of international projects/networks (thematic, industry specific) to which the cluster belongs	2.21	no data available	no data available
<b>CLUSTER GROWTH POTENTIAL</b>		<b>6.59</b>		
<b>Regional conditions</b>		<b>6.98</b>		
	Potential, natural resources, local economic tradition	7.23		
	Availability and mobility of highly skilled employees	5.63		
	The region's ability to attract investment (attractive investment opportunities, municipal infrastructure)	7.83		
	Openness of the local/regional community to co-operation (entrepreneurs, enterprise related institutions, etc.)	7.23		
<b>Public authorities' policies for cluster development</b>		<b>5.04</b>		
	Cluster promotion by the authorities	7.06		
	Financial support by the authorities of the cluster's development	3.69		
	Organisational, and training and education support	3.11		
	Modifications in the education system for the needs of the cluster	6.29		
<b>Institutional milieu</b>		<b>6.17</b>		
	Adapting information, consulting and training services to the cluster's needs	5.40		
	Availability of funds supporting the development of the cluster (e.g. loan and guarantee funds, venture capital, seed capital, etc.)	5.90		
	Openness to co-operation and the quality of the R&D sector in the region	7.17		no data available
<b>Cluster management</b>		<b>8.19</b>		

	Leadership in the cluster, coordinator's strength and position	7.40		
	Coordinator's involvement in the animation of cooperation within the cluster	8.37		
	The cluster's involvement with the outside environment.	8.80		

Source: Developed based on the results of research among the cluster coordinators in 2010, 2012 and 2014.

In 20 out of 50 indicators, there was an increase of the mean value in 2014 in relation to 2012. This indicates that the clusters results' were worse for 29 out of 50 indicators for the 2012–2014 period. For one indicator the mean value remained the same. In 31 out of 50 indicators, the mean value increased in relation to 2010, and for 19 indicators it decreased.

The mean values for sub-areas in 2014, only increased in relation to 2012 in 4 instances out of 15. Conversely, in 11 sub-areas in 2014, there was a decrease in relation to 2012. The mean value of the clusters in 2014 in relation to 2010 was higher in 8 sub-areas, whereas, for the remaining 7 sub-areas, the values decreased.

Only 1 out of 4 areas experienced an increase in the mean value in 2014 in relation to 2010 (the *Cluster growth potential*). The mean values for the remaining 3 areas were higher in 2010. It applies to the *Cluster resources*, *Cluster processes*, and *Cluster growth potential*. It is significant that the mean value for 2014 was lower than for 2012 in the fourth area, the *Cluster Results*.

Taking into account only the mean values in areas/sub-areas/indicators of cluster benchmarking which were obtained based on the coordinators responses (relative values), it may be concluded that the condition of clusters during 2010-2014 period has deteriorated within the indicators describing developing processes of clusters.

## 11. Recommendations for various stakeholder groups

### 11.1. Recommendations for cluster coordinators

**1) Increased commitment of private members' resources to supporting clusters should be the proper means to assuring financial stabilisation of clusters. With regard to defraying fixed costs of cluster functioning, membership contributions of participants should be more closely linked to coordinators offering them services which would be adequate to levels of the contributions paid in. Cluster coordinators should also emphasise actions to strengthen cluster members' conviction they need to enhance their financial involvement in pro-development projects.**

The deteriorating position in respect of financial resources seems the key adverse development in the area of *Cluster resources* identified in the current edition of cluster benchmarking. At the same time, no continuing effect can be observed of increasing numbers of projects implemented on improving the financial resources situation of clusters.

Fixed costs must be covered with member contributions in order to maintain functional stability of clusters, with enterprises being the prime contributors in practice. The possibility of expanding the share of private resources in cluster budgets is corroborated by the regularity noted as part of the survey that as clusters mature, their members are increasingly aware of the need to participate in cluster budgets, whereby clusters would be able to become independent from external means of financing. In addition, the survey of participants showed that payers of contributions are generally satisfied their amounts are adequate to benefits the payers receive. Thus, it can be concluded that raising the number of paying members must consider provision of services of adequate value.

Services to be provided by a coordinator may include, for instance, training services, advisory services or services related to innovation or internationalisation actions. Services justifying financial contributions of cluster members towards costs of operation should be chiefly addressed to enterprises and support their innovation, competitiveness and, as a result, market expansion.

Financing of pro-development projects should involve more private resources of their members/ beneficiaries, leaving some payments towards costs of managing pro-development projects to finance support and strengthening of cluster coordinators.

**2) Cluster coordinators should weigh reasons for and limitations of quantitative growth consisting in combining more entities and their economic potential. Large clusters provide better conditions for conducting processes of knowledge creation and innovation activities including R&D. They gain more recognition in local and regional environments. Extensive clusters may foster divergent member expectations, however. Particularly as far as selection of new members is concerned, cluster coordinators should take into account sectorial links and development needs of their cluster.**

#### *2a) Arguments for increasing cluster size:*

Performance of the largest clusters is best in all dimensions of innovation. Thus, impact of clusters on innovation processes can also be enhanced by expanding the cluster size (given other factors remain unchanged).

R&D units, including universities, more commonly become parts of large clusters. Enterprises of significant potential, including those with R&D facilities of their own, are more willing to join large clusters. Such innovation-oriented enterprises find potential partners for

joint R&D undertakings. This implies that large clusters offer better conditions for development of R&D activities.

Not only R&D activities, but also more broadly defined innovative actions, such as joint work on innovative products, processes, organisational and marketing innovations, have more advantageous conditions in large clusters. This is confirmed by results of the survey which indicate that, in respect of the *Creation of knowledge and innovation*, large clusters (more than 60 entities) enjoy a substantial edge over medium-sized and small clusters. Activities for creation of knowledge and innovations are correlated with cluster size.

Growing participation of scientific units in clusters should be considered in the context of developing an appropriate institutional structure. Absence of appropriate entities in a region where a cluster is rooted may be a problem. In the event, it is reasonable to make contact with more remote entities which are capable of intensifying innovation processes in a cluster, though. On the other hand, negative results of analysis of the factor concerning legally protected innovations in clusters should become a guideline for both cluster and overall innovation policies in respect of the need to foster unique innovations as part of clusters.

Large clusters seem to have more clout with local and regional environments. To some degree, it confirms the result of the benchmarking in the sub-area *Public authority policies for cluster development*.

Large clusters are better able to provide training and educational support. Results of the benchmarking demonstrated the largest clusters have obtained maximum means in three factors of the sub-area *Human resources development* under analysis, including numbers of joint training organised in the cluster.

#### *2b) Limits to rationality of forming large clusters:*

Issues of diverse expectations from members of different categories may arise in clusters. Diverging expectations of members can significantly hinder cluster management, especially in case of leadership issues as discussed with reference to analysis of the sub-area *Cluster management*. This situation may require verification of members in respect of their actual activity and readiness to become involved in key cluster projects.

It is also worthwhile to consider increasing numbers of cluster members from the viewpoint of the relatively low ratings of regional conditions by large clusters. This result may suggest that the rapid quantitative growth has failed to produce sectorial links in a region and value chains related to the main sector. It is a good idea to select new cluster members more discriminately, having in mind development needs of a cluster and potential of a region.

**3) Cluster coordinators should orient strategies and actions of their cluster towards furthering market expansion of enterprises, including preparation of joint product ranges, to a far greater extent. It is also reasonable for cluster coordinators to enhance their efforts for constructing group purchasing organisations in respect of raw materials or e.g. telecommunications, information and communication services.**

A clear majority of projects realised till now have not been targeted at improving market activity of clusters and of their member enterprises in particular. The hypothesis can be even posited, which would require further verification, that clusters focussing on implementing large numbers of projects were diverted from market actions aimed at improving market positions of enterprises in specific markets. Considering that a cluster ultimately serves to improve competitiveness of enterprises and regions, possible neglect of market actions in favour of projects oriented, for instance, towards networking or marketing of a cluster itself should be viewed critically as a symptom of imperfect cluster management.

Approximately 40% members of an average cluster were involved in or supplied their ready-made 'contributions' to products and services offered by the cluster in the process of developing their joint offers. The result can be regarded as positive, though it also points to a relevant area for improvement of cluster market activities by involving increasing numbers of participants in the process.

The survey identified low diversity of joint channels of distribution employed by clusters, e.g. wholesale, shared deliveries to strategic retail or wholesale chains, shared fair stands, shared tender bids, shared sales outlets, joint Internet sales or retaining of shared agents or exporters in international markets. The percentage of cluster members participating in joint channels of distribution proved to be low.

The lack of a distinct advantage of large clusters in the field of market activities, given their objectively greater market power and the capacity for applying more diverse market instruments, shows that it is difficulties arriving at agreements concerning this type of actions rather than low economic or bidding potential in the market that is the barrier restricting market activities of clusters. This is most clearly confirmed by a certain advantage of the smallest clusters in the case of actions for shared procurement.

The role and importance of a cluster coordinator in the process of identifying needs and building group purchasing organisations should be stressed as well. Actions in this respect relate directly to reducing operational costs of individual cluster members and may have direct impact on their financial performance. A relevant offer prepared by a cluster coordinator is one of determinants of a cluster's market activities and maturity of its member entities. A cluster coordinator's actions as part of group purchasing organisations may encompass market exploration, negotiations and preparation of commercial contracts concerning supply of goods/ services on better terms than would be the case for individual entities.

**4) Cluster coordinators should revise marketing strategies in consideration of the need to promote not only a cluster as such but, as a minimum, a joint market offer of the cluster, of its individual participants or of these participants themselves, especially of enterprises in leading sectors. A cluster coordinator should treat marketing activities, including fair and exhibition appearances for the benefit of members, as an important and valuable service.**

The entire survey of participants' involvement in promotional campaigns may prove somewhat disappointing. Participation of less than a half of cluster members in national business events is not a satisfactory figure, in particular. Participation of barely a third of cluster members in cluster promotional actions can be explained by the fact that these actions were not aimed at promoting the members themselves but an entire cluster. As a matter of fact, this limited involvement of cluster members in activities of the sub-area *Marketing and PR* points to the need to revise marketing strategies of particular clusters considering the need to promote not only a cluster as such but at least its joint market offer, the market offer of its members or of those members on their own, especially of enterprises.

Actions to enhance marketing activities of clusters in their international dimension are reasonable as well. A coordinator's marketing for a shared offer of a cluster or its members can be seen as a form of service provided to participants in return for which fees can be charged to meet costs of the coordinator's work.

The diminishing fair and exhibition activities observed appear to be a simple consequence of restricted external financing. It must also be emphasised, however, that clusters were unable to maintain the earlier intensity of actions when financed with their own resources. Marketing is a key element of enterprise operations. Joint pursuit of these actions can generate

economic benefits to firms as well as to cluster coordinators. Cluster coordinators should treat marketing as an important and valuable service for which fees can be charged. This can be regarded as a source of cluster self-financing.

A peculiar phenomenon can be noted in the context of fair and exhibition activities of large clusters. Their average performance proves only marginally better than that of medium-sized clusters. Large clusters focused on simpler marketing instruments concentrating on a cluster itself rather than its member firms. It seems that larger clusters in particular could markedly intensify their fair and exhibition activities, where they appear to fail to realise their potential in full at present.

#### **5) Cluster coordinators must concentrate their actions on stimulating innovation processes in enterprises operating as part of clusters.**

In view of the significance of innovations in contemporary competitive processes and the special role of clusters in stimulating these processes, it should be concluded that the adverse status and changes in the sub-area *Creation of knowledge and innovations*, part of the area *Processes in a cluster*, poses the maximum threat to proper development of clusters in Poland.

Although a certain improvement of clusters' innovation performance can be observed, it must be remembered that the average score of slightly above two points is proof of limited pro-innovation actions of the clusters under discussion. A very poor performance with regard to implementation of legally protected innovative solutions can be noted in both 2012 and 2014. The low scores are certainly to some extent a function of the generally poor innovativeness of the Polish economy, particularly innovation on the level of not only individual enterprises but also of their markets. Entities operating as part of clusters should be expected to display distinctly greater innovation of a unique nature. Regrettably, high innovativeness of cluster enterprises with regard to unique, breakthrough innovations cannot be affirmed in light of the cited benchmarking results.

The survey of cluster members' opinions established that, on average, every third entity has been involved in joint work on new or substantially modified products or services. It may be optimistically viewed as a good starting point for mobilising cluster members around product and technological innovations. It is beyond any doubt, however, that this indicator ought to rise, particularly for clusters operating in industrial sectors.

Meanwhile, this survey has highlighted a relatively low focus of clusters' actions/ projects on innovative issues. It may be assumed that the considerable innovation potential identified in the enterprises could be put to far better effect by more extensive cooperation for innovations within clusters. Coordinators should be encouraged to seek and implement actions connected with improvement of enterprise innovation. Fostering awareness of all cluster participants concerning benefits arising from joint efforts for all types of innovation (product, process, organisational and marketing) should become a key element of coordinators' activities.

#### **6) Cluster coordinators should be involved in organising R&D work for members. They should attempt to raise numbers of R&D staff in clusters by attracting more R&D sector units and enterprises with R&D facilities.**

The status of R&D activities in enterprises belonging to clusters is relatively high, whereas the impact of clusters themselves on R&D activities was limited. Only 31% firms engaged in such activities rate them as significant. Nevertheless, an analysis of cluster project

implementation among firms conducting R&D activities indicates a correlation between numbers of projects realised and the sense of a cluster's heightened effect on R&D activities.

Members participating in joint R&D efforts constitute nearly 24% of the entire population. Even if one considers that some cluster participants are not interested in R&D work due to the sector they represent and that some others carry out R&D activities independently from clusters, the ratio of involvement in this type of undertakings can be deemed insufficient<sup>13</sup>. Attempts should be undertaken to substantially boost involvement of cluster members in joint R&D activities.

Low ratings of coordinator actions in this area are proof R&D activities as part of clusters need to be mobilised. It is worthwhile to treat these low ratings as an expression of cluster members' interest in this field of activity. It is reasonable, therefore, to verify cluster coordinators' commitment to R&D efforts of their clusters.

Cluster coordinators should also attempt to increase R&D staffing in clusters. Absence of R&D personnel or its very limited share in a majority of clusters suggests clusters comprise R&D entities and enterprises having R&D facilities to a markedly inadequate degree. Development of clusters in this respect is uneven and deficits of R&D human resources may constitute a major barrier to growth of cluster innovation in the near future. Given the need to build an appropriate institutional structure, a rising share of scientific units in clusters must be taken into consideration. Relevant entities are absent in regions where clusters are based, though. In the circumstances, initiating collaboration with units outside the region where a cluster is based is reasonable.

**7) Cluster coordinators should realise projects associated with development of joint cluster infrastructure, particularly in the area of R&D activities and laboratory equipment.**

Clusters still facilitate access to material infrastructure resources to a highly limited degree. Meanwhile, this dimension of business support offers great opportunities for cluster development, especially in the area of shared use of R&D infrastructure. The need for increased coordinators' commitment to organisation of R&D work itself was justified on the occasion of discussing Recommendation 9. With reference to R&D infrastructure alone, it must be borne in mind that small and medium-sized enterprises, with limited capacity for individual creation of research facilities, prevail in the structure of clusters. R&D infrastructure to be shared by a specific group of firms is the natural solution, therefore. Cluster coordinators should play a key stimulating role in this difficult process that requires not only high financial expenditure but also mutual trust of the entities involved.

**8) Cluster coordinators should be 'competence brokers' which would consist in on-going identification of competences required by members and organising the process of competence development in partnership with public authorities, job market institutions, schools and universities. Supply of specialised educational and training services to members should be included in strategies of cluster development and their day-to-day operations as a key function of cluster coordinators.**

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<sup>13</sup> More than a half (57%) of medium-sized and small business operating in Poland state they conduct or commission R&D work. It is far more commonly undertaken in the industry than in commerce and services. 65% industrial enterprises and every second commercial and service firm declare they carry out R&D projects or commission them from third parties. Cf. e.g. *Raport Działalność badawczo-rozwojowa przedsiębiorstw w Polsce. Perspektywa 2020*, KPMG; <https://www.kpmg.com/PL/pl/IssuesAndInsights/ArticlesPublications/Documents/2013/Dzia%C5%82alnos%C4%99biorstw-w-Polsce.pdf>

Cluster coordinators have shown diminished activities in the field of improving competences of cluster staff. Clusters insufficiently realise the objective of an all-round improvement of competences of staff of their members, particularly of enterprises. Raising specialist competences inherently related to leading cluster sectors can and should be a key task of their coordinators. A range of surveys and analysis concerning satisfaction of employers' requirements with regard to competences of their present and future employees point to severe deficits in this area<sup>14</sup>. Clusters are the right environment to solve such problems. Providing conditions for human resources development may be a major dimension in development of clusters themselves, even a source of self-financing. Supply of specialised educational and training services to members should be considered in strategies of cluster development.

Training undertakings should be scheduled jointly with enterprises. Cluster activity can assist with organising specialist training, delivered effectively by combining training requirements of a higher number of entities. It should be kept in mind simple mass training for plenty of workers is not a priority at the current stage. Highly specialist training projects, often characterised by high cost levels, are needed. Barriers are also common relating to availability of appropriate specialists or educational equipment. The need for specialist training to be arranged abroad must be taken into account as well. Access to competent staff is becoming a key challenge in the framework of regional conditions. It is on provision of highly qualified human resources to cluster entities that future activities of cluster coordinators should focus.

In view of the ineffectiveness of actions undertaken till now at the level of regions, job market or educational institutions to adapt the formal and continuing education systems to enterprise requirements, clusters should become links between educational institutions and enterprises. The role of clusters as 'competence brokers' for cluster entities can be mentioned in this connection. The job of cluster coordinators would be to constantly identify competences required by members and to organise required training.

Cooperation with both trade schools and universities cannot be restricted to consulting fields of education. Clusters should become partners in the very process of education. They may co-implement the so-called dual education jointly with trade schools, with part of curricular activities to be held at employers' locations. They may be partners in the framework of the so-called 'practical education profile', currently practicable and promoted by the Ministry of Science and Higher Education under the amended University Education Act, effective since 1.10.2014.

### **9) Support for enterprise internationalisation should become a key role of cluster coordinators.**

Figures on the share of exports in total cluster sales, primarily concerning their dynamics, point to substantial export potential of clusters. The position of a cluster leader, exporting 90% of its sales, is an opposite illustration of the case in point. However, coordinators frequently fail to provide responses on exports of cluster members, possibly due to their ignorance of the issue. This proves that problems of exporting have not been the centre of attention in these clusters. They may be supposed not to have pursued, or have pursued to a limited extent only, joint actions aimed at increasing numbers of export markets and the share of exports in the sales structure. It seems this type of actions, taking advantage of best practices from other clusters, might bring considerable effects. Support for

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<sup>14</sup> See for instance the conclusions in: B. Plawgo, *Badanie Rozwoju Struktur Klastrowych w województwie podlaskim*, BFKK, Białystok 2014; [www.bfkk.pl/przedsiębiorczosc/klastry.htm](http://www.bfkk.pl/przedsiębiorczosc/klastry.htm)

internationalisation should be a principal direction of development for clusters in Poland, as this is the sole means to assuring sales markets to rapidly growing enterprises.

Internationalisation of clusters can support actions associated with improving enterprise innovation, especially in conditions of heavy competition in newly-acquired foreign markets. Experience of internalisation gained by other clusters could then be shared as part of mutual cooperation and transfer of best practices.

**10) Forms of communication introduced by cluster coordinators should be adapted to specific conditions of a given cluster, including a phase of its development. Frequency of entity meetings within a cluster should match individual preferences and needs of particular members by establishing appropriate working groups or other adequate platforms for meetings.**

The somewhat limited variety of forms of communication in clusters should not be perceived as negative. Cluster coordinators ought to analyse both efficiency and effectiveness of the particular forms of communication and to leave those they view as optimum.

The assessments of the different forms of communication utilised by younger and older clusters appear to build a logical model of communication development in a cluster going through successive phases of its development. Regular meetings of cluster entities play a key role at the initial stage. A wide variety of tools and techniques of communication are resorted to in parallel over the subsequent stages. Frequency of the meetings becomes lower, instruments and forms of communication are selected in even older clusters. State-of-the-art tools are developed to improve efficiency and effectiveness of information and knowledge sharing, including application of electronic communication platforms. Informal sharing of knowledge and information among participants plays an important role also in older clusters, though. This kind of observable regularities in evolution of communication system in clusters as they mature should be taken advantage of by coordinators in their practice of cluster management.

Direct meetings of cluster members are important at all development stages of communication in a cluster, though their frequency may change. Cluster coordinators report a high, even increasing regularity of such meetings. It is undoubtedly a positive signal and symptom of the willingness on the part of cluster members to develop their collaboration and reaffirm trust and the consequent sharing of knowledge. Information on meeting frequencies provided by cluster participants fully confirms the optimistic results of the survey of coordinators in this respect and also demonstrates the participants' great readiness to take part in the meetings. Many would be ready to meet even more often, which suggests a need for flexible arrangement of meetings, not always involving all members (creation of the so-called narrower working groups). Frequency of the meetings should be adapted to individual needs and preferences of individual participants to a greater degree.

**11) Cluster coordinators should take more advantage of information and communication technologies in communication within clusters. The need to maintain communication platforms should be indicated even if they must be financed with members' resources.**

There is a worrying declining tendency with regard to efficiency and effectiveness of knowledge and information sharing. This is chiefly caused by limited use of communication platforms, which enhance efficiency and effectiveness of knowledge and information sharing. This can only be explained by closing, in some cases, of projects financing support of such platforms. Regardless of whether this explanation is correct, the

survey results clearly point to insufficient use of state-of-the-art forms of communication. It must be highlighted that coordinators indicated a total lack of this form of communication in 15 cases. This is indubitably an adverse phenomenon that calls for improvement.

Use of information and communication technologies in communication will not only streamline information flows and improve quality of management, but it also constitutes an important platform for horizontal relations among members.

A clear advantage of large clusters could be noted in respect of using state-of-the-art forms of communication, namely, communication platforms. It should be postulated, however, that this positive experience of large clusters should be taken advantage of by all, even small clusters. Maintenance of communication platforms should be a fixed cost element of cluster operations and part of membership contributions.

## **12) Cluster coordinators should attempt to raise quality of their cluster management.**

The falling mean indicator for *Cluster coordinator's leadership (power and position) in a cluster* exceeded 10% in 2012-2014. This is a persistent trend, since the cluster average in 2012 had also dropped since 2010. This development suggests that the issue of leadership is currently the central problem of cluster management.

The mean generated in 2014 implies a cluster coordinator enjoys a firm position in a region, yet its power in relation to cluster enterprises is relatively weak. This constitutes a major problem in the process of cluster management since a coordinator finds it hard to enforce new ideas or discipline members relative to decisions and actions already undertaken. The key issues connected with both management and development of clusters may be at stake here. Without firm leadership, clusters will be unable to undertake a range of much-needed pro-development actions. It is difficult to assume that discussion and consensus should be the sole methods of arriving at resolutions. As clusters expand, this manner of making even the most trifling decisions may paralyse their activities. Coordinators should share experience, training, leadership workshops, but above all concentrate on building their personal position in relation to cluster participants.

### **11.2. Recommendations for local/regional authorities**

**1) As part of cluster development policies and, more particularly, from the viewpoint of regional development policies, clusters including many members representing sectors oriented towards external markets, should be treated differently than small clusters supporting local/ regional markets. Diverse forms and intensities of support should be prepared for both the cluster groupings.**

Clusters are highly varied in respect of their economic potential as measured by numbers of employees in cluster cores. Developing any support instruments or model methods of cluster management cannot be done not taking cluster size into account. It is even reasonable to refer differently to various types of cluster structures. In the context of clusters examined and discussed in this Report and their structure of employment, it appears difficult to treat them as a homogenous grouping to which all generalisations could reasonably be applied.

The smallest clusters rated to the *Regional conditions of cluster development* the most highly as offering adequate potential for growth of clusters they represent. This may result from better adaptation of small clusters to unique characteristics of regions where they are based, including their assets. Justification for operations of small clusters closely linked to specific potential of the regions where they are rooted should be noted in this connection. It

should be kept in mind, however, that other research into cluster structures in Poland has revealed presence of a number of areas of sectorial business concentration, or clusters in their economic sense, where cluster initiatives to drive and reinforce cooperation processes are absent. It is therefore reasonable to postulate emergence of new cluster initiatives.

Thus, support instruments dedicated to clusters should consider the specific nature of clusters and match the degree of their development.

**2) Clusters should be treated as key instruments of raising innovation of regional economies. They should be subjects of regional innovation strategies and regional operational programmes (ROPs).**

Changes in the sub-area *Creation of Knowledge and Innovation* clearly point to deteriorating conditions for creation of state-of-the-art product, process, organisational and marketing solutions. Considering the importance of innovation to contemporary competitive processes and the potentially special role of clusters in stimulating these processes, it should be concluded that the adverse situation and changes in the sub-area *Creation of Knowledge and Innovation*, part of the area *Processes in a Cluster*, pose the most serious risk to proper development of clusters in Poland.

Till now, even greater numbers of projects realised by a cluster have failed to translate into improved performance in respect of both technological and organisational innovations. Projects implemented so far seem to aim at improving innovation of cluster enterprises to an insufficient degree. It is therefore recommended that clusters as tools improving innovation of enterprises, particularly SMEs, be included in future regional operational programmes (ROPs), which should lead to increasing numbers of innovative projects pursued by clusters and thereby involving individual enterprises in innovation processes.

Clusters ought to be identified as major elements of regional innovation systems. Definite roles should be assigned to clusters, as well as to other institutions responsible for innovation in particular regions, at the level of operationalization of regional innovation strategies (RIS) that set out guidelines for regional authorities to act in this respect.

**3) Clusters should be provided opportunities for realising projects associated with creation of joint cluster infrastructure, especially in respect of R&D activities and laboratory equipment.**

The clusters under survey have already solved basic infrastructural problems of their operation to a considerable extent. The availability of office space or conference rooms for cluster requirements can generally be described as sufficient. Development of more advanced aspects of infrastructure resources is the current challenge. Clusters are particularly stratified in respect of the *Accessibility of laboratories for cluster members*. It is necessary to realise projects helping to expand laboratory equipment, thereby improving access of cluster members to state-of-the-art research facilities.

Projects financed as part of ROPs so far have tended to be targeted at networking, marketing or production of intangible assets. Without disqualifying the value of such projects, it can be posited that, as clusters mature, projects creating permanent infrastructure foundations for competitiveness of cluster enterprises should gain increasing significance. Creation of new R&D facilities, in fact feasible at the level of projects implemented by clusters, should be considered first. On the other hand, attention must be paid to reasonable utilisation of the existing infrastructure. Infrastructure whose scope commonly overlaps with interests of cluster enterprises has been established as part of projects realised in a number

of regions. It is therefore a key objective of regional authorities to identify such situations and help to use existing resources rationally.

**4) Cluster actions relating to joint market expansion of enterprises (shared procurement, channels of distribution, fair and exhibition activities, etc.) should be fostered to a far greater extent in the process of developing cluster support instruments.**

Projects implemented till now at the regional level have failed to generate adequate effects in respect of market expansion. A cautious conclusion may be drawn, therefore, that these projects have focused on development of cluster structures rather than their market power as measured with levels of innovation. This orientation of a great majority of projects is likely to have been justified by the early stage of cluster development in Poland. Given the relatively high standard of development of the cluster group under discussion at the moment, however, continuing concentration of projects on the so-called networking actions is no longer reasonable. It is necessary to reorient also projects co-financed with public resources towards actions connected with market expansion of enterprises.

Creation of joint cluster offers, establishment and strengthening of shared channels of distributions should be supported first of all.

**5) It is a task of regional authorities to adapt the trade education system to requirements of the economy in general and of clusters in particular.**

Training activities of clusters cannot be interpreted as focused solely on training on development of clusters themselves or on preparation of human resources to act as part of specialist networks of cooperation. It is in this perspective that the scope of training activities of the clusters under examination should be evaluated. The level of previously estimated training activities can be characterised as significant yet widely diverging from objective training requirements of cluster members.

Regional authorities should allow clusters to undertake training actions. Clusters should also be viewed as a novel type of practical education institutions, also capable of raising competences of other community groups by taking advantage of often unique material resources of their members. Clusters have the possibility of improving competences by arranging internships as well as practical training addressed to the unemployed, young or those interested in job reorientation, thereby enriching the range of training offered by job market institutions.

Access to competent staff is becoming the main challenge in regional conditions. Regional authorities ought to focus predominantly on providing highly-qualified workers to cluster entities. They should adapt the trade and secondary technical education systems to requirements of clusters on an on-going basis in view of the fact that, as clusters develop, they keep generating ever new requirements with regard to staff qualifications and competences. Authorities responsible for the education system at all levels should treat clusters as important partners in the process of developing not only directions for the trade education but also methods of instruction. The related objective of regional authorities consists in developing specific competences of youth and adults that would correspond to needs of clusters and their constituent entities. In this area, public authorities should encourage schools to undertake direct cooperation with clusters so that the latter could become partners of educational institutions in dual education. As part of this mode of education, a considerable portion of the teaching process scheduled by the curriculum is implemented at employers' locations. This practical part of the education could be organised within clusters.

**6) Regional authorities should consider clusters as partners in the process of setting strategic directions of development, including the so-called regional or smart specialisation.**

The survey has revealed that some clusters feel their leading sectors are not adequately taken into account in defining regional smart specialisations. Meanwhile, clusters can and should play a key role in this process and the associated verification of Regional Innovation Strategies.

In its *Europe 2020* Strategy, the European Union intensely promotes notions of economic policies founded on smart specialisations. Defining cohesion of the concept of smart specialisation with clusters and cluster policies in more detail is significant from the viewpoint of possible implementation of this concept. Both the policies: of clusters and smart specialisation, share an approach based on the idea of spatial concentration of business activities. Both attempt to take advantage of proximity to promote economic growth and competitiveness. The theories of smart specialisations and clusters share two central elements: 1) focus on productivity and innovation as key factors of competitiveness and 2) stressing support for economic structures rooted regionally to take advantage of proximity. Differences between the concepts of clusters and smart specialisations are pointed out as well. Smart specialisations place more emphasis on using knowledge transfers between their different domains in the hope of new market niche opportunities emerging. The notion of clusters, meanwhile, is normally applied to firms in related sectors characterised by a critical mass and similarities of infrastructure and resource requirements. The essential difference, however, concerns the distinct definition of the objective of the Smart Specialisations Strategy, that is, transformation of regional economies around unique, knowledge-based, new fields of activity – whereas the goal of most clusters is to improve effectiveness of their member firms. The role of clusters ought to be viewed via processes of creating new cluster initiatives, though. Clusters may contribute to practical rootedness of newly-developed smart specialisations through emergence and development of new cluster initiatives linked to those specialisations. Such a process should undoubtedly win support of regional authorities.

Regardless of the still dynamically developing model of implementing the Smart Specialisations Strategy in Poland, however, it is important for regional authorities to treat clusters as partners in the process of determining smart specialisations and implementation of regional innovation strategies. Both the processes should be treated as continuous, in consideration of the objectively high dynamics of economic changes, while clusters should be among key partners of public authorities in this respect.

**7) As part of promotional actions on the regional level, particular regions should be highlighted as attractive locations for specific sectors.**

Most clusters assess the regions where they are rooted as attractive locations for investment, with insufficient endeavours dedicated to promoting their assets, however. This interpretation may give rise to some doubts since authorities of individual Polish regions have substantially intensified their territorial promotion recently. It seems, though, there is a difference between general promotion of a given region outside as an attractive place for doing business and promotion of specific investment assets unique to definite sectors, where genuine benefits can only become apparent. It is this aspect of promotions that seems underestimated. It must be remembered that investors are interested in access to specialised local resources. Therefore, promotion of investment strengths should encompass specific features of interrelated sectors in which a given region can boast of a competitive edge. It is

clusters in their objective and economic sense that are just such interrelated sectors. Thus, it should be recommended that public authorities include cluster initiatives linked to key sectors in their promotional campaigns. Clusters ought to take an active part in promotional activities of their regions as well with a view to promoting particular regions as attractive locations for specific sectors of economy, with clusters as major factors of such attractiveness.

### **8) A concept of regional cluster policy should be adopted.**

Regional authorities should develop principles of cluster support to determine not only means to but also criteria of access to this support. Such regional cluster policies would not only ensure equal access to public resources but would above all channel activities of existing and emerging clusters towards actions in compliance with regional policies in place. Clusters should be aware what actions regional authorities intend to support with regard to cluster development. As a result, they could become conscious participants in implementation of regional policies. Involving clusters as social partners in preparing guidelines for regional cluster policies is the proper starting point for joint implementation of cluster policies.

Detailed solutions of regional cluster policies must arise from a consensus to be arrived at in particular regions, also including existing clusters.

### **11.3. Recommendations for national authorities, government agencies and entrepreneurs' organisations**

#### **1) Development of clusters as dynamic economic structures driving growth of the economy and of employment should be supported on the national level.**

The survey of cluster coordinators has revealed a 7% growth of employment with entities belonging to the clusters under examination during the last two years. This fact must be considered a key result of this research, an expression of the dynamics and role of clusters in the economy, as well as a strong argument for policies of their support. Given that figures published by the National Office for Statistics GUS<sup>15</sup> indicate that numbers of people in jobs have remained virtually unchanged in the same period, the employment growth in clusters is proof they comprise highly competitive and expansive entities. This does not mean that the changes of employment are a simple consequence of action undertaken so far, but rather that these actions were sufficiently effective for clusters to draw important, dynamic sectors and competitive entities. Like in the experience of highly-developed countries, clusters are centres of economic growth.

#### **2) Clusters should be treated as major instruments of improving competitiveness of the Polish economy and thus constitute subjects of pro-innovation policies on the national level. National support of clusters should be targeted at pro-innovative actions of selected clusters showing maximum potential for development of the Polish economy.**

The survey of enterprises belonging to clusters has shown nearly 58% to have implemented some innovations in the two years under query. This indicator is not directly comparable to GUS figures concerning innovation of Polish enterprises, nonetheless, it can be stated that enterprises being part of clusters are highly likely to exhibit more innovativeness than the average for the entire enterprise population. Innovations original in a market are introduced by approximately 40% of cluster enterprises. These data are not immediately

<sup>15</sup> Number of people in jobs according to BAEL: 0.1.2012 – 16,200,000, and 15,793,000 in April 2014, <http://rynekpracy.org/x/1002424>

comparable to statistics either, yet the indicator appears relatively high with reference to the available statistics. Clusters can be assumed to encompass largely enterprises of significant innovative potential. The natural characteristic of clusters as pro-innovative environments is thus reaffirmed. It may be concluded, on the one hand, that projects realised in clusters boost innovation of enterprises. Such an interpretation is acceptable, though it must be borne in mind that a relatively low focus of cluster projects on the issue of innovation improvement has been determined by the survey. Clusters proved of some assistance to fewer than 40% enterprises involved in implementing innovations, with approximately 8% of those enterprises indicating a very high impact of clusters on implementing innovations. The length of an enterprise's operation as part of cluster structure has been found to have a positive impact on their innovativeness. This implies that the effect of clusters on enterprise innovation is palpable, yet its scale is still insufficient.

This is probably related to the dependence that more innovative enterprises tend to join cluster structures. Some projects pursued by active clusters have aimed at implementing innovative solutions and have in addition proved effective, while more innovative enterprises are more committed to cluster actions. Regardless of the force of the two trends of this dependence between activity in a cluster and levels of enterprise innovation, its occurrence confirms clusters are an environment conducive to pro-innovation actions. In light of this statement, the conclusion that it is reasonable to use cluster environments to enhance innovation of the Polish economy appears justified.

**3) Clusters may play a significant role as instruments acting on growth of Polish enterprises' internationalisation, in particular, their foreign expansion. Clusters should be subjects of internationalisation support policies realised on the national level.**

Some influence of clusters on successes of Polish enterprises in foreign markets can already be noted. The scale of this influence is still relatively limited. Clusters had maximum impact on finding new markets, with a quarter of businesses to have gained such new markets admitting to considerable cluster influence. In view of the fact that clusters comprise enterprises of substantial export potential, which in addition take active part in cluster projects, however, there still remains a profound, and not fully explored, potential of clusters to exert their advantageous influence on enterprise internationalisation.

The survey has demonstrated that the more cluster projects an enterprise has realised, the more successful it has been in foreign markets, regardless of the source of funding for such projects. Greater numbers of projects furthered expansiveness. It was the nature of projects involving firms that directly helped them to win new markets, launch new products in international markets or increase exports revenue. The enterprises most expansive in international markets are interested in active participation in clusters and cluster projects. Like with reference to innovation activities, clusters may be concluded to provide an appropriate environment for stimulating success in foreign markets, both by attracting active exporters and supporting them as actors in cluster projects.

**4) A system of improving management competences of cluster coordinators should be established on the national level. Beside organisation of training, postgraduate studies, domestic or international internships, a programme of sharing cluster management best practices ought to become its key element. In addition, a database of experts with knowledge and hands-on experience of coordinating cluster structures should be created, for use by new cluster initiatives ('a cluster experts database').**

The rate of cluster development has been distinctly varied. There are clusters capable of substantially improving their performance even in difficult conditions of strictures on access to external sources of financing and those that have stabilised or even limited their activities. It must be strongly emphasised that standards of performance and management in clusters under study have become markedly varying while the process of learning and experience sharing between clusters is not sufficient. It would be worthwhile to assure an improved flow of knowledge on the national level between clusters displaying different results so that clusters that have merely stabilized their achievements in absolute terms would be better able to bridge the widening gap to the best clusters. A programme of experience sharing among clusters, with those showing optimum performance acting as knowledge leaders in the respective areas, might be the solution of choice.

Cluster coordinators may be treated as certain human resources possessing experience of stimulating cluster collaboration. On the one hand, this experience acquired when heading leading clusters in Poland should be taken advantage of to develop competences in less evolved cluster structures, especially in their seed phase. The group of approximately 100 individuals who manage the 35 clusters in Poland surveyed ought to be treated as the target for educational action improving their competences with regard to stimulation of cluster development up to world standards using international cooperation (training, study visits, etc.), on the other hand. It can be noted at this juncture that the ratio of cluster managers in large clusters is slightly greater than in the case of small clusters, the latter in turn barely higher than the same indicator for medium-sized clusters. It should be concluded, therefore, that multiplying entities as part of clusters will not substantially increase commitment of coordinating individuals. It may be assumed in this connection that coordination expenditure exhibits effects of scale, meaning these costs rise more slowly than the scale of clusters being coordinated. Individuals experienced in coordinating specific clusters may be the proper human resource to support development of new clusters. Newly emerging clusters ought to have access to staff capable of accelerating processes of initiating cooperation. A 'cluster experts database' may become a form of such contact making.

**5) Conditions should be ensured of equal access of clusters to public sources of financing while providing for a stable realisation of economic policy goals utilising clusters. This should be taken to include the principle that clusters could receive public support in return for services driving enterprise expansion.**

The deteriorating financial resources position appears the chief adverse development in the area *Cluster resources* in the current edition of the cluster benchmarking survey. Beside levels of public financing for cluster operations in themselves, dramatic disparities of financial resources of individual clusters is another problem. The disparity seems to arise from highly varied capacities of clusters for obtaining public financing for their actions. In addition to the dwindling involvement of private resources, an adverse tendency towards inability to replace public finance with members' resources is noted. A majority of the clusters studied appear to be insufficiently mature to effectively finance their operation up to high standards and without participation of public funding. Shrinking of both public resources and of self-financing can be observed in their budgeting. It must be admitted, though, that the decline of public funding is markedly faster, which implies clusters make efforts to mobilise their members' resources, a good sign of their willingness to continue operations. It is reasonable to define tasks/ services which could be provided by clusters to their members and to offer public support for such services as a form of maintaining stable financing for clusters. Levels of co-financing should be linked not to the existence of clusters as such but to the scope of their services, such as training, advisory services, services concerning innovative

actions or internationalisation. Numbers of firms/ workers/ operations to which services are supplied could be the factor determining levels of the co-financing. Each and every service should aim at improving innovation and competitiveness and, in consequence, of market expansion of enterprises.

**6) National programmes should provide possibilities for clusters to realise projects related to creation of cluster infrastructure equipment, especially in respect of research and development activities and laboratory equipment.**

The need to focus clusters' actions on stimulation of innovation processes is beyond any doubt. This was substantiated in *Recommendation 6 for Cluster coordinators*. The reasons offered in *Recommendation 3 for local authorities* are worth mentioning as it is clearly stressed that the possibilities should be assured for clusters to realise projects connected to creation of joint cluster infrastructure, particularly with regard to R&D activities and laboratory equipment. It is the national authorities that will have decision-making power concerning development of research infrastructure in line with the concept of smart specialisation, in the new programming period. Thus, implementation of the recommendations to coordinators and local authorities, thoroughly reasonable in light of the clusters' role as the right environment for R&D efforts, cannot be appropriately attained without coordination of these actions on the national level. The mechanism of coordination should lead to a full utilisation of resources existing in regions, to be supplemented as required with new elements, absent now but crucial to development of clusters.

**7) Clusters should be taken into consideration as potential beneficiaries of actions supporting R&D efforts, particularly in their international dimension.**

The need for enhanced cluster commitment to R&D activities is indicated in *Recommendation 7 for Cluster Coordinators*. At the same time, *Recommendation 9 for Cluster Coordinators* highlights the still low support of clusters in making R&D facilities available to their members. Let us return to *Recommendation 6 for Cluster Coordinators*, though, where the very poor result of cluster benchmarking is indicated concerning implementation of legally protected innovative solutions. Meanwhile, it is clusters that are expected to display a distinctly greater level of breakthrough innovations. Innovation deficits may be overcome by clusters conducting their own R&D work or organising such efforts for the benefit of their members. Activities of Polish clusters as part of international research consortia, with adequate potential to realise innovations that are revolutionary on the global scale, are of particular importance in this connection. Mobilising actions in this respect should attract cluster support on the national level.

**8) Forms of clusters' sharing knowledge and experience concerning internationalisation of clusters themselves and, above all else, support for foreign expansion of enterprises (e.g. via 'The Cluster Club') should be provided on the national level.**

Virtually all clusters participating in the survey have some exports potential, yet numbers of markets they support are highly varied in the clusters under discussion. It should be mentioned that the unusually great number of markets characterising the leader (as many as 100 foreign markets serviced by the leading cluster) has strongly contributed to a reduction of benchmark ratings of the remaining clusters covered by this survey. The average number of markets supported by a cluster, 27, is a better proof of the potential of markets supported by clusters than the benchmarking indicators themselves. It must be therefore concluded that a part of clusters service relatively extensive foreign markets (many countries) while others

tend to focus on limited numbers of markets. This statement alone leads to the conclusion that the individual clusters can share experience and knowledge of specific foreign markets, at least as far as the institutional domain is concerned, which could drive expansion of some clusters previously operating in few markets. Clusters supporting low numbers of foreign markets could undertake actions to facilitate acquisition of new markets by enterprises, which is the case in leading clusters. Information sharing between clusters, for instance as part of 'The Cluster Club', currently sponsored by the Ministry of Economy, could be an instrument of support for expansion to new markets.

The foregoing conclusions are fully confirmed with figures concerning internationalisation of cluster structures itself. A marked rise in the numbers of effective cooperation agreements between clusters and foreign entities is a positive symptom of internationalisation of clusters themselves. Details on cluster participation in international networks and specialist projects imply the process of cluster internationalisation has commenced, an indubitable reason for optimism. The overall standard of clusters' internationalisation continues to be low, however. Clusters should be supported in the process of their internationalisation, though it must be remembered that it is not the internationalisation of clusters but of enterprises, as indicated before, that is the ultimate objective.

**9) Mechanisms should be established on the national level to encourage universities to cooperate with the economy, including clusters, on development of the educational offer (in respect of study subjects and the so-called educational effects) and on methods of instruction, especially as part of 'the practical education profile'.**

Deficits of adequately qualified staff should be treated as one of the main, if not the key, barrier to cluster development in Poland. The survey has revealed a deteriorating position in respect of the indicator *Availability and mobility of highly qualified workers*. National authorities have both the instruments and the need to influence universities, as referred to in *Recommendation 5 and Recommendation 6 for Scientific Units and Research Institutes*. Having the legal instruments cited there at disposal, the practical implementation (for example, in the work of the Polish Accreditation Committee) can take clusters into account as elements of the practical education context required of a university or as institutions evaluating projected educational effects. It should be kept in mind that clusters can become major elements improving the practical nature and thereby quality of the university education in Poland.

**10) Sharing of experience in cluster policies between public authorities of various regions needs to be stimulated.**

Clusters encounter a relatively strong diversity of attitudes on the part of authorities in regions where they are rooted. It appears that the possible role of clusters in promoting regional development is not fully grasped in some regions, whereas authorities of some other regions seem distinctly more favourably inclined towards the idea of using clusters to reinforce processes of regional development. In the circumstances, the postulate of stimulation of experience sharing between regional authorities regarding support for development of cluster structures as important instruments of regional development policies seems reasonable. Lack of understanding for the idea of employing clusters as efficient and effective means to supporting regional development among some public managers may be overcome through direct contact with public authorities in Poland and abroad which successfully use clusters to promote economic development.

**11) Research into leadership processes in clusters, as well as incidental training and sharing of experience on leadership practices in clusters, e.g. in the framework of ‘The Academy of Cluster Managers’, are needed on the national level.**

The survey results indicate a cluster coordinator enjoys a strong status in a region, yet is relatively weak in relation to cluster enterprises. This gives rise to a major problem in the process of cluster management, since coordinators find it hard to enforce their ideas or discipline members with regard to decisions or actions already undertaken. Without firm leadership, clusters will be unable to take a range of the much-needed pro-development actions. Research into cluster leadership is required, therefore. Transfer of knowledge and experience in this respect should be practical in nature and based on knowledge, experience and well-tested models of managers who have been successful in this field. Therefore, leadership training needs to be conducted, e.g. in the form of ‘The Academy of Cluster Managers’, to provide for sharing of experience between coordinators.

#### 11.4. Recommendations for cluster members

**1) Cluster members should take a more active part in cluster maintenance, both in respect of incurring fixed costs and involvement in pro-development projects. In return, they may expect corresponding services to be provided by coordinators.**

The need for a greater degree of cluster maintenance with members’ resources was justified at more length in *Recommendation 1 for cluster coordinators*. The deteriorating financial position and the need to incur more fixed costs via membership contributions have been emphasised. It should be stressed, however, that entities operating as part of clusters could count on services of adequate value in exchange for their payments. Cluster members should determine and report to coordinators what type of services they would be interested in in return for the financing they provide. Services offered by coordinators might include, for instance, training, advisory services, services on innovative actions or internationalisation. Participants in cluster structures ought to clearly formulate their expectations concerning the types of projects they would be interested in realising, also some involving considerable contributions of their own. Selection of valuable services and projects as part of a cluster could fully substantiate increased financial commitment as a form of improved efficiency and organisation of cluster participants.

**2) Cluster members should be involved not only in ‘soft’ projects, most commonly implemented till now, but also infrastructure projects to enhance innovation and competitiveness which will require substantial own contributions.**

*Recommendation 9 for cluster coordinators* clearly indicates clusters ought to realise projects relating to creation of shared infrastructure, particularly in respect of R&D activities and laboratory equipment. A persuasive argument for this recommendation is offered by *Recommendation 7 for cluster coordinators*, which suggests clusters should become involved in organisation of R&D work for their members. The need for mobilising R&D activities is confirmed by low ratings of coordinators in the fields of R&D and innovations. These poor assessments could also be seen as an expression of cluster members’ interest in these areas of cluster activities. In fact, wishing for significant progress in respect of innovation, cluster members should be involved in infrastructure projects to lay the foundations required to implement innovations and market expansion.

**3) Cluster members should take flexible part in knowledge sharing processes in accordance with their requirements and current state of readiness to share it. In technical terms, it may justify participation in narrower platforms of knowledge sharing as part of working groups or other adequate forms of meetings with other cluster participants.**

*Recommendation 16 for cluster coordinators* suggests it is reasonable to establish as flexible forms of sharing ‘tacit knowledge’ as possible by forming narrower working groups or other appropriate meeting platforms for these groups which are already prepared to share knowledge without waiting for such need to spread among all cluster entities. Members ought to determine to what degree and with what entities they wish to share the ‘tacit knowledge’ and take appropriate part in a variety of knowledge sharing platforms. The very frequency of participation in meetings can be adapted to individual preferences and needs of a given member, considering a certain minimum.

**4) Cluster members should be prepared to undertake joint actions across cluster structures, as well as development projects, especially of a commercial nature, to benefit potentially varied groups of entities from a given cluster.**

A number of the foregoing recommendations have pointed to areas of desirable actions within clusters, for instance, *Recommendation 7 for cluster coordinators*. Nevertheless, involvement of cluster entities in R&D efforts should be recommended. It should be borne in mind that such endeavours will require own contributions from participants in research projects or establishment of R&D infrastructure. All cluster members, most frequently unable to commercialise results arrived at as part of such research, cannot be expected to incur such costs. In the circumstances, organising development projects within clusters for a specific group of entities interested in the results and willing to bear costs of the undertaking by founding dedicated companies and consortia seems a reasonable solution. This applies not only to the R&D work mentioned above but also to many other directions of development, like those indicated in such recommendations for coordinators as: *Recommendation 3, Recommendation 4, Recommendation 5, Recommendation 10 or Recommendation 11*.

**5) Entities operating in clusters should establish and consequently accept a cluster coordinator leadership.**

*Recommendation 18 for cluster coordinators* mentioned the issue of leadership is currently the central problem of cluster management. Without firm leadership, clusters will be unable to undertake a range of pro-development actions. It is difficult to assume that discussion and full consensus of all participants will be the sole method of resolution of each and every question. As clusters expand, this way of making even the most trifling decisions will cause any activity to evaporate. Leadership ought to be the principal source of power in the cluster management process. Understanding the peculiar managerial status of a cluster coordinator should persuade members to obey and recognise his or her leadership to some extent.

#### **11.5. Recommendations for scientific organizations and research institutes**

**1) Scientific units ought to take a markedly more active part in functioning of clusters, primarily through stimulation of R&D projects and their joint implementation with other cluster participants.**

*Recommendation 7 for cluster coordinators* suggests clusters should become involved in organisation of R&D work for their members. In addition, it is indicated according to *Recommendation 8 for cluster coordinators* that attempts should be made to increase R&D staffing in clusters by attracting more units of R&D sector as well as enterprises possessing R&D facilities. This is justified by the fact that absence or very limited shares of R&D personnel in most clusters imply that clusters focus R&D entities and enterprises having R&D facilities to a decidedly insufficient degree. It should be noted that considerable emphasis will be placed on stimulation of R&D work as part of actions to stimulate economic growth in the next programming period. Considering all of the above, scientific units should perceive clusters as strategic partners in their own R&D efforts. Their cooperation with clusters is in the interests of both clusters and research units themselves as it may contribute to expanding scope of their actions and the available sources of financing for their activities.

**2) Scientific units should treat clusters as locations for transferring their research results to economic practice.**

*Recommendation 9 for cluster coordinators*, which arises from *Recommendation 6*, *Recommendation 7* and *Recommendation 8*, suggests clusters should carry out projects relating to establishment of shared infrastructure, particularly that, which is linked to R&D activities. Such newly-established infrastructure can and should be jointly utilised, also by scientific units. It should be added that some enterprises and other cluster members have their own R&D facilities. From the viewpoint of a scientific unit, therefore, a cluster can be seen as a perfect location for its own scientific and R&D efforts without the need to search for potential recipients of such research work.

**3) Scientific units should co-participate in clusters' infrastructure projects aimed at enhancing innovation and competitiveness, especially in respect of R&D activities and laboratory equipment.**

*Recommendation 9 for Cluster Coordinators* states directly that clusters ought to realise projects relating to establishment of shared infrastructure, particularly with regard to research and development activities and laboratory equipment. Considerable importance of clusters for scientific units as part of joint actions concerning creation of R&D infrastructure is implied by *Recommendation 3 for Local Authorities* and *Recommendation 8 for Government Policy Subjects, Government Agencies and Entrepreneur Organisations*, where cluster support is postulated in respect of the possibility to pursue projects relating to creation of cluster infrastructure facilities, in particular as it concerns research and development activities and laboratory equipment. Scientific units can take advantage of the opportunity offered by participation in such projects in order to improve accessibility of R&D infrastructure in clusters and to enrich their own resources. Coordination of infrastructure actions between clusters and scientific units will facilitate rational use of existing infrastructure and addition of new elements to current resources.

**4) It is reasonable for scientific units to treat clusters as the context for developing high-quality research and teaching staff with practical experience.**

*Recommendation 7 for cluster coordinators* showed clusters should become involved in R&D efforts. Participation of scientific units' personnel in such work may be a perfect form of improving qualifications of scientific staff, including work for purposes of promotion to higher scientific degrees. The issue of clusters as educational environments is also highlighted in *Recommendation 5 for local authorities*, which points to clusters as a new type of practical

education institutions capable of improving competences by means of frequently unique material facilities of their members. Staff exchanges, internships, joint research by teams including scientific staff and practitioners may become instrumental in this respect.

**5) Universities should treat clusters as practical education partners, also by implementing the so-called 'practical education profile'.**

Improving the education process so that it provides knowledge and practical skills is a challenge currently facing universities. Practical instruction should be held in conditions typical for a given professional area and make it possible for students to carry out practical activities. Moreover, practical instruction should be run by individuals with professional experience gained outside universities and appropriate to such instruction. These requirements can be properly fulfilled in the case of most subjects only via cooperation with employers. Clusters, combinations of employers having varied practical education places and large numbers of work stations connected to core sectors which should be appropriate to educational profiles of universities, may become perfect for cooperation with employers. For a university, a cluster ought to constitute a fundamental context of practical education.

Questions of utilising clusters as practical contexts of education have also been justified in *Recommendation 12 for cluster coordinators* and *Recommendation 5 for local authorities*, which suggest public authorities should support training actions organised by clusters and treat clusters as major partners in improving competences of communities. Putting this recommendation in practice is likely to offer scientific units good opportunities for working with clusters.

**6) Universities should treat clusters as important representatives of job market requirements and develop their educational offer, on the level of both subjects of study, specialist and detailed educational effects, as appropriate to cluster needs.**

Development prospects of universities are to a pronounced extent dependent on their ability to adapt their educational offer to requirements of the job market. The conviction of potential applicants and present students that economic practice expects graduates of a given subject appears the key challenge to universities, especially in the context of a dramatic fall in numbers of university applicants. Universities may legally administer a subject of studies or begin education in a new subject if they demonstrate job market requirements for the proposed educational offer exist. Universities are obliged to conduct on-going analysis of conformity of assumed educational effects with the job market's requirements.

## **11.6. Recommendations for business environment institutions**

**1) Improved matching of training and advisory offer to requirements of clusters and their members should be recommended.**

In accordance with *Recommendation 10 for cluster coordinators*, provision of specialised educational and training services to members should be included in strategies of cluster development and their day-to-day operations as a key function. The survey results indicate no positive shift towards adapting training and advisory services to members' needs can be confirmed. The standard of their matching can only be described as insufficient and requiring improvement. Given the fact that relatively high numbers of business environment institutions are parts of clusters, the identified failure to adjust their offer to cluster requirements may appear to result from insufficient commitment to identification and

satisfaction of expectations of other partners, especially enterprises. Knowledge flows within clusters encompassing business environment institutions must have failed to achieve an appropriate level of ‘tacit knowledge’ sharing related to actual needs of business partners. One should be aware that business environment institutions may limit themselves to formal participation in clusters without sufficient involvement in sharing of information. Thus, revision of their offer will only become possible after increased integration of the business environment institutions into internal communication systems as well as their participation in more joint undertakings, not necessarily connected to education or consulting.

*Recommendation 12 for cluster coordinators* pointed to ineffectiveness of earlier actions on the level of public authorities, job market institutions and educational institutions in respect of adapting the formal and continuing education systems to requirements of enterprises. The much-needed role of clusters as ‘competence brokers’ for the benefit of cluster members was emphasised. It would then be the task of clusters to identify competences demanded by their members and to organise the process of their development in partnership, also with training institutions, on a continuous basis. It offers an opportunity for mobilising the latter. *Recommendation 5 for local authorities* should also be taken into consideration as it suggests public authorities ought to support training actions arranged by clusters and treat clusters as important partners in raising competences of residents. Realisation of this recommendation is likely to provide training institutions with opportunities for more beneficial collaboration with clusters.

## **2) Training institutions should treat clusters as the practical context for their training action, also for target groups other than staff of cluster entities.**

Improvement of competences is in many cases the most effective if taking place in practical/ real conditions. Business environment institutions, particularly training institutions, may use clusters as practical contexts of training offered to diverse target groups. An innovative concept of taking advantage of material resources of cluster members, especially enterprises, is proposed here to organise training processes in the workplace as services to individuals other than personnel of specific entities. Such activities of training institutions as arranging for internships, but also practical professional training addressed to the unemployed, youth, those interested in job reorientation, and others may be considered.

*Recommendation 5 for local authorities* stresses clusters could be regarded as a new type of practical education institutions capable of boosting competences of other resident groups as well by using often unique material resources of their members. Collaboration with clusters may provide not only adequate practical instruction facilities but also access to expert resources for continuing education addressed to various target groups.

## **3) Financial institutions should be involved in clusters’ actions by attempting to adapt their products and services to specific requirements of clusters, in particular, of leading sector enterprises.**

*Recommendation 14 for cluster coordinators* emphasised experience of highly-developed countries as indicating presence of financial institutions specialised in financing specific sectors. Knowing a sector in depth, these institutions are better able to estimate risks of certain undertakings and consequently able to finance projects banking institutions would find too risky. Improved knowledge of a sector also helps to better design the financing offered, take a more advantageous competitive position, and acquire the attractive market of cluster entities. Financial institutions can therefore enhance their competitiveness by adapting their offer to the specific nature of a cluster’s lead sectors.

**4) All business environment institutions participating in clusters should take a flexible part in as many pro-development undertakings/ projects as possible, adding their own competences.**

That cluster entities should become involved in a number of projects was justified in *Recommendation 4 for entities in clusters*. The need for intense activity of clusters and thus of their members is also described as part of *Recommendation 13 for cluster coordinators*. It is mentioned there that clusters ought to overcome barriers to and difficulties with cooperation inside their own environment by means of their high activity. Similar conclusions may be applied to activities of business environment institutions within clusters themselves. Cooperation can become closer and ‘tacit knowledge’ can flow by implementation of specific projects. Projects in the fields of innovation, internationalisation and market expansion, even if narrow (e.g. technical) in their basic dimension, always require support by a range of environment institutions. These institutions should always be involved in determining whether they are capable of making contributions of their own to a project and, if this is feasible, should take part in the undertakings.

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## Glossary

### Average

The average for a cluster in a given year – a total value of indices in a particular subfield divided by the number of indices in this subfield. The average for all clusters – a total value of indices in a particular subfield for all the clusters divided by the number of indices in this subfield.

*Source: Own work.*

### Benchmark

The highest value achieved by the cluster in a given field / subfield.

*Source: Own work.*

### Benchmarking

A continuous and systematic process of comparing one's own efficacy, measured in productivity, quality and experience, with the results of the companies and organisations that may be regarded as models of excellence. Among numerous classifications of the benchmarking, the most frequently distinguished ones include the benchmarking of: processes (in case of which, procedures and processes employed by an organisation are compared), results (comparison of the results achieved in a group of similar organisations), strategies (in case of which, the comparison is made on the level of strategic measures, i.e. methods for formulating the vision of development and accuracy of the organisation's goals), conditions (based on the comparison of differences resulting from various conditions in which the compared entities operate).

*Source: B. Karlöf, S. Östblom: Benchmarking. Równaj do najlepszych, Zarządzanie i Finanse – Józef Śniadecki, Warszawa 1995, J. Woźnicki (ed.), Benchmarking w systemie szkolnictwa wyższego, Fundacja Rektorów Polskich, Warszawa 2008 Centrum Benchmarkingu Polska (<http://www.benchmarking.com.pl/>); K. B. Matusiak (ed.), Innowacje i transfer technologii. Słownik pojęć, Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2008.*

### Best practices

The concept of best practices is a derivative of the benchmarking as a tool for managing an organisation. Generally, the notion of best practices may be defined as "processes or methods that, if successfully realised, lead to the increased productivity". Best practices are not a novelty. They have been successfully put into practice in other organisations. The implementation of these measures is aimed at improving the results achieved by an organisation, thus increasing its productivity.

It is difficult to indicate general best practices for all or selected groups of receivers. Their selection and implementation should always be undertaken individually and preceded by a process of selecting and assessing the chosen methods as models ones in the particular case. The best practices for a particular organisation are those solutions and measures that, once implemented, lead to the improvement of achieved results.

*Source: K. B. Matusiak (ed.), Innowacje i transfer technologii. Słownik pojęć, Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2011*

### Cluster members

The entities that function within the cluster, including companies, business-related institutions of the R&D sector (universities, research institutes, educational institutions), and the institutions that support business (incubators, science and technology parks, technology transfer centres, special economic zones, certifying authorities, training and consulting companies, financial institutions and other specialised business-related institutions), as well as the public administration.

*Source: Kierunki i założenia polityki klastrowej w Polsce do 2020 roku. Rekomendacje grupy roboczej ds. polityki klastrowej, PARP 2012.*

### **Cluster strategy**

A long-term (or mid-term) plan for the operation and development of the cluster that identifies the goals/development directions and the strategic measures. The plan is developed as a result of a discussion between the crucial cluster members and the reached consensus. The strategy should be of formal nature (i.e. in writing).

*Source: Own work.*

### **Core of the cluster**

A group of entities, characterised by a high activity and involvement in the cluster's functioning, that operate within the "root" region for the purpose of developing the dominant sector (line of business) of the cluster. The entities in the cluster's core have strong formal and/or informal co-operational relations.

*Source: Own work based on: Th. Andersson, S. Schwaag Serger, J. Sörvik, E. Wise Hansson, The Cluster Policies Whitebook, International Organisation for Knowledge Economy and Enterprise Development, Malmö 2004; Przygodzki Z. Clusters in supporting innovativeness of a region. Implementing Regional Innovation Systems (RIS) conception in structural policy programs in Poland, [in:] L'Europe et le développement regional. Politiques communautaires, entpreneuriat et mobilisation de la societe civile , PGV / AESIC ISLA-Lisboa, Lizbona 2007, pp. 268-273.*

### **Internationalisation**

Undertaking measures outside of the home country. In companies, the internationalisation is regarded as an advanced stage of expansion, which usually follows the stage of increase in exports, and a launch into international markets. In case of most SMEs, a high degree of internationalisation is observable when the company exports a considerable part of its production or begins to cooperate with a foreign entity. Regardless of the form and the scope, the internationalisation is regarded both as a symptom of and a condition for the competitiveness of companies as well as regions, countries and integration associations.

*Source: M. K. Nowakowski (ed.), Bariery internacjonalizacji przedsiębiorstwa, KeyText, Warszawa 1997 N. Daszkiewicz Internacjonalizacja małych i średnich przedsiębiorstw we współczesnej gospodarce, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2003; Sixth Periodic Report on the Social and Economic Situation and Development of the Regions of the European Union, Bruksela-Luksemburg 1999.*

### **Ordinal scale**

A type of a measuring scale employed in research that enables the quantification of impingement of the analysed phenomenon and the examination of the "less-more" relation, in case of which (...) a measuring scale of 0 to 10 (the so-called monopolar scale) is applied, with 1 being the minimum and 10 being the maximum in terms of assessing the particular phenomena.

*Source: Z. Kędzior (ed.), Badania rynku. Metody i zastosowania, PWE, Warszawa 2005.*

### **Region competitiveness**

The ability of the region, that is exposed to international competition, to achieve a relatively high income and employment level.

*Source: Sixth Periodic Report on the Social and Economic Situation and Development of the Regions of the European Union, Brussels-Luxembourg 1999.*

### **Stages of the cluster's development**

The analysis of the development of cluster initiatives in various parts of the world enabled the distinction of several stages of their life cycle. The first stage (incubation) is observable when several entities begin to collaborate in their basic line of business, within which cooperation links are created, thus enabling those entities to pursue their shared goals. It is characteristic for this stage that new companies join the cluster, including the entities from the related and support sectors, that are encouraged by the successes of the cluster members. In the stage of maturity, the cluster arrives at a critical point of its development. There is a considerable number of companies associated within the cluster and the cluster itself has strong external relations. Within the cluster, new entities (*spin-offs*) emerge and the existing ones blend and convert. In the stage of decline of the cluster, there is a decrease in relations among its members as well as a decrease in competitiveness, e.g. as a result of the "aging" of the line of business within which the cluster had been organised. The clusters showing the ability to adapt to new conditions (changes in the market, new technologies etc.) are able to avoid a crisis by the transformation of their structures and relations between their members during the transformation stage.

#### Stage of incubation

- Creating environmental conditions necessary for the development of clusters (lobbying to the benefit of the cluster, connections with public authorities);
- Improving relations with the research units within the sector;
- Creating one's own organisational structure and brand image;
- Developing a strategy for operation and collaboration;
- Selecting leaders to become the "propellers" of the cluster's development.

#### Stage of development

- Creating relations with partners and building trust between partners;
- Creating and developing one's own projects;
- Shaping solid financial backing for the development of the cluster;
- Realisation of the shared market activity (shared orders, marketing etc.).

#### Stage of maturity

- New products as a result of shared initiatives;
- One's own patents and innovations;
- Attracting new projects to the region;
- Internationalisation of the cluster.

*Source: Own work based on: Opinion of the Committee of the Regions on 'Clusters and cluster policy', Official Journal of the European Union, C 257 from 9.10.2008 (2008/C 257/12), pp. 80-81; Th. Andersson, S. SchwaagSerger, J. Sörvik, E. Wise Hansson, The Cluster Policies Whitebook, International Organisation for Knowledge Economy and Enterprise Development, Malmö 2004.*

### **Sub-synthetic index**

An index specified for all fifteen fields on the basis of an arithmetic mean from benchmarks of particular variables.

*Source: own work based on Metodyka benchmarkingu klastrów w Polsce, PARP, Warszawa 2010.*

### **Support institutions**

A group of organisationally diversified non-commercial institutions that are active in the field of supporting entrepreneurship and self-employment, transferring and commercialising technologies, and improving competitiveness of the SMEs.

*Source: K. B. Matusiak (ed.), Innowacje i transfer technologii. Słownik pojęć, Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2011*

### **Synthetic index**

An index specified for all four fields on the basis of an arithmetic mean from benchmarks of the subfields.

*Source: own work based on Metodyka benchmarkingu klastrów w Polsce, PARP, Warszawa 2010.*

### **The "root" region**

The location of the cluster's core, where 70% of the cluster members are concentrated, that forms the territory of a commune or district or the neighbouring communes or districts.

*Source: Own work based on: M. E. Sokołowicz, Region wobec procesów globalizacji - terytorializacja przedsiębiorstw międzynarodowych (na przykładzie regionu łódzkiego), Doctoral Dissertations in Economics and Business Administration, Publishing House of the University of Łódź, 2008; G. Grabher, *The Embedded Firm: On the Socioeconomics of Industrial Networks*, London, Routledge, 1993; M. S. Granovetter, 1985, *Economic Action and Social Structure: The Problem of Embeddedness*, *American Journal of Sociology* 91, pp. 481-510.*

### **Type of initiative**

Among the analysed cluster initiatives, three types have been distinguished. A bottom-up initiative is observable in a situation when clusters and co-operational associations of companies emerge since the companies themselves perceive such a solution as necessary. A top-down initiative appears when the cluster is initiated by the entities that are not companies (public sector, non-profit institutions). In case of the cluster being created as a result of an agreement between the entrepreneurs and representatives of other institutions, a mixed initiative takes place.

*Source: Own work based on: O. Solvell, G. Lindquist, Ch. Ketels, *The Cluster Initiative Greenbook*, Ivory Tower, Sweden 2003; Th. Andersson, S. SchwaagSerger, J. Sörvik, E. Wise Hansson, *The Cluster Policies Whitebook*, International Organisation for Knowledge Economy and Enterprise Development, Malmö 2004.*

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## Statistical Annex

### Values, the average value and benchmark value for the clusters that have remained operational for up to 4 years

FIELD	SUBFIELD	1	2	3	4	5	6	7	8	9	10	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	1.75	0.75	0.75	0.75	1.75	1.00	1.50	1.25	0.75	0.75	1.10	1.75
	Financial resources	0.67	3.33	0.67	0.33	1.33	2.33	0.33	0.00	0.00	0.00	0.90	3.33
	Infrastructural (tangible) resources	1.67	5.33	7.00	6.00	7.67	1.33	5.33	5.33	8.50	4.33	5.25	8.50
	Cluster resources	1.36	3.14	2.81	2.36	3.58	1.56	2.39	2.19	3.08	1.69	2.42	3.58
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	0.00	3.00	5.67	2.33	1.00	1.33	4.00	1.33	3.00	0.67	2.23	5.67
	Marketing and PR	5.00	6.00	6.00	4.67	6.67	4.33	9.00	8.33	9.00	4.00	6.30	9.00
	Internal communication	5.3	6.8	7.3	5.8	9.3	5.8	6.8	6.8	7.0	5.0	6.55	9.25
	Creation of knowledge and innovation	4.33	4.00	7.00	2.33	4.67	4.00	6.67	5.67	3.33	3.00	4.50	7.00
	Processes in the cluster	3.65	4.94	6.48	3.77	5.40	3.85	6.60	5.52	5.58	3.17	4.90	6.60
<b>CLUSTER PERFORMANCE</b>	Human resources development	0.67	0.33	2.00	0.33	2.33	0.33	2.00	0.00	0.33	0.67	0.90	2.33
	Increasing the competitive advantage of cluster	0.67	0.67	1.00	0.33	2.00	0.33	0.67	1.00	0.33	0.00	0.70	2.00
	Improvement of cluster innovation	0.50	4.00	0.50	1.00	1.50	1.67	1.67	0.67	0.00	5.00	1.65	5.00
	Cluster internationalisation	1.67	0.75	1.00	0.75	2.00	0.75	1.00	0.33	0.00	0.33	0.86	2.00
	Cluster performance	0.88	1.44	1.13	0.60	1.96	0.77	1.33	0.50	0.17	1.50	1.03	1.96
<b>GROWTH POTENTIAL</b>	Regional conditions	9.50	5.75	6.75	6.25	6.75	6.25	8.75	8.50	8.25	6.75	7.35	9.50
	Public authorities' policy supporting cluster development	3.75	5.25	4.50	1.75	4.75	4.00	4.25	8.25	7.25	6.25	5.00	8.25
	Associated institutions	4.33	6.00	6.00	7.00	5.00	3.33	4.33	9.00	4.50	8.67	5.82	9.00
	Cluster management	9.33	9.33	6.67	8.00	9.33	8.00	9.67	9.67	8.33	5.00	8.33	9.67
	Growth potential	6.73	6.58	5.98	5.75	6.46	5.40	6.75	8.85	7.08	6.67	6.63	8.85

### Values, the average value and benchmark value for the clusters that have remained operational for at least 4 years

Field	Sub-field	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	2.00	1.00	6.75	1.00	1.75	0.25	0.75	4.00	2.25	0.75	1.00	0.50	3.00
	Financial resources	0.33	2.67	6.67	3.67		3.33	0.33	0.33	0.00	3.33	0.00	3.33	0.67
	Infrastructural (tangible) resources	4.00	3.67	8.67	9.67	8.33	5.33	10.00	4.33	5.00	5.00	3.50	8.33	2.33
	Cluster resources	2.11	2.44	7.36	4.78	5.04	2.97	3.69	2.89	2.42	3.03	1.50	4.06	2.00
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	1.67	3.67	3.33	5.67	0.33	1.00	3.67	2.00	3.67	1.00	0.33	0.67	0.00
	Marketing and PR	8.33	7.67	9.33	7.67	8.00	7.00	8.67	5.33	5.33	4.67	4.33	3.67	6.00
	Internal communication	5.5	6.8	9.5	7.8	8.5	4.5	8.5	5.3	4.5	5.8	6.0	5.3	5.0
	Creation of knowledge and innovation	5.67	6.33	8.00	5.00	7.33	2.67	3.00	2.00	3.33	5.33	3.67	0.67	5.00
	Processes in the cluster	5.29	6.10	7.54	6.52	6.04	3.79	5.96	3.65	4.21	4.19	3.58	2.56	4.00
<b>CLUSTER PERFORMANCE</b>	Human resources development	2.33	1.67	5.00	0.00	7.00	0.67	0.00	0.67	1.00	1.33	0.67	0.00	2.33
	Increasing the competitive advantage of cluster	2.67	5.50	8.33	1.00	3.50	0.00	0.00	0.00	1.33	0.50	0.33	0.33	0.33
	Improvement of cluster innovation	2.00	0.00	6.67	2.00	1.50	0.33	3.33	0.00	0.50	0.33	1.00	0.00	3.67
	Cluster internationalisation	0.67	2.75	6.75	2.25	3.00	3.75	2.50	1.50	0.33	2.33	0.00	0.00	4.25
	Cluster performance	1.92	2.48	6.69	1.31	3.75	1.19	1.46	0.54	0.79	1.13	0.50	0.08	2.65
<b>GROWTH POTENTIAL</b>	Regional conditions	5.25	8.50	6.00	5.50	8.50	7.50	7.50	7.25	7.00	6.00	5.50	5.50	5.00
	Public authorities' policy supporting cluster development	5.25	5.75	6.25	4.75	5.75	3.25	6.50	6.75	6.75	3.75	2.00	4.50	4.50
	Associated institutions	5.00	7.50	9.00	3.00	7.67	4.33	7.67	6.00	6.50	8.67	5.33	9.00	3.33
	Cluster management	7.00	9.33	9.67	8.67	8.67	8.33	9.67	5.33	7.67	8.00	7.67	7.00	8.33
	Growth potential	5.63	7.77	7.73	5.48	7.65	5.85	7.83	6.33	6.98	6.60	5.13	6.50	5.29

Field	Sub-field	14	15	16	17	18	19	20	21	22	23	24	25	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	1.25	2.00	4.25	2.75	3.50	1.75	2.25	6.50	1.00	1.75	1.75	5.33	2.36	6.75
	Financial resources	0.00	0.67	0.00	1.00	0.33	0.00	1.00	3.33	0.00	0.67	1.00	1.00	1.40	6.67
	Infrastructural (tangible) resources	6.33	4.67	6.00	8.67	8.00	6.67	6.33	8.67	7.33	1.33	8.33	8.67	6.37	10.00
	Cluster resources	2.53	2.44	3.42	4.14	3.94	2.81	3.19	6.17	2.78	1.25	3.69	5.00	3.43	7.36
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	0.00	4.00	1.33	4.00	5.33	0.00	6.67	0.00	4.33	3.33	2.67	7.00	2.63	7.00
	Marketing and PR	3.67	6.67	7.00	7.00	5.33	2.33	9.00	3.33	4.67	5.33	5.67	8.67	6.19	9.33
	Internal communication	7.0	5.5	8.0	7.0	7.0	6.0	8.8	7.0	7.3	5.5	6.3	9.0	6.68	9.50
	Creation of knowledge and innovation	4.33	6.00	4.67	5.67	5.33	3.00	7.67	4.00	4.67	2.33	4.00	9.00	4.75	9.00
	Processes in the cluster	3.75	5.54	5.25	5.92	5.75	2.83	8.02	3.58	5.23	4.13	4.65	8.42	5.06	8.42
<b>CLUSTER PERFORMANCE</b>	Human resources development	0.33	1.00	5.33	1.33	2.33	0.00	2.00	4.00	0.67	2.50	N/A	5.00	1.97	7.00
	Increasing the competitive advantage of cluster	1.67	3.33	2.33	3.00	4.00	0.67	2.67	1.00	1.67	2.67	1.00	3.00	2.03	8.33
	Improvement of cluster innovation	0.33	8.67	2.67	0.00	3.33	2.33	6.33	2.33	3.33	1.50	0.50	7.00	2.39	8.67
	Cluster internationalisation	3.00	2.75	1.00	1.33	3.75	0.00	1.00	2.67	2.75	2.75	1.67	5.75	2.34	6.75
	Cluster performance	1.33	3.94	2.83	1.42	3.35	0.75	3.00	2.50	2.10	2.35	1.06	5.19	2.17	6.69
<b>GROWTH POTENTIAL</b>	Regional conditions	5.75	6.25	7.00	7.25	5.75	8.50	7.25	8.75	7.25	6.75	5.75	9.50	6.83	9.50
	Public authorities' policy supporting cluster development	3.50	4.50	7.75	7.00	5.75	6.50	1.75	4.75	3.00	5.25	3.75	7.00	5.05	7.75
	Associated institutions	7.33	4.67	7.67	8.00	9.00	6.67	3.33	6.33	3.33	4.33	6.67	7.33	6.31	9.00
	Cluster management	7.33	7.00	8.00	9.67	7.67	9.00	9.00	8.33	5.33	8.00	8.67	10.00	8.13	10.00
	Growth potential	5.98	5.60	7.60	7.98	7.04	7.67	5.33	7.04	4.73	6.08	6.21	8.46	6.58	8.46

### Values, the average value and benchmark value for the clusters with up to 28 entities

Field	Sub-field	1	2	3	4	5	6	7	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	0.75	0.75	1.75	1.00	0.25	1.00	0.75	0.89	1.75
	Financial resources	0.00	0.33	0.67	0.00	3.33	0.00	0.33	0.67	3.33
	Infrastructural (tangible) resources	4.33	10.00	1.67	3.50	5.33	7.33	6.00	5.45	10.00
	Cluster resources	1.69	3.69	1.36	1.50	2.97	2.78	2.36	2.34	3.69
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	0.67	3.67	0.00	0.33	1.00	4.33	2.33	1.76	4.33
	Marketing and PR	4.00	8.67	5.00	4.33	7.00	4.67	4.67	5.48	8.67
	Internal communication	5.0	8.5	5.3	6.0	4.5	7.3	5.8	6.04	8.50
	Creation of knowledge and innovation	3.00	3.00	4.33	3.67	2.67	4.67	2.33	3.38	4.67
	Processes in the cluster	3.17	5.96	3.65	3.58	3.79	5.23	3.77	4.16	5.96
<b>CLUSTER PERFORMANCE</b>	Human resources development	0.67	0.00	0.67	0.67	0.67	0.67	0.33	0.52	0.67
	Increasing the competitive advantage of cluster	0.00	0.00	0.67	0.33	0.00	1.67	0.33	0.43	1.67
	Improvement of cluster innovation	5.00	3.33	0.50	1.00	0.33	3.33	1.00	2.07	5.00
	Cluster internationalisation	0.33	2.50	1.67	0.00	3.75	2.75	0.75	1.68	3.75
	Cluster performance	1.50	1.46	0.88	0.50	1.19	2.10	0.60	1.18	2.10
<b>GROWTH POTENTIAL</b>	Regional conditions	6.75	7.50	9.50	5.50	7.50	7.25	6.25	7.18	9.50
	Public authorities' policy supporting cluster development	6.25	6.50	3.75	2.00	3.25	3.00	1.75	3.79	6.50
	Associated institutions	8.67	7.67	4.33	5.33	4.33	3.33	7.00	5.81	8.67
	Cluster management	5.00	9.67	9.33	7.67	8.33	5.33	8.00	7.62	9.67
	Growth potential	6.67	7.83	6.73	5.13	5.85	4.73	5.75	6.10	7.83

**Values, the average value and benchmark value for the clusters with 29-60 entities**

Field	Sub-field	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	1.25	0.75	1.00	0.75	0.75	4.00	1.50	1.75	0.75	1.00	0.50	1.75	1.00	1.25	1.75	1.32	4.00
	Financial resources	0.00	3.33	2.33	3.33	0.00	0.33	0.33	1.00	0.67	3.67	3.33	0.00	2.67	0.00	0.67	1.44	3.67
	Infrastructural (tangible) resources	5.33	5.00	1.33	5.33	8.50	4.33	5.33	8.33	7.00	9.67	8.33	6.67	3.67	6.33	1.33	5.77	9.67
	Cluster resources	2.19	3.03	1.56	3.14	3.08	2.89	2.39	3.69	2.81	4.78	4.06	2.81	2.44	2.53	1.25	2.84	4.78
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	1.33	1.00	1.33	3.00	3.00	2.00	4.00	2.67	5.67	5.67	0.67	0.00	3.67	0.00	3.33	2.49	5.67
	Marketing and PR	8.33	4.67	4.33	6.00	9.00	5.33	9.00	5.67	6.00	7.67	3.67	2.33	7.67	3.67	5.33	5.91	9.00
	Internal communication	6.8	5.8	5.8	6.8	7.0	5.3	6.8	6.3	7.3	7.8	5.3	6.0	6.8	7.0	5.5	6.38	7.75
	Creation of knowledge and innovation	5.67	5.33	4.00	4.00	3.33	2.00	6.67	4.00	7.00	5.00	0.67	3.00	6.33	4.33	2.33	4.24	7.00
	Processes in the cluster	5.52	4.19	3.85	4.94	5.58	3.65	6.60	4.65	6.48	6.52	2.56	2.83	6.10	3.75	4.13	4.76	6.60
<b>CLUSTER PERFORMANCE</b>	Human resources development	0.00	1.33	0.33	0.33	0.33	0.67	2.00	N/A	2.00	0.00	0.00	0.00	1.67	0.33	2.50	0.82	2.50
	Increasing the competitive advantage of cluster	1.00	0.50	0.33	0.67	0.33	0.00	0.67	1.00	1.00	1.00	0.33	0.67	5.50	1.67	2.67	1.16	5.50
	Improvement of cluster innovation	0.67	0.33	1.67	4.00	0.00	0.00	1.67	0.50	0.50	2.00	0.00	2.33	0.00	0.33	1.50	1.03	4.00
	Cluster internationalisation	0.33	2.33	0.75	0.75	0.00	1.50	1.00	1.67	1.00	2.25	0.00	0.00	2.75	3.00	2.75	1.34	3.00
	Cluster performance	0.50	1.13	0.77	1.44	0.17	0.54	1.33	1.06	1.13	1.31	0.08	0.75	2.48	1.33	2.35	1.09	2.48
<b>GROWTH POTENTIAL</b>	Regional conditions	8.50	6.00	6.25	5.75	8.25	7.25	8.75	5.75	6.75	5.50	5.50	8.50	8.50	5.75	6.75	6.92	8.75
	Public authorities' policy supporting cluster development	8.25	3.75	4.00	5.25	7.25	6.75	4.25	3.75	4.50	4.75	4.50	6.50	5.75	3.50	5.25	5.20	8.25
	Associated institutions	9.00	8.67	3.33	6.00	4.50	6.00	4.33	6.67	6.00	3.00	9.00	6.67	7.50	7.33	4.33	6.16	9.00
	Cluster management	9.67	8.00	8.00	9.33	8.33	5.33	9.67	8.67	6.67	8.67	7.00	9.00	9.33	7.33	8.00	8.20	9.67
	Growth potential	8.85	6.60	5.40	6.58	7.08	6.33	6.75	6.21	5.98	5.48	6.50	7.67	7.77	5.98	6.08	6.62	8.85

### Values, the average value and benchmark value for the clusters with at least 60 entities

Field	Sub-field	1	2	3	4	5	6	7	8	10	11	12	13	14	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	2.75	2.25	1.75	1.75	2.00	6.50	2.25	3.50	3.00	2.00	5.33	4.25	6.75	3.39	6.75
	Financial resources	1.00	1.00	1.33	N/A	0.33	3.33	0.00	0.33	0.67	0.67	1.00	0.00	6.67	1.36	6.67
	Infrastructural resources (tangible)	8.67	6.33	7.67	8.33	4.00	8.67	5.00	8.00	2.33	4.67	8.67	6.00	8.67	6.69	8.67
	Cluster resources	4.14	3.19	3.58	5.04	2.11	6.17	2.42	3.94	2.00	2.44	5.00	3.42	7.36	3.91	7.36
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	4.00	6.67	1.00	0.33	1.67	0.00	3.67	5.33	0.00	4.00	7.00	1.33	3.33	2.95	7.00
	Marketing and PR	7.00	9.00	6.67	8.00	8.33	3.33	5.33	5.33	6.00	6.67	8.67	7.00	9.33	6.97	9.33
	Internal communication	7.0	8.8	9.3	8.5	5.5	7.0	4.5	7.0	5.0	5.5	9.0	8.0	9.5	7.27	9.50
	Creation of knowledge and innovation	5.67	7.67	4.67	7.33	5.67	4.00	3.33	5.33	5.00	6.00	9.00	4.67	8.00	5.87	9.00
	Processes in the cluster	5.92	8.02	5.40	6.04	5.29	3.58	4.21	5.75	4.00	5.54	8.42	5.25	7.54	5.77	8.42
<b>CLUSTER PERFORMANCE</b>	Human resources development	1.33	2.00	2.33	7.00	2.33	4.00	1.00	2.33	2.33	1.00	5.00	5.33	5.00	3.15	7.00
	Increasing the competitive advantage of cluster	3.00	2.67	2.00	3.50	2.67	1.00	1.33	4.00	0.33	3.33	3.00	2.33	8.33	2.88	8.33
	Improvement of cluster innovation	0.00	6.33	1.50	1.50	2.00	2.33	0.50	3.33	3.67	8.67	7.00	2.67	6.67	3.55	8.67
	Cluster internationalisation	1.33	1.00	2.00	3.00	0.67	2.67	0.33	3.75	4.25	2.75	5.75	1.00	6.75	2.71	6.75
	Cluster performance	1.42	3.00	1.96	3.75	1.92	2.50	0.79	3.35	2.65	3.94	5.19	2.83	6.69	3.08	6.69
<b>GROWTH POTENTIAL</b>	Regional conditions	7.25	7.25	6.75	8.50	5.25	8.75	7.00	5.75	5.00	6.25	9.50	7.00	6.00	6.94	9.50
	Public authorities' policy supporting cluster development	7.00	1.75	4.75	5.75	5.25	4.75	6.75	5.75	4.50	4.50	7.00	7.75	6.25	5.52	7.75
	Associated institutions	8.00	3.33	5.00	7.67	5.00	6.33	6.50	9.00	3.33	4.67	7.33	7.67	9.00	6.37	9.00
	Cluster management	9.67	9.00	9.33	8.67	7.00	8.33	7.67	7.67	8.33	7.00	10.00	8.00	9.67	8.49	10.00
	Growth potential	7.98	5.33	6.46	7.65	5.63	7.04	6.98	7.04	5.29	5.60	8.46	7.60	7.73	6.83	8.46

**Values, the average value and benchmark value for the clusters that realise at least 3 projects in collaboration**

Field	Sub-field	1	2	3	4	5	6	7	8	9	10	11	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	1.00	2.00	1.00	0.25	1.50	1.75	2.25	1.00	0.75	1.75	0.75	1.27	2.25
	Financial resources	2.33	0.33	0.00	3.33	0.33	1.00	1.00	3.67	0.00	1.33	0.33	1.24	3.67
	Infrastructural (tangible) resources	1.33	4.00	7.33	5.33	5.33	8.33	6.33	9.67	8.50	7.67	10.00	6.71	10.00
	Cluster resources	1.56	2.11	2.78	2.97	2.39	3.69	3.19	4.78	3.08	3.58	3.69	3.08	4.78
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	1.33	1.67	4.33	1.00	4.00	2.67	6.67	5.67	3.00	1.00	3.67	3.18	6.67
	Marketing and PR	4.33	8.33	4.67	7.00	9.00	5.67	9.00	7.67	9.00	6.67	8.67	7.27	9.00
	Internal communication	5.8	5.5	7.3	4.5	6.8	6.3	8.8	7.8	7.0	9.3	8.5	7.02	9.25
	Creation of knowledge and innovation	4.00	5.67	4.67	2.67	6.67	4.00	7.67	5.00	3.33	4.67	3.00	4.67	7.67
	Processes in the cluster	3.85	5.29	5.23	3.79	6.60	4.65	8.02	6.52	5.58	5.40	5.96	5.54	8.02
<b>CLUSTER PERFORMANCE</b>	Human resources development	0.33	2.33	0.67	0.67	2.00	N/A	2.00	0.00	0.33	2.33	0.00	1.07	2.33
	Increasing the competitive advantage of cluster	0.33	2.67	1.67	0.00	0.67	1.00	2.67	1.00	0.33	2.00	0.00	1.12	2.67
	Improvement of cluster innovation	1.67	2.00	3.33	0.33	1.67	0.50	6.33	2.00	0.00	1.50	3.33	2.06	6.33
	Cluster internationalisation	0.75	0.67	2.75	3.75	1.00	1.67	1.00	2.25	0.00	2.00	2.50	1.67	3.75
	Cluster performance	0.77	1.92	2.10	1.19	1.33	1.06	3.00	1.31	0.17	1.96	1.46	1.48	3.00
<b>GROWTH POTENTIAL</b>	Regional conditions	6.25	5.25	7.25	7.50	8.75	5.75	7.25	5.50	8.25	6.75	7.50	6.91	8.75
	Public authorities' policy supporting cluster development	4.00	5.25	3.00	3.25	4.25	3.75	1.75	4.75	7.25	4.75	6.50	4.41	7.25
	Associated institutions	3.33	5.00	3.33	4.33	4.33	6.67	3.33	3.00	4.50	5.00	7.67	4.59	7.67
	Cluster management	8.00	7.00	5.33	8.33	9.67	8.67	9.00	8.67	8.33	9.33	9.67	8.36	9.67
	Growth potential	5.40	5.63	4.73	5.85	6.75	6.21	5.33	5.48	7.08	6.46	7.83	6.07	7.83

### Values, the average value and benchmark value for the clusters that realise 4-8 projects in collaboration

Field	Sub-field	1	2	3	4	5	6	7	8	9	10	11	12	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	1.00	0.75	1.25	4.00	0.75	1.75	3.50	0.75	3.00	0.75	5.33	0.75	1.97	5.33
	Financial resources	0.00	0.67	0.00	0.33	0.00	0.67	0.33	3.33	0.67	3.33	1.00	0.33	0.89	3.33
	Infrastructural (tangible) resources	3.50	7.00	5.33	4.33	4.33	1.33	8.00	5.33	2.33	5.00	8.67	6.00	5.10	8.67
	Cluster resources	1.50	2.81	2.19	2.89	1.69	1.25	3.94	3.14	2.00	3.03	5.00	2.36	2.65	5.00
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	0.33	5.67	1.33	2.00	0.67	3.33	5.33	3.00	0.00	1.00	7.00	2.33	2.67	7.00
	Marketing and PR	4.33	6.00	8.33	5.33	4.00	5.33	5.33	6.00	6.00	4.67	8.67	4.67	5.72	8.67
	Internal communication	6.0	7.3	6.8	5.3	5.0	5.5	7.0	6.8	5.0	5.8	9.0	5.8	6.25	9.00
	Creation of knowledge and innovation	3.67	7.00	5.67	2.00	3.00	2.33	5.33	4.00	5.00	5.33	9.00	2.33	4.56	9.00
	Processes in the cluster	3.58	6.48	5.52	3.65	3.17	4.13	5.75	4.94	4.00	4.19	8.42	3.77	4.80	8.42
<b>CLUSTER PERFORMANCE</b>	Human resources development	0.67	2.00	0.00	0.67	0.67	2.50	2.33	0.33	2.33	1.33	5.00	0.33	1.51	5.00
	Increasing the competitive advantage of cluster	0.33	1.00	1.00	0.00	0.00	2.67	4.00	0.67	0.33	0.50	3.00	0.33	1.15	4.00
	Improvement of cluster innovation	1.00	0.50	0.67	0.00	5.00	1.50	3.33	4.00	3.67	0.33	7.00	1.00	2.33	7.00
	Cluster internationalisation	0.00	1.00	0.33	1.50	0.33	2.75	3.75	0.75	4.25	2.33	5.75	0.75	1.96	5.75
	Cluster performance	0.50	1.13	0.50	0.54	1.50	2.35	3.35	1.44	2.65	1.13	5.19	0.60	1.74	5.19
<b>GROWTH POTENTIAL</b>	Regional conditions	5.50	6.75	8.50	7.25	6.75	6.75	5.75	5.75	5.00	6.00	9.50	6.25	6.65	9.50
	Public authorities' policy supporting cluster development	2.00	4.50	8.25	6.75	6.25	5.25	5.75	5.25	4.50	3.75	7.00	1.75	5.08	8.25
	Associated institutions	5.33	6.00	9.00	6.00	8.67	4.33	9.00	6.00	3.33	8.67	7.33	7.00	6.72	9.00
	Cluster management	7.67	6.67	9.67	5.33	5.00	8.00	7.67	9.33	8.33	8.00	10.00	8.00	7.81	10.00
	Growth potential	5.13	5.98	8.85	6.33	6.67	6.08	7.04	6.58	5.29	6.60	8.46	5.75	6.56	8.85

**Values, the average value and benchmark value for the clusters that realise at least 9 projects in collaboration**

Field	Sub-field	1	2	3	4	5	6	7	8	9	10	11	12	Average value in 2014	Benchmark value in 2014
<b>CLUSTER RESOURCES</b>	Human resources and the cluster know-how	1.25	2.25	2.00	1.75	0.50	1.75	6.75	6.50	4.25	1.00	2.75	1.75	2.71	6.75
	Financial resources	0.00	0.00	0.67	0.00	3.33	N/A	6.67	3.33	0.00	2.67	1.00	0.67	1.67	6.67
	Infrastructural (tangible) resources	6.33	5.00	4.67	6.67	8.33	8.33	8.67	8.67	6.00	3.67	8.67	1.67	6.39	8.67
	Cluster resources	2.53	2.42	2.44	2.81	4.06	5.04	7.36	6.17	3.42	2.44	4.14	1.36	3.68	7.36
<b>PROCESSES WITHIN THE CLUSTER</b>	Market activity	0.00	3.67	4.00	0.00	0.67	0.33	3.33	0.00	1.33	3.67	4.00	0.00	1.75	4.00
	Marketing and PR	3.67	5.33	6.67	2.33	3.67	8.00	9.33	3.33	7.00	7.67	7.00	5.00	5.75	9.33
	Internal communication	7.0	4.5	5.5	6.0	5.3	8.5	9.5	7.0	8.0	6.8	7.0	5.3	6.69	9.50
	Creation of knowledge and innovation	4.33	3.33	6.00	3.00	0.67	7.33	8.00	4.00	4.67	6.33	5.67	4.33	4.81	8.00
	Processes in the cluster	3.75	4.21	5.54	2.83	2.56	6.04	7.54	3.58	5.25	6.10	5.92	3.65	4.75	7.54
<b>CLUSTER PERFORMANCE</b>	Human resources development	0.33	1.00	1.00	0.00	0.00	7.00	5.00	4.00	5.33	1.67	1.33	0.67	2.28	7.00
	Increasing the competitive advantage of cluster	1.67	1.33	3.33	0.67	0.33	3.50	8.33	1.00	2.33	5.50	3.00	0.67	2.64	8.33
	Improvement of cluster innovation	0.33	0.50	8.67	2.33	0.00	1.50	6.67	2.33	2.67	0.00	0.00	0.50	2.13	8.67
	Cluster internationalisation	3.00	0.33	2.75	0.00	0.00	3.00	6.75	2.67	1.00	2.75	1.33	1.67	2.10	6.75
	Cluster performance	1.33	0.79	3.94	0.75	0.08	3.75	6.69	2.50	2.83	2.48	1.42	0.88	2.29	6.69
<b>GROWTH POTENTIAL</b>	Regional conditions	5.75	7.00	6.25	8.50	5.50	8.50	6.00	8.75	7.00	8.50	7.25	9.50	7.38	9.50
	Public authorities' policy supporting cluster development	3.50	6.75	4.50	6.50	4.50	5.75	6.25	4.75	7.75	5.75	7.00	3.75	5.56	7.75
	Associated institutions	7.33	6.50	4.67	6.67	9.00	7.67	9.00	6.33	7.67	7.50	8.00	4.33	7.06	9.00
	Cluster management	7.33	7.67	7.00	9.00	7.00	8.67	9.67	8.33	8.00	9.33	9.67	9.33	8.42	9.67
	Growth potential	5.98	6.98	5.60	7.67	6.50	7.65	7.73	7.04	7.60	7.77	7.98	6.73	7.10	7.98

## The members' opinion survey - results

### 1. What type of entity do you represent?

	Frequency	Percentage
Micro-enterprise (0-9 employees)	238	38,5%
Small enterprise (10-49 employees)	143	23,1%
Medium-sized enterprise (50-249 employees)	91	14,7%
Large enterprise (at least 250 employees)	41	6,6%
Research unit	48	7,8%
Local government unit	7	1,1%
Business-related institution	16	2,6%
Non-governmental organisation	19	3,1%
Other	16	2,6%
<b>Total</b>	<b>618</b>	<b>100,0%</b>

### 2. Please specify the year in which you became a member of the cluster.

	Frequency	Percentage
2000	1	0,2%
2003	1	0,2%
2005	3	0,7%
2006	21	4,6%
2007	21	4,6%
2008	37	8,1%
2009	23	5,0%
2010	48	10,5%
2011	69	15,0%
2012	100	21,8%
2013	91	19,8%
2014	43	9,4%
<b>Total</b>	<b>459</b>	<b>100,0%</b>
I don't know / I can't remember	165	

### 3. What function do you serve within the cluster?

	Frequency	Percentage
Cluster member without a specified function	510	82,7%
Cluster member with a specified function	73	11,8%
other	20	3,2%
I don't know / Hard to say	15	2,4%
<b>Total</b>	<b>617</b>	<b>100,0%</b>

#### OPINION ON VARIOUS ASPECTS OF THE CLUSTER MANAGEMENT

### 4. Please assess (in a continuum from 1 to 5) the activity of the cluster's coordinator within the following aspects of the cluster's development: 1 - very low, 5 - very high.

Activity of the coordinator in terms of stimulating the cooperation between the members of the cluster (organisation of meetings and conferences, exchange of information)

	Frequency	Percentage
1 very low	17	2,9%
2	35	5,9%
3	104	17,6%
4	212	35,8%
5 very high	224	37,9%
<b>Total</b>	<b>593</b>	<b>100,0%</b>
I don't know / Hard to say	25	

Activity of the coordinator in terms of promoting the cluster and its members

	Frequency	Percentage
<b>1 very low</b>	10	1,7%
<b>2</b>	58	10,0%
<b>3</b>	100	17,2%
<b>4</b>	201	34,5%
<b>5 very high</b>	212	36,4%
<b>Total</b>	582	100,0%
<b>I don't know / I can't remember</b>	36	

Activity of the coordinator in terms of establishing cooperation between the enterprises and the science industry, both within and outside the cluster

	Frequency	Percentage
<b>1 very low</b>	18	3,2%
<b>2</b>	45	8,1%
<b>3</b>	123	22,2%
<b>4</b>	176	31,7%
<b>5 very high</b>	196	35,3%
<b>Total</b>	558	100,5%
<b>I don't know / I can't remember</b>	60	

Activity of the coordinator in terms of establishing cooperation between the enterprises and the public authorities, including local government units

	Frequency	Percentage
<b>1 very low</b>	17	3,3%
<b>2</b>	28	5,5%
<b>3</b>	90	17,7%
<b>4</b>	182	35,8%
<b>5 very high</b>	191	37,6%
<b>Total</b>	508	100,0%
<b>I don't know / I can't remember</b>	110	

Activity of the coordinator in terms of organising trainings / developing human resources of the enterprises within the cluster

	Frequency	Percentage
<b>1 very low</b>	21	3,7%
<b>2</b>	48	8,5%
<b>3</b>	136	24,1%
<b>4</b>	194	34,3%
<b>5 very high</b>	166	29,4%
<b>Total</b>	565	100,0%
<b>I don't know / I can't remember</b>	53	

Activity of the coordinator in terms of supporting the innovativeness of the enterprises within the cluster

	Frequency	Percentage
<b>1 very low</b>	27	4,9%
<b>2</b>	52	9,5%
<b>3</b>	148	27,0%
<b>4</b>	160	29,1%
<b>5 very high</b>	162	29,5%
<b>Total</b>	549	100,0%
<b>I don't know / I can't remember</b>	69	

Activity of the coordinator in terms of stimulating research and development to the benefit of the enterprises within the cluster

	Frequency	Percentage
<b>1 very low</b>	28	5,3%
<b>2</b>	65	12,4%
<b>3</b>	142	27,0%
<b>4</b>	152	29,0%
<b>5 very high</b>	137	26,1%
<b>Total</b>	525	100,0%
<b>I don't know / I can't remember</b>	94	

Activity of the coordinator in terms of stimulating the capital expenditure in the enterprises within the cluster

	Frequency	Percentage
<b>1 very low</b>	32	6,4%
<b>2</b>	78	15,7%
<b>3</b>	135	27,1%
<b>4</b>	135	27,1%
<b>5 very high</b>	118	23,7%
<b>Total</b>	498	100,0%
<b>I don't know / I can't remember</b>	120	

Activity of the coordinator in terms of supporting expansion of the enterprises in the national market (e.g. providing information, taking part in domestic trade fairs)

	Frequency	Percentage
<b>1 very low</b>	21	3,9%
<b>2</b>	46	8,5%
<b>3</b>	109	20,2%
<b>4</b>	192	35,6%
<b>5 very high</b>	173	32,0%
<b>Total</b>	540	100,0%
<b>I don't know / I can't remember</b>	78	

Activity of the coordinator in terms of supporting expansion of the enterprises in foreign markets (e.g. organising trade missions, providing information, taking part in international trade fairs)

	Frequency	Percentage
<b>1 very low</b>	32	6,1%
<b>2</b>	53	10,1%
<b>3</b>	97	18,5%
<b>4</b>	167	31,8%
<b>5 very high</b>	177	33,7%
<b>Total</b>	525	100,0%
<b>I don't know / I can't remember</b>	93	

Activity of the coordinator in terms of obtaining public funds for the development of the cluster

	Frequency	Percentage
<b>1 very low</b>	15	2,8%
<b>2</b>	35	6,6%
<b>3</b>	95	18,0%
<b>4</b>	174	33,0%
<b>5 very high</b>	209	39,7%
<b>Total</b>	527	100,0%
<b>I don't know / I can't remember</b>	91	

**5. Please assess the frequency of member meetings.**

	Frequency	Percentage
Too low	66	10,7%
adequate	452	73,1%
Too high	3	0,5%
I don't know / Hard to say	97	15,7%
<b>Total</b>	<b>618</b>	<b>100,0%</b>

**5a. Please indicate an entity which, in your opinion, plays the most active role in the functioning of the cluster. (multiple choice)**

	Frequency	Percentage
coordinator of the cluster	458	73,0%
other entity or entities	50	8,0%
I don't know / Hard to say	137	21,9%
	645	102,9%

Multiple choice questions - values do not add up to 100%. N=618.

**6. Does the cluster, in your opinion, lack any specific types of entities or have an insufficient number of such entities? (multiple choice)**

	Frequency	Percentage
Yes, enterprises	126	20,4%
Yes, research units	93	15,0%
Yes, local government units	83	13,4%
Yes, business-related institutions	92	14,9%
Yes, non-governmental organisations	47	7,6%
No	185	29,9%
I don't know / Hard to say	156	25,2%
	782	126,5%

Multiple choice questions - values do not add up to 100%. N=618

**7. Do you pay a cluster membership fee?**

	Frequency	Percentage
Yes	364	58,9%
No	207	33,5%
I don't know / Hard to say	48	7,8%
<b>Total</b>	<b>618</b>	<b>100,0%</b>

**8. Please assess the charge rate of the membership fee in relation to the benefits you receive from being a member of the cluster.**

	Frequency	Percentage
Commensurate	246	67,6%
Disproportionally high	45	12,4%
Disproportionally low	13	3,6%
I don't know / Hard to say	60	16,5%
<b>Total</b>	<b>364</b>	<b>100,0%</b>

**9. Can you reveal the annual amount of this fee?**

	Frequency	Percentage
less than 100 PLN	14	6,8%
101-500 PLN	39	18,9%
501-1000 PLN	47	22,8%
1001-1500 PLN	35	17,0%
1501-2000 PLN	7	3,4%
2001-3000 PLN	40	19,4%

3001-4000 PLN	3	1,5%
more than 4000 PLN	21	10,2%
	206	100,0%
I don't know / I can't remember	163	

It was an open-ended question and the answers have been assigned to relevant brackets.

**10. Have you participated / Are you participating in a project, realised by members of the cluster, aimed at developing a new or heavily modified product or service?**

	Frequency	Percentage
Yes	228	37%
No	337	55%
I don't know / Hard to say	53	9%
Total	618	100%

**11. Has this project included / Does this project include the research and development (the R&D encompasses chiefly the development of the prototypes of potential commercial viability, the experimental production and testing new products, processes and services)?**

	Frequency	Percentage
Yes	149	65,4%
No	71	31,1%
I don't know / Hard to say	8	3,5%
Total	228	100,0%

**12. Has the R&D been undertaken in cooperation with an external (non-member) partner?**

	Frequency	Percentage
Yes	76	51,4%
No	52	35,1%
I don't know / Hard to say	20	13,5%
Total	148	100,0%

**13. Has this been a foreign partner?**

	Frequency	Percentage
Yes	20	26,3%
No	53	69,7%
I don't know / Hard to say	3	3,9%
Total	76	100,0%

**14. Have you participated / Are you participating in a project, realised by members of the cluster, aimed at: (multiple choice)**

	Frequency	Percentage
developing systems for the purpose of supporting business processes within the cluster (e.g. an IT system providing computer-aided deliveries or sales at the disposal of the cluster members)	100	16,2%
raising qualifications of personnel of the enterprises within the cluster (e.g. trainings)	228	36,9%
participating in domestic economic events organised for the cluster members (e.g. trade fairs / exhibitions / events)	288	46,6%
participating in international economic events organised for the cluster members (e.g. trade fairs / exhibitions / events)	190	30,7%
promoting the cluster (e.g. advertisements)	232	37,5%
creating and improving structures of the cluster and its organisation (e.g. organisation of the office work, strategy development)	180	29,1%
other measures	7	1,1%
we have not participated in any projects realised by the cluster members	120	19,4%
I don't know / Hard to say	41	6,6%
	138	224,3%
	6	

Multiple choice question - values do not add up to 100%. N=618

**15. Please specify the aggregate number of such projects that you have participated in / you are participating in. From the moment the entity joined the cluster**

Minimum	0
Maximum	120
Average	7.74
median	4

From January 2013

Minimum	0
Maximum	40
Average	3.85
median	2

**15aa. Please specify the aggregate number of projects aimed at developing a new or heavily modified product or service that you have participated in / you are participating in.**

From the moment the entity joined the cluster

	Frequency
1	2
2	4
5	1
<b>Total</b>	<b>7</b>
<b>I don't know / Hard to say</b>	<b>5</b>

From January 2013

	Frequency
0	2
1	1
2	5
5	1
<b>Total</b>	<b>9</b>
<b>I don't know / Hard to say</b>	<b>5</b>

**15a. Has at least one of those projects been co-financed by the public funds, including foreign ones?**

	Frequency	Percentage
<b>Yes</b>	270	57,6%
<b>No</b>	65	13,9%
<b>I don't know / Hard to say</b>	134	28,6%
<b>Total</b>	469	100,0%

**15b. Has at least one of those project been financed exclusively by private funds?**

	Frequency	Percentage
<b>Yes</b>	66	25,6%
<b>No</b>	123	47,7%
<b>I don't know / Hard to say</b>	69	26,7%
<b>Total</b>	258	100,0%

**15c. Please specify which of the above-mentioned projects have been financed exclusively by private funds: (multiple choice)**

	Frequency	Percentage
<b>developing systems for the purpose of supporting business processes within the cluster (e.g. an IT system providing computer-aided deliveries or sales at the disposal of the cluster members)</b>	5	8,2%
<b>raising qualifications of personnel of the enterprises within the cluster (e.g. trainings)</b>	15	24,6%
<b>participating in domestic economic events organised for the cluster members (e.g. trade fairs / exhibitions / events / trade missions)</b>	27	44,3%

participating in international economic events organised for the cluster members (e.g. trade fairs / exhibitions / events / trade missions)	10	16,4%
promoting the cluster (e.g. advertisements)	17	27,9%
creating and improving structures of the cluster and its organisation (e.g. organisation of the office work, strategy development)	23	37,7%
a project aimed at developing a new / heavily modified product or service	24	39,3%
other	1	1,6%
I don't know / Hard to say	3	4,9%
	125	204,9%

Multiple choice question - values do not add up to 100%, N=61.

**16. Have you participated in this project / these projects by financial or non-financial contribution?**

	Frequency	Percentage
only by a membership fee	106	22,60%
by additional payments not related to a membership fee	84	17,91%
by an obligation to transfer part of the profits made on the project to the benefit of the cluster	26	5,54%
by an obligation to render our resources available (e.g. infrastructure, means of transportation, equipment) for the purpose of the project's realisation	114	24,31%
by making our personnel available for the purpose of the project's realisation	176	37,53%
otherwise	9	1,92%
No	100	21,32%
I don't know / Hard to say	43	9,17%
	625	133,26%

Multiple choice question - values do not add up to 100%, N=469.

**17. While taking into account only those project that have been realised within the last 24 months, please specify the number of cluster members you have directly collaborated with for the purpose of the project's realisation.**

Minimum	0
Maximum	63
Average	6.07
Median	4

**18. How would you assess the benefits you have reaped from the participation in %x1%? Please assess these benefits in a continuum from 1 to 5 (1 - small benefits, 2 - large benefits).**

	Frequency	Percentage
1 Small benefits	43	9,9%
2	58	13,4%
3	126	29,0%
4	147	33,9%
5 Large benefits	60	13,8%
Total	434	100,0%
I don't know / Hard to say	36	

**19. What reason have you had for deciding not to participate in such projects? (multiple choice)**

	Frequency	Percentage
there have been no such projects	14	12,5%
we have not been invited by the coordinator to participate in the project	34	30,4%
we have lacked time to participate in the project	23	20,5%
we have lacked experience / qualifications to participate in the project	5	4,5%
we have not been interested in the project	26	23,2%
we have lacked financial means to participate in the project	11	9,8%
I don't know / Hard to say	18	16,1%
otherwise	6	5,4%
	137	122,3%

Multiple choice question - values do not add up to 100%, N=112.

20. How would you assess the activity of the cluster in terms of realising projects that involve its members? Please assess this activity in a continuum from 1 to 5 (1 - low activity, 2 - high activity).

	Frequency	Percentage
1 Low activity	43	7,7%
2	79	14,1%
3	153	27,3%
4	202	36,0%
5 High activity	84	15,0%
Total	561	100,0%
I don't know / Hard to say	57	

21. How would you assess the efficacy of the cluster in terms of obtaining public funds (e.g. EU funds)? Please assess this efficacy in a continuum from 1 to 5 (1 - low efficacy, 5 - high efficacy).

	Frequency	Percentage
1 Low efficacy	27	5,5%
2	74	14,9%
3	123	24,8%
4	150	30,3%
5 High efficacy	121	24,4%
Total	495	100,0%
I don't know / Hard to say	125	

22. Have the entity you represent been using the tangible assets remaining at the cluster's disposal and rendered available to its members? (multiple choice)

	Frequency	Percentage
Vehicles (e.g. a car)	3	0,49%
Office facilities	73	11,81%
Office equipment	57	9,22%
Warehouse facilities	9	1,46%
Research equipment	27	4,37%
Ready-to-use software	37	5,99%
we have not been using any tangible assets of the cluster	458	74,11%
Other	21	3,40%
I don't know / Hard to say	39	6,31%
	713	115,37%

Multiple choice question - values do not add up to 100%, N=618.

24. How would you assess the aggregate amount of tangible assets of the cluster? Please assess these assets in a continuum from 1 to 5 (1 - insufficient, 5 - sufficient).

	Frequency	Percentage
1 Insufficient	59	18,7%
2	47	14,9%
3	67	21,3%
4	89	28,3%
5 Sufficient	54	17,1%
Total	315	100,0%
I don't know / Hard to say	303	

24a. How would you assess the availability of the cluster's tangible assets (including tangible assets of other members of the cluster) to its members? Please assess this availability in a continuum from 1 to 5 (1 - difficult access, 5 - easy access).

	Frequency	Percentage
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<b>1 Difficult access</b>	30	9,8%
<b>2</b>	54	17,6%
<b>3</b>	60	19,6%
<b>4</b>	91	29,7%
<b>5 Easy access</b>	70	22,9%
<b>Total</b>	306	100,0%
<b>I don't know / Hard to say</b>	312	

23. Have the entity you represent been using intangible assets remaining at the cluster's disposal and rendered available to its members?

	Frequency	Percentage
patents, utility models, licences, franchises	11	1,78%
know-how	88	14,24%
expert analyses	70	11,33%
databases	101	16,34%
trademark of the cluster	191	30,91%
reputation of the cluster	180	29,13%
software	59	9,55%
relations with business partners (suppliers, consumers, competitors)	196	31,72%
knowledge and experience of employees of other entities within the cluster	219	35,44%
relations with public authorities	121	19,58%
we have not been using any intangible assets of the cluster	223	36,08%
I don't know / Hard to say	32	5,18%
Other	5	0,81%
	1496	242,07%

Multiple choice question - values do not add up to 100%, N=618.

25. How would you assess the aggregate amount of intangible assets of the cluster? Please assess these assets in a continuum from 1 to 5 (1 - insufficient, 5 - sufficient).

	Frequency	Percentage
<b>1 Insufficient</b>	18	5,2%
<b>2</b>	40	11,6%
<b>3</b>	99	28,6%
<b>4</b>	116	33,5%
<b>5 Sufficient</b>	73	21,1%
<b>Total</b>	346	100,0%
<b>I don't know / Hard to say</b>	271	

25a. How would you assess the availability of the cluster's intangible assets (including the assets of other members of the cluster) to its members? Please assess this availability in a continuum from 1 to 5 (1 - difficult access, 5 - easy access).

	Frequency	Percentage
<b>1 Difficult access</b>	32	9,1%
<b>2</b>	38	10,9%
<b>3</b>	89	25,4%
<b>4</b>	118	33,7%
<b>5 Easy access</b>	73	20,9%
<b>Total</b>	350	100,0%
<b>I don't know / Hard to say</b>	268	

26. How would you assess the activity of research units that are members of the cluster in terms of their involvement within the cluster? Please assess this activity in a continuum from 1 to 5 (1 - low activity, 2 - high activity).

	Frequency	Percentage
<b>1 Low activity</b>	41	11,9%

2	56	16,2%
3	94	27,2%
4	96	27,8%
5 High activity	57	16,5%
<b>Total</b>	345	100,0%
<b>I don't know / Hard to say</b>	122	

**27. Had you collaborated with any research units before you joined the cluster?**

	Frequency	Percentage
Yes	264	56,3%
No	188	40,1%
I don't know / Hard to say	18	3,8%
<b>Total</b>	469	100,0%

**27a. Does any of the research units you had collaborated with before you joined the cluster belong to your cluster, now?**

	Frequency	Percentage
Yes	136	51,5%
No	90	34,1%
I don't know / Hard to say	38	14,4%
<b>Total</b>	264	100,0%

**28. Have your membership in the cluster affected the following?**

Tightening of the cooperation with research units

	Frequency	Percentage
Yes	112	42,4%
No	102	38,6%
Hard to say	49	18,6%
<b>Total</b>	264	100,0%

The establishment of cooperation with new research units

	Frequency	Percentage
Yes	100	37,9%
No	111	42,0%
Hard to say	53	20,1%
<b>Total</b>	264	100,0%

**28a. Have your membership in the cluster encouraged the entity you represent to establish cooperation with any research units?**

	Frequency	Percentage
Yes	70	34,1%
No	118	57,6%
I don't know / Hard to say	18	8,8%
<b>Total</b>	205	100,0%

**29. Are you currently collaborating with any research units?**

	Frequency	Percentage
Yes	289	61,5%
No	164	34,9%
I don't know / Hard to say	18	3,8%
<b>Total</b>	470	100,0%

**29a. What types of research units do you collaborate with?**

	Frequency	Percentage
--	-----------	------------

<b>institutions of higher education</b>	256	88,6%
<b>research institutes</b>	148	51,2%
<b>institutes of the Polish Academy of Sciences</b>	65	22,5%
<b>I don't know / Hard to say</b>	3	1,0%
	397	137,4%

Multiple choice question - values do not add up to 100%, N=289.

**30. How would you assess the quality of your cooperation with research units? Please assess this quality in a continuum of 1 to 5 (1 - loose cooperation, 5 - tight cooperation).**

	<b>Frequency</b>	<b>Percentage</b>
<b>1 Loose cooperation</b>	7	2,4%
<b>2</b>	19	6,6%
<b>3</b>	66	22,9%
<b>4</b>	109	37,8%
<b>5 Tight cooperation</b>	87	30,2%
<b>Total</b>	288	100,0%
<b>I don't know / Hard to say</b>	1	

**31. In the last 24 months, have the entity you represent: -**

Introduced new or significantly improved products or services

	<b>Frequency</b>	<b>Percentage</b>
<b>Yes</b>	360	70,3%
<b>No</b>	129	25,2%
<b>I don't know / Hard to say</b>	23	4,5%
<b>Total</b>	512	100,0%

Significantly modified or introduced new production processes / processes of rendering services, e.g. by purchasing machinery or engineering equipment, implementing computer-aided production or quality assurance systems (ISO, TQM etc.), introducing changes in the distribution of goods, implementing a new software to aid purchases, sales, accounting and storing

	<b>Frequency</b>	<b>Percentage</b>
<b>Yes</b>	268	52,3%
<b>No</b>	212	41,4%
<b>I don't know / Hard to say</b>	32	6,3%
<b>Total</b>	512	100,0%

Introduced significant organisational changes, e.g. by implementing new methods for managing deliveries, and/or new methods for splitting tasks between employees, and/or new methods for organising relations with the environment (outsourcing the accounting, the HR, the IT etc.)

	<b>Frequency</b>	<b>Percentage</b>
<b>Yes</b>	262	51,2%
<b>No</b>	224	43,8%
<b>I don't know / Hard to say</b>	26	5,1%
<b>Total</b>	512	100,0%

Introduced significant changes in the marketing strategy of the company, e.g. by refreshing the appearance of the product or its packaging, changing methods for the promotion and distribution, updating the process of price setting

	<b>Frequency</b>	<b>Percentage</b>
<b>Yes</b>	274	53,5%
<b>No</b>	207	40,4%
<b>I don't know / Hard to say</b>	31	6,1%
<b>Total</b>	512	100,0%

**31a. How innovative have your new or significantly improved products or services been?**

	<b>Frequ</b>	<b>Percen</b>
--	--------------	---------------

	ncy	tage
<b>the introduced products / services had not been offered by the competition (i.e. the products were a novelty in the company's main market)</b>	183	50,83%
<b>the introduced products / services had already been offered by the competition</b>	152	42,22%
<b>I don't know / Hard to say</b>	48	13,33%
	383	106,39%

Multiple choice question - values do not add up to 100%. N=360

**31b. How innovative have your new or significantly improved production methods been?**

	Freque ncy	Perce ntage
<b>the introduced production methods had not been employed by the competition (i.e. the methods were a novelty in the company's main market)</b>	112	41,79%
<b>the introduced production methods had already been employed by the competition</b>	124	46,27%
<b>I don't know / Hard to say</b>	47	17,54%
	283	105,60%

Multiple choice question - values do not add up to 100%. N=268

**32. How would you assess the degree to which your membership in the cluster have contributed to the introduction of such an innovation? Please assess this degree in a continuum of 1 to 5 (1 - to a small degree, 5 - to a large degree).**  
Introduction of new or significantly improved products or services

	Frequency	Percentage
<b>1 To a small degree</b>	133	42,5%
<b>2</b>	54	17,3%
<b>3</b>	39	12,5%
<b>4</b>	54	17,3%
<b>5 To a large degree</b>	32	10,2%
<b>Total</b>	313	100,0%
<b>I don't know / Hard to say</b>	47	

Significant modification or introduction of new production processes / processes of rendering services, e.g. by purchasing machinery or engineering equipment, implementing computer-aided production or quality assurance systems (ISO, TQM etc.), introducing changes in the distribution of goods, implementing a new software to aid purchases, sales, accounting and storing

	Frequency	Percentage
<b>1 To a small degree</b>	119	51,1%
<b>2</b>	25	10,7%
<b>3</b>	33	14,2%
<b>4</b>	40	17,2%
<b>5 To a large degree</b>	15	6,4%
<b>Total</b>	233	100,0%
<b>I don't know / Hard to say</b>	35	

Introduction of significant organisational changes, e.g. by implementing new methods for managing deliveries, and/or new methods for splitting tasks between employees, and/or new methods for organising relations with the environment (outsourcing the accounting, the HR, the IT etc.)

	Frequency	Percentage
<b>1 To a small degree</b>	113	48,1%
<b>2</b>	39	16,6%
<b>3</b>	37	15,7%
<b>4</b>	28	11,9%
<b>5 To a large degree</b>	18	7,7%
<b>Total</b>	235	100,0%
<b>I don't know / Hard to say</b>	27	

Introduction of significant changes in the marketing strategy of the company, e.g. by refreshing the appearance of the product or its packaging, changing methods for the promotion and distribution, updating the process of price setting

	Frequency	Percentage
<b>1 To a small degree</b>	109	44,7%
<b>2</b>	38	15,6%
<b>3</b>	42	17,2%
<b>4</b>	36	14,8%
<b>5 To a large degree</b>	19	7,8%
<b>Total</b>	244	100,0%
<b>I don't know / Hard to say</b>	31	

32a. How would you assess the degree to which your membership in the cluster have influenced the innovativeness of the solutions developed by an entity you represent? Please assess this degree in a continuum of 1 to 5 (1 - to a small degree, 5 - to a large degree).

	Frequency	Percentage
<b>1 To a small degree</b>	147	41,2%
<b>2</b>	45	12,6%
<b>3</b>	79	22,1%
<b>4</b>	48	13,4%
<b>5 To a large degree</b>	38	10,6%
<b>Total</b>	357	100,0%
<b>I don't know / Hard to say</b>	36	

33. Have the entity you represent undertaken any research and development measures in the last 24 months (the R&D encompasses chiefly the development of the prototypes of potential commercial viability, the experimental production and testing new products, processes and services)?

	Frequency	Percentage
<b>Yes</b>	263	51,4%
<b>No</b>	225	43,9%
<b>I don't know / Hard to say</b>	24	4,7%
<b>Total</b>	512	100,0%

33a. Please specify the percentage of your capital expenditure that you allocate for the R&D.

	Frequency	Percentage
<b>Less than 10%</b>	32	36,4%
<b>Between 10% and 25%</b>	16	18,2%
<b>Between 25% and 50%</b>	11	12,5%
<b>Between 50% and 75%</b>	5	5,7%
<b>Between 75% and 100%</b>	4	4,5%
<b>I don't know / Hard to say</b>	19	21,6%
<b>Total</b>	88	100,0%

33b. How many people do you employ in departments related to the R&D?

Minimum	0
Maximum	2
Average	6.32
Median	2

34. How would you assess the degree to which your membership in the cluster have influenced your activity in terms of research & development? Please assess this degree in a continuum of 1 to 5 (1 - to a small degree, 5 - to a large degree).

	Frequency	Percentage
<b>1 To a small degree</b>	97	39,1%
<b>2</b>	31	12,5%
<b>3</b>	44	17,7%

4	45	18,1%
5 To a large degree	31	12,5%
Total	248	100,0%
I don't know / Hard to say	15	

35. Please assess the manner in which your income from sales in 2013 has changed in relation to the income from sales in 2011 (in nominal values) (if the company was not yet operational in 2011, please compare to the income in the year when the company was launched):

	Frequency	Percentage
decreased significantly	26	5,1%
decreased slightly	42	8,2%
remained unchanged	53	10,3%
increased slightly	157	30,6%
increased significantly	148	28,8%
I don't know / Hard to say	87	17,0%
Total	513	100,0%

36. Please assess (in a continuum of 1 to 5) the degree to which your membership in the cluster has influenced the increase of income from sales. Please assess this degree in a continuum of 1 to 5 (1 - to a small degree, 5 - to a large degree).

	Frequency	Percentage
1 to a small degree	163	57,8%
2	42	14,9%
3	34	12,1%
4	31	11,0%
5 to a large degree	11	3,9%
Total	282	100,0%
I don't know / Hard to say	23	

P36a. Please assess the manner in which your income in 2013 has changed in relation to the income in 2011 (in nominal values) (if the company was not yet operational in 2011, please compare to the income in the year when the company was launched):

	Frequency	Percentage
decreased significantly	36	7,0%
decreased slightly	42	8,2%
remained unchanged	65	12,7%
increased slightly	159	31,1%
increased significantly	116	22,7%
I don't know / Hard to say	94	18,4%
Total	512	100,0%

36b. Please assess (in a continuum of 1 to 5) the degree to which your membership in the cluster have influenced the increase of income. Please assess this degree in a continuum of 1 to 5 (1 - to a small degree, 5 - to a large degree).

	Frequency	Percentage
1 to a small degree	147	58,6%
2	40	15,9%
3	25	10,0%
4	25	10,0%
5 to a large degree	14	5,6%
Total	251	100,0%

37. In which markets does the company you represent operate?

	Frequency	Percentage
Local (commune / district)	153	29,88%

<b>Regional (voivodeship)</b>	200	39,06%
<b>National</b>	366	71,48%
<b>International (27 EU member states)</b>	225	43,95%
<b>International (out of the 27 EU member states)</b>	155	30,27%
<b>I don't know / Hard to say</b>	3	0,59%
	1102	215,23%

Multiple choice questions - values do not add up to 100%. N=512

**37a. How many countries does the company you represent operate in?**

Minimum	0
Maximum	60
Average	8.18
Median	5

**38. Which market is the main one for the company you represent?**

	Frequency	Percentage
<b>Local (commune / district)</b>	17	6,2%
<b>Regional (voivodeship)</b>	59	21,6%
<b>National</b>	140	51,0%
<b>International (27 EU member states)</b>	43	15,5%
<b>International (out of the 27 EU member states)</b>	16	5,8%
<b>Total</b>	274	100,0%

**39. Please specify the manner in which the position of the company you represent (in its main market) has changed over the last two years.**

	Frequency	Percentage
<b>declined significantly</b>	4	0,8%
<b>declined</b>	16	3,1%
<b>remained unchanged</b>	139	27,1%
<b>strengthened</b>	246	48,0%
<b>strengthened significantly</b>	78	15,2%
<b>I don't know / Hard to say</b>	30	5,8%
<b>Total</b>	513	100,0%

**40. Please assess (in a continuum of 1 to 5) the degree to which your membership in the cluster have influenced the solidification of the company's position in its main market. Please assess this degree in a continuum of 1 to 5 (1 - to a small degree, 5 - to a large degree).**

	Frequency	Percentage
<b>1 To a small degree</b>	120	39,5%
<b>2</b>	59	19,4%
<b>3</b>	59	19,4%
<b>4</b>	44	14,5%
<b>5 To a large degree</b>	22	7,2%
<b>Total</b>	304	100,0%
<b>I don't know / I can't remember</b>	19	

**41. Please specify whether the company you represent has, in the last 24 months: - Introduced new products / services to an international market**

	Frequency	Percentage
<b>Yes</b>	163	63,7%
<b>No</b>	75	29,3%
<b>I don't know / Hard to say</b>	18	7,0%
<b>Total</b>	256	100,0%

Entered new international markets

	Frequency	Percentage
<b>Yes</b>	144	56,3%
<b>No</b>	88	34,4%
<b>I don't know / Hard to say</b>	24	9,4%
<b>Total</b>	256	100,0%

Increased its income from the export

	Frequency	Percentage
<b>Yes</b>	154	60,2%
<b>No</b>	66	25,8%
<b>I don't know / Hard to say</b>	36	14,1%
<b>Total</b>	256	100,0%

42. Please assess (in a continuum of 1 to 5) the degree to which your membership in the cluster have influenced:  
Introduction of new products / services to an international market

	Frequency	Percentage
<b>1 to a small degree</b>	89	58,9%
<b>2</b>	15	9,9%
<b>3</b>	25	16,6%
<b>4</b>	11	7,3%
<b>5 to a large degree</b>	10	6,6%
<b>Total</b>	151	100,0%
<b>I don't know / I can't remember</b>	12	

Entering new international markets

	Frequency	Percentage
<b>1 to a small degree</b>	67	48,9%
<b>2</b>	18	13,1%
<b>3</b>	19	13,9%
<b>4</b>	22	16,1%
<b>5 to a large degree</b>	10	7,3%
<b>Total</b>	137	100,0%
<b>I don't know / I can't remember</b>	7	

Increase of income from the export

	Frequency	Percentage
<b>1 to a small degree</b>	80	55,6%
<b>2</b>	22	15,3%
<b>3</b>	22	15,3%
<b>4</b>	11	7,6%
<b>5 to a large degree</b>	8	5,6%
<b>Total</b>	144	100,0%
<b>I don't know / I can't remember</b>	10	

43. Please finish the following sentence: The benefits we reap from being a member of the cluster are:

	Frequency	Percentage
<b>Larger than expected</b>	79	12,8%
<b>Quite as expected</b>	251	40,5%
<b>Smaller than expected</b>	212	34,2%
<b>I don't know / Hard to say</b>	77	12,4%
<b>Total</b>	619	100,0%

43a. Please make an attempt to estimate the annual financial benefits, for the entity you represent, from being a member of the cluster.

	Frequency	Percentage
0 PLN	191	30,9%
less than 25 000 PLN	106	17,1%
25000-50000 PLN	22	3,6%
50000-100000 PLN	23	3,7%
100000-500000 PLN	15	2,4%
more than 500000 PLN	7	1,1%
I don't know / Hard to say	254	41,0%
<b>Total</b>	<b>619</b>	<b>100,0%</b>

44. Please indicate which of the following statements describes the current situation of the cluster in a most accurate manner:

	Frequency	Percentage
The initiative remains in the seed stage	25	4,0%
The initiative has come to a standstill	12	1,9%
The initiative remains in the stagnation stage, rather without prospects for development	96	15,5%
The initiative remains in the maturity stage	76	12,3%
The initiative keeps developing and has rather good prospects for further development	294	47,5%
I don't know / Hard to say	116	18,7%
<b>Total</b>	<b>619</b>	<b>100,0%</b>

45. How would you assess the chance that the cluster would still function in 2017 without having obtained public funds along the way? Please assess this chance in a continuum of 1 to 5 (1 - small chance, 5 - large chance).

	Frequency	Percentage
1 Small chance	109	21,0%
2	94	18,1%
3	124	23,9%
4	94	18,1%
5 Large chance	98	18,9%
<b>Total</b>	<b>519</b>	<b>100,0%</b>
I don't know / Hard to say	100	

46. What are your expectations towards the cluster?

	Frequency	Percentage
Stronger stimulation of cooperation between the cluster members (organisation of meetings and conferences, exchange of information)	318	51,46%
Intensification of promotion of the cluster and its members	357	57,77%
Tightening of cooperation between the companies and the R&D units, both within the cluster and outside of it	289	46,76%
Increase in cooperation between the cluster and public authorities, including local government units	222	35,92%
Development in terms of trainings, raising qualifications of personnel within the cluster	283	45,79%
Better support in terms of innovativeness of the companies within the cluster	306	49,51%
Stronger stimulation of the R&D to the benefit of the companies within the cluster	264	42,72%
Stronger stimulation of the increase in capital expenditure of the companies within the cluster	188	30,42%
Taking measures aimed at expansion of the companies within the cluster in the domestic market (providing information, participation in domestic trade fairs)	253	40,94%
Taking measures aimed at expansion of the companies within the cluster into international markets (e.g. organisation of trade missions, providing information, participation in international trade fairs)	230	37,22%
Higher activity in terms of obtaining public funds for the purpose of developing the cluster	318	51,46%
We have no expectations towards the cluster	19	3,07%

<b>Other</b>	19	3,07%
<b>I don't know / Hard to say</b>	20	3,24%
	308	499,35%
	6	

Multiple choice questions - values do not add up to 100%. N=618

**47. How would you assess the general level of satisfaction of being a member of the cluster? Please assess this level in a continuum of 1 to 5 (1 - we are disappointed, 5 - we are contended).**

	<b>Frequency</b>	<b>Percentage</b>
<b>1 We are disappointed</b>	12	2,1%
<b>2</b>	64	11,1%
<b>3</b>	179	31,1%
<b>4</b>	175	30,4%
<b>5 We are very contended</b>	147	25,5%
<b>Total</b>	576	100,0%
<b>I don't know / Hard to say</b>	43	

**M1. Among the interviewees, there have been:**

	<b>Frequency</b>	<b>Percentage</b>
<b>Owner / Part-owner</b>	211	34,1%
<b>Chairman / Deputy chairman</b>	147	23,8%
<b>Sales director</b>	32	5,2%
<b>Marketing director</b>	20	3,2%
<b>Finance director</b>	8	1,3%
<b>HR director</b>	5	0,8%
<b>Chief accountant</b>	1	0,2%
<b>Chief technologist</b>	7	1,1%
<b>Refused to answer</b>	73	11,8%
<b>Other authorised person</b>	115	18,6%
<b>Total</b>	618	100,0%

**M2. In which year was the entity you represent established?**

The respondents gave years in which the entities they represent were established. Then, their answers have been assigned to relevant brackets, grouped by the duration of the entities' existence.

	<b>Frequency</b>	<b>Percentage</b>
<b>less than 1 year</b>	14	2,4%
<b>1-2 years</b>	30	5,2%
<b>2-5 years</b>	78	13,6%
<b>5-10 years</b>	121	21,1%
<b>10-20 years</b>	150	26,1%
<b>more than 20 years</b>	181	31,5%
<b>Total</b>	574	100,0%
<b>I don't know / I can't remember</b>	41	

**M3. What is the legal establishment of the entity you represent?**

	<b>Frequency</b>	<b>Percentage</b>
<b>Sole proprietorship</b>	151	27,6%
<b>General partnership</b>	19	3,5%
<b>Unlimited company</b>	27	4,9%
<b>Limited liability company</b>	252	46,0%
<b>Joint-stock company</b>	53	9,7%

<b>Association</b>	15	2,7%
<b>Foundation</b>	10	1,8%
<b>Research unit</b>	6	1,1%
<b>Other</b>	15	2,7%
<b>Total</b>	548	100,0%

**M4. How many people (expressed as full-time jobs) does the entity you represent employ (in case of universities, please include only those employed in departments that directly cooperate with the cluster)?**

Minimum	0
Maximum	160000
Average	391.25
Median	16

**M5. How many people does the entity you represent employ for the purpose of undertaking the R&D measures (in case of universities, please include only those employed in departments that directly cooperate with the cluster)?**

Minimum	0
Maximum	1800
Average	20.49
Median	3

**M6 How many of those people are directly involved in the R&D projects realised by the cluster?**

Minimum	0
Maximum	40
Average	4.84
Median	3

**M7. What is the line of business of the entity you represent?**

	<b>Frequen cy</b>	<b>Percenta ge</b>
<b>Section A: Farming, forestry, hunting, and fishery</b>	13	2,5%
<b>Section C: Processing industry</b>	119	3,5%
<b>Section D: Production and supply of electricity, gas, vapour, hot water, and hot air for the air conditioning systems</b>	18	1,4%
<b>Section E: Supply of water, wastewater and waste management, general reclamation</b>	7	8,9%
<b>Section F: Construction</b>	46	7,8%
<b>Section G: Retail and wholesale</b>	40	0,8%
<b>Section H: Transportation and stock management</b>	4	1,0%
<b>Section I: Providing accommodation and gastronomy</b>	5	11,3%
<b>Section J: Information and communication</b>	58	1,0%
<b>Section K: Finances and insurance</b>	5	1,2%
<b>Section L: Real estate</b>	6	17,1%
<b>Section M: Professional, scientific and technical activity</b>	88	1,8%
<b>Section N: Administration and supporting services</b>	9	2,7%
<b>Section P: Education</b>	14	0,8%
<b>Section Q: Healthcare and social assistance</b>	4	7,4%
<b>Section S: Other services</b>	38	7,4%
<b>I don't know</b>	40	7,8%
<b>Total</b>	514	100,0%

**Section C: Processing industry - please specify:**

	<b>Freque ncy</b>	<b>Percent age</b>
<b>10 – Production of food</b>	4	3,3%
<b>14 – Production of clothing</b>	2	1,7%
<b>16 – Production of goods made of wood and cork, excluding furniture; production of goods made of straw and weaving materials</b>	4	3,3%
<b>17 – Production of paper and goods made of paper</b>	3	2,5%

18 – Printing and reproduction of data carriers	2	1,7%
20 – Production of chemicals and chemical products	4	3,3%
22 – Production of goods made of rubber and plastic	12	9,9%
23 – Production of goods made of other mineral non-metallic materials	2	1,7%
24 – Production of metals	3	2,5%
25 – Production of finished goods made of metal, excluding machines and devices	37	30,6%
26 – Production of computers, electronic and optical devices	4	3,3%
27 – Production of electrical devices	5	4,1%
28 – Production of machines and devices that are not classified elsewhere	21	17,4%
29 – Production of vehicles, trailers and semi-trailers, excluding motorcycles	2	1,7%
30 – Production of other transportation equipment	3	2,5%
32 – Production of other goods	3	2,5%
33 – Repairing, maintenance and installation of machines and devices	7	5,8%
I don't know / Hard to say	3	2,5%
<b>Total</b>	<b>121</b>	<b>100,0%</b>

Only the answers given by respondents are listed in the table – not every branch of the Sector C.

**M8. How far (approximately) from the headquarters of the cluster's coordinator is the entity you represent located?**

	<b>Frequency</b>	<b>Percentage</b>
<b>Less than 5 km</b>	195	31,6%
<b>5-10 km</b>	143	23,2%
<b>10-50 km</b>	102	16,5%
<b>50-100 km</b>	60	9,7%
<b>More than 100 km</b>	95	15,4%
<b>I don't know / Hard to say</b>	22	3,6%
<b>Total</b>	<b>617</b>	<b>100,0%</b>

The Polish Agency for Enterprise Development (PARP) is a government agency that has been providing support to entrepreneurs since 2000. The objective of PARP is the development of small and medium-sized enterprises in Poland, i.e. establishment of new companies, improvement of qualifications and increase in capacity, strengthening of the competitive position based on innovation and modern technologies, creating a business-friendly environment and providing appropriate conditions for conducting business activity. While performing its activities supporting entrepreneurs (as well as business environment institutions, local government units, state budget units, higher education institutions), PARP uses the funds from the state budget and the European Union funds. Both before and after the accession of Poland to the European Union, PARP has provided financial support, training, advisory support and information to entrepreneurs. In the years 2007-2015, the Agency has been and still is responsible for the implementation of measures mandated under three operational programmes, namely, **Innovative Economy, Human Capital and Development of Eastern Poland**, and actively participates in developing the premises for support programmes under the 2014-2020 financial plan.

PARP has vast experience not only in providing EU assistance to entrepreneurs. Several years ago the **Enterprise Research Centre** was established at the Agency to conduct research on entrepreneurship, innovation, human resources and services supporting the business activity. The research results provide the basis for drafting the premises for other support programmes that respond to the identified needs of entrepreneurs. Starting from 2013, PARP has been implementing a pilot project to analyse the impact of planned and existing regulations on the small and medium-sized enterprise sector (SMEs).

For the support to be efficient, entrepreneurs must have easy access to information about such assistance. PARP has initiated the establishment of the **National SME Services Network (KSU)**. The KSU offers advisory services to companies at each stage of business activity: starting from registration, through efficient operation and management of the company to suspension or termination of activity. All KSU centres (approximately 170) operate according to set standards of services, thus ensuring that entrepreneurs receive the highest quality services. An entrepreneur wishing to use business advisory services can turn to KSU Consultation Centres, KSU National Innovation Centres and centres providing services in the areas of environmental protection, fast cost optimization and for testing new pilot services. Entrepreneurs may also obtain a loan or a guarantee from the cooperating fund. The numerous organisations that make up the KSU cooperate with other well-known networks, including the Enterprise Europe Network (consortia of former Euro Info Centres (EIC) and Innovation Relay Centres (IRC)).

The **Enterprise Europe Network** centre operating at PARP offers entrepreneurs the chance to seize opportunities in the European market. The centre offers free-of-charge comprehensive services including information, training and consulting mainly on European Union legislation and policies, business activity in Poland and abroad, access to financing, internationalisation of enterprises, technology transfer and participation in EU framework programmes. Furthermore, thanks to cooperation with almost 600 member organisations from over 50 countries in Europe, the Middle East, Asia and America, the Enterprise Europe Network helps entrepreneurs find foreign partners and organise their participation in fairs and economic missions.

PARP acts as a contact point for „Erasmus for Young Entrepreneurs”, a programme financed by the European Commission. The programme offers new or aspiring entrepreneurs an opportunity of traineeship in companies operating in other European Union Member States.

The involvement of PARP in international fora and organisations supporting entrepreneurship and innovation translates into the high quality of provided services and their convergence with global trends. The membership in **TAFTIE** (The European Network of Innovation Agencies) guarantees constant access to the best practices followed by the leading European innovation agencies. As a member of the **Global Practitioners Network for Competitiveness, Clusters and Innovation (TCI)**, PARP can establish working contacts with experts from around the world and exchange experience and knowledge on cluster development and cluster-based policy. PARP is also an associate member of **IASP** (International Association of Science Parks and Areas of Innovation), which allows it to utilize the extensive experience of foreign science parks.

PARP regularly adjust its information and advisory offer to the changing needs of entrepreneurs and emerging new communication channels. The Agency currently operates around a dozen **specialist websites and social networking websites** offering e-learning courses, e-books, transmissions from training meetings and conferences, information on financial support possibilities and how to apply for them, knowledge databases, publications and research results. All these web sources (as well as additional information and tools) can also be accessed on the main PARP website: [www.parp.gov.pl](http://www.parp.gov.pl). This website is used by almost a million internet users a month.

Anyone interested in obtaining information on support programmes offered by PARP to entrepreneurs and business environment institutions may use the helpline operated by the **PARP Information Centre**. PARP's consultants provide information by phone and e-mail and also meet directly with the interested parties.

*You are welcome to use our services!*