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IDENTIFICATION OF THE CLUSTER ON THE BASIS OF THE ICT INDUSTRY

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Abstract: The aim of the conducted empirical analysis was to identify the cluster, which was implemented on the basis of two organizations operating in the ICT industry. The observed low activity of clusters in the socio-economic space, with the exception of projects co-financed from public funds, was the main incentive to conduct the study. The implementation of the assumed objective was reduced to seeking an answer to the question to what extent the national networks meet the cluster identification criteria. The objects analyzed were highly effective in creating a network of connections, new organizational entities as well as personal involvement in the functioning of many entities. The positive quantitative image of both networks, however, did not coincide with the positive functional verification based on the catalogue of features required for the cluster. In addition to formal doubts regarding referring to the established networks of organizational links as clusters, there appear natural doubts about the effectiveness of these entities in the context of theoretical assumptions, and finally the legitimacy of financing such initiatives from public funds.

Keywords: European funds, cluster, cluster policy, cohesion policy, entrepreneurship.

1. Introduction

Together with Poland's accession to the European Union (EU), domestic economic policy has taken on a new shape. The introduced dependence on the development strategy of the whole European community forced the necessity of incorporating innovative solutions into socio-economic practice. Thus, various public support aimed at cluster initiatives and clusters should be considered in this context. The socio-economic expectations formulated on this background are huge, and at the same time, there is a need to evaluate the implemented projects and identify established networks in the context of their compliance with theory.

The general cognitive dimension of the conducted analysis is limited to determining the place and role of clusters in the national economic policy, including the legitimacy of financing such projects with public funds. Still, its key dimension includes the empirical identification of

two key national clusters in the ICT industry. The choice of the research plan, including the methodology used, is part of the identified cognitive gap. The observation of two networks (micro level), crucial for the implementation of the assumed research objective, was combined with a quantitative analysis embedded in the resources of official public statistics (macro level). The choice of the ICT industry is associated with the particularly great importance assigned to it in modern economic development and, at the same time, the largest participation of this type of organizations in the population of domestic clusters. The conducted analysis is a continuation of the research already carried out, which included both clusters. The basic research problem, which is the subject of the conducted analysis, comes down to looking for an answer to the question to what extent the national networks meet the cluster identification criteria. Doubts in this area arise from the extensive theoretical and empirical dissertations.

The theoretical-practical character of the study is part of the cognitive-application function of economics. The results of the analysis are complementary to the knowledge about clusters, with particular emphasis on their implementation into economic practice, including connections with economic policy. In turn, the applied research methodology, used to identify the cluster, is a model solution suitable for re-use as well as for further development leading to giving it a value full of universalism and objectivism.

2. The place of clusters in the national socio-economic space

Although it is not a new subject of scientific considerations, the issues and aspects of clusters (networks, arrays) cannot be considered an established theory in this case. The multitude of definitions and methods of cluster identification has, however, become the cause of standardization problems. The popularity of the concept of cluster significantly exceeded the knowledge about this phenomenon. Diversity and lack of explicitness of definitional and classification decisions indicate that the cluster concept is not fully formed and mature yet (Gorynia, and Jankowska, 2008). The truth is that this does not mean that there is a need for full standardization. Incorporation of defined solutions into the public policy system, including the financial installation planned for this type of activities, requires the identification of the relations between the incurred expenditures and benefits obtained. In the case of Polish clusters, however, this is not possible due to the fact that clusters are not a legally distinguished form of conducting economic activity.

2.1. Clusters as the subject of empirical research

The popularity of cluster organizations is not matched by the popularity of the cluster concept proposed by Michael Porter or the popularity of cluster identification methods, which results in the lack of cluster identification research (Główka, 2016). Limitation, fragmentation

and unreliability of the research methods used, based mainly on quantitative analyzes and expert methods (subjective conclusions formulated on the basis of information usually acquired in a cluster environment from significant cluster entities) (Jegorow, 2016b), make the urge to conduct research on national clusters necessary. Researchers point to the need for conducting qualitative analyses, including case studies (Jankowska, 2012; Konstantynova, and Lehmann, 2017; Adamczuk, 2014; Główka, 2016).

The conducted empirical studies of clusters indicate the existence of a clear dissonance between the assumptions underlying their concept and the practical implementation of Porter's theory. The confrontation of national economic practice with theoretical assumptions is indispensable in the context of high public subsidies directed to the implementation of projects, not so much as those which fit into the cluster concept, but accomplished under the slogan of the cluster. The problem is complex and should be considered both separately and together in endogenous and exogenous terms.

Regardless of the established facts, the dominant idea in the ongoing discussions concerning regional development is still the creation of networks between companies, including, among others, the ones within clusters. Optimism seems to be stronger in case of smaller endogenous potential of a given economy and limited experience in the functioning of clusters, as is the case in Bulgaria (Bankova, 2015; Slavov-Georgievaa, and Bankova, 2017) or Russia (Vertakova, and Risin, 2015). At the same time, empirical studies point to very diverse cluster policies in various regions of the world which do not give a chance for simple adaptation of proven solutions (Sopoligová, and Pavelková, 2017).

2.2. Clusters as an element of the European Union's economic policy

In 2006, the European Commission announced the undertaking of intensified actions to support clusters, including the possibility of co-financing initiatives implemented in this field (KWE, 2006), and in 2008 it defined a policy framework to support the development of more world-class clusters in the EU (KWE, 2008). Clusters were recognized as the driving force of regional economic growth and competitiveness. Cluster policy has become an important part of stimulating economic change, especially at a level lower than national. Referring to the example of the Silicon Valley, public support for the development of clusters has gained widespread recognition. The most common approach applied in cluster policy was based on the mapping of clusters and creation of organizations in appropriate clusters, which developed activities for entities of the established network with the help of public-private funds (Konstantynova, and Lehmann, 2017). New concepts defining the EU development framework translated into the inclusion of financing cluster initiatives and clusters into the long-term financial framework 2007-2013 and 2014-2020 of cohesion policy. The approach to clusters in Poland, including their support, should be perceived as a direct consequence of the adopted EU development model. Thus, the cluster policy introduced a decade ago has become an extremely important element of the national economic policy (Kowalski, 2013).

An economy based on clusters has been included in the theory of growth poles, which is the foundation of the polarization-diffusion model of development (Churski, 2014). This concept was introduced in response to the failure of the equalization model, but not as a derivative of the well-described theory, rather as a certain political idea (Szlachta, and Zaleski, 2010). It is assumed that the support of clusters can increase the transfer of technologies and the diffusion of innovation from areas with the highest level of competitiveness to areas where this level is the lowest (Kowalski, 2013). Expectations which arose in relation to clusters, both with regard to the national and EU economic policy, are extremely large, and they are mainly associated with innovations and internationalization. Noticing the problems involved in the implementation of the assumed concepts into economic practice and the low effectiveness of many projects implemented so far, the European Commission underlines the strategic nature of these initiatives with high potential. This approach determines further support of clusters, but mainly the strongest ones. In this context, the concept of smart specializations is also introduced (EC, 2016). Thus, if the 2007-2013 long-term financial framework predicted the possibility of supporting cluster initiatives, the 2014-2020 perspective was oriented towards the support of well-shaped and strong networks. In response to the challenges posed in Poland, the institution of the national key cluster (KKK) was established. The status of the KKK is connected with the function of the coordinator of other clusters and with open access to European funds dedicated to these entities within the EU cohesion policy between 2014 and 2020 (Jegorow, 2016b). At the same time, it should be noted that the variable and inconsistent cluster policy has not been beneficial to the so far effective implementation of the cluster concept in the economic system. The identified over-administration, which complicates and lengthens the project financing process, created unjustified barriers to development, resulting in the collapse of the majority of the created cluster initiatives (Szymoniuk, 2014).

The emergence of clusters in the Polish socio-economic space is both the effect of adapting proven solutions in other economies as well as the emergence of high-budget public programs dedicated to this concept. Management according to proven patterns or raising funds for the implementation of public programs is part of various themes. The creation of clusters and joining of the already created structures combine covering a niche in the market with the pursuit of competitive advantage. High subsidies included in multi-annual development programs which support clusters also create another field to increase the effect of dependent entrepreneurship (Jegorow, 2017). The research carried out so far further demonstrates that direct simplified transfer of proven solutions into the field of new clusters did not always lead to positive paths of development of the established networks due to the negligence of conditions typical of a given country or region (Konstantynova, and Lehman, 2017).

The abuse of the cluster concept created by Porter both as a result of calculated business activity and lack of knowledge lead to a distortion of this concept. The problem is significant because many of these types of undertakings are initiated or sponsored by public institutions, such as the Chełmski Klaster Poradnictwa Zawodowego – Chełm Cluster of Career Counseling

(NT, 05/01/2018), or representatives of the scientific community, as is the case with the Lublin Cycling Tourism Cluster (LKTR, 10.06.2017)[1]. There are numerous examples like these. The very idea of this initiative is not a problem, but the fact that many projects implemented under the cluster's "name" have received co-financing from the cohesion policy funds of the 2007-2013 long-term financial framework should be assessed negatively.

3. Methodology of research

Identification of a cluster raises a complex cognitive problem, which translates into barriers in the operationalization of this concept. Consequently, the use of this concept within economic policy is difficult both in the programming dimension and in the ex-post evaluation. Ambiguity in the identification of a network of organizational connections in the form of a cluster allows to draw up a catalog of expressly required mandatory features which are still insufficient. (Gorynia, and Jankowska, 2008; Fuks et al., 2012; Główka, 2016):

- spatial concentration ((C_1) operating in geographic proximity (C_2) in an area characterized by a high level of economic activity close to the cluster's profile),
- intersectoral links (presence of (C_3) in the cluster structure together with public administration enterprises and scientific institutions),
- specialization ((C_4) presence of companies dealing with the same, related or substitutive activity),
- competition ((C_5) interactions between entities forming a cluster within the competition and at the same time cooperation),
- critical mass ((C_6) a sufficiently large number of cluster members).

The above catalog is not closed but the introduced analysis is of an enumerative nature. The evolution of the cluster's concept and its adaptation to conditions determined by particular economies, limited both spatially and by law, should lead to further analyses in the subject matter.

3.1. Research tools

The key research dimension was based on case studies of two formally independent clusters operating in the ICT industry. The conducted desk research analysis covered the information made public on the websites of the examined networks and organizations related to them. The study also carried out comparative studies based on data from the Central Statistical Office databases and the author's knowledge acquired during direct cooperation with the analyzed organizations.

[1] In 2018 until the publishing of the paper the website was not available.

Considering the range of features adopted for cluster identification, their complexity and qualitative context, a unique required criterion for recognizing a given network as a cluster can be obtained. In the analysis, the author uses her original cluster identification model based on a catalog of defined features (invented by her). The key issue in the conducted considerations is the issue of meeting a given criterion. Assuming that: $\propto_1, \ldots, \propto_6$ they are the weights of meeting particular features $C_1, \ldots, C_6$ determined by the level of their validity, the formal pattern defining the cluster identification criterion can be presented in the following form:

$$CL = \sum_{i=1}^{n} \alpha_i C_i \tag{1}$$

where $n = 6$, which results from the scope of features accepted for analysis and which does not constitute a closed catalog.

Without prejudging which features are superior to others in cluster identification, their equivalence was taken for granted in the analyzed example, assuming that $C_i = 1$, where $i \in \{1, 2, \ldots, 6\}$. In general, this condition can be represented as $\sum_{i=1}^{n} C_i = n$, which allows to specify the importance of particular features in cluster identification. In turn, coefficients can take values from 0 (completely unfulfilled) to 1 (completely fulfilled), i.e. $\alpha_i \in \langle 0, 1 \rangle$, where $i \in \{1, 2, \ldots, 6\}$.

The adopted cluster identification concept is based on the value of the indicator, whose value in the analyzed case is non-negative and cannot exceed 6. The conducted analysis, however, does not give grounds for formulating binding conclusions in the scope of creating binding norms. Accepting a simplified deduction, it can be assumed that the acceptable level of the analyzed ratio should not be lower than 75%. Of course, this is only a contractual limit, the standardization of which should aim at increasing the value of the analyzed indicator.

3.2. Subject of study

The subject of the analysis included in the case study are two KKKs (national key clusters): Mazowiecki ICT Cluster (MKICT) and Wschodni Klaster ICT – Eastern ICT Cluster (WKICT), which are entities selected as the leaders of the cluster environment by the expert groups appointed by government institutions. The selection of the studied subjects is not accidental and results from their organizational activity as well as the identified functional superficiality. Both entities are also related to each other organizationally and personally, which results directly from, among others, the provisions contained in the National Court Register – KRS (Jegorow, 2014b, 2016a). Both clusters were created in 2007. The initiators of both networks were two formally independent associations: Stowarzyszenie Rozwoju Społeczno-Gospodarczego „Wiedza” (Association for Social and Economic Development "Knowledge") and Stowarzyszenie Rozwoju Aktywności Społecznej „Triada” (Association for the Development of Social Activity "Triada"), replaced in the meantime by Wschodnia Agencja Rozwoju

Sp. z o.o (WAR – Eastern Development Agency)[2], which in turn were created in 2006 at the initiative of one person[3]. Both clusters have long lists of members coming from various sectors, thus placing their design within the concept of a triple helix[4].

Active participation of both entities in the implementation of projects co-financed from European funds, including participation in transnational initiatives, distinguishes them in the national population of clusters. Without questioning the above-average commitment of the leaders of the established networks, recognized by means of prestigious awards, serious doubts arise in the area of impact of the coordinator and the implemented projects on the cluster members (Jegorow, 2016a). The cognitive dimension of the analyzed clusters is limited by their creation embedded in superficial analyses based mainly on the program assumptions formulated by the interested parties themselves (Bembenek, 2017; Jegorow, 2014; Stępień, 2015). Therefore, in practice, the described potential of clusters is predominantly declarative in nature. In the case of a new entity, this form of diagnosis is justified, whereas in the case of entities operating on the market for more than a decade, it is necessary in the cognitive dimension to confront the assumptions with the achievements.

4. Research findings

The conducted analysis made it possible to identify both clusters in a system of six distinctive features. For each criterion, a general assessment was established combining the quantitative and qualitative dimension. The quantified image of individual clusters was presented in the discussion of results.

[2] Although it was formally new, in fact, the "Triada" Asssociation holds 100% of the shares in WAR in the amonut of PLN 113,000. WAR is a member of MKICT.

[3] This person is Jarosław Martyniuk, acting as the president of Stowarzyszenie „Wiedza" (Knowledge Association) until August 2017, while in "Triada" Association at first he was a treasurer and now a president. J. Martyniuk was also the first president of WAR (2010-2011) as well as vice president of MKICT and WKICT immediately after their formation.

[4] At the same time, it should be emphasized that on the websites of entities related to the analyzed clusters, information can be found that Wschodnia Agencja Rozwoju Sp. z o.o. (Eastern Agency of Development Ltd.) – WKICT Coordinator -and Stowarzyszenie Rozwoju Społeczno-Gospodarczego "Wiedza" (Association of Socio-Economic Development "Knowledge") - Coordinator of MKICT - are the founders of the Startup Polish Energy Foundation registered on April 11, 2016 in Lublin (FSPE, Dec 20, 2017). In turn, the foundation is the sole shareholder (PLN 50,000) in the Startup Polish Energy Ltd. registered on May 16, 2016 in Lublin. Organizational connections of the above entities mean numerous personal ties, including direct connections between the authorities of both clusters. Additionally, WKICT and the Startup Polish Energy Ltd. can be found among the founders of the Ogólnopolskie Porozumienie Kooperacyjne Klastrów Energii „KlasGRID" (National Cooperation Agreement of Energy Clusters "KlasGRID"), the president of which is the president of WKICT. The agreement defining the objective of the action as the development of distributed energy and improving the level of energy security (KlasGRID, 20th Dec 2017) was drawn up on October 20, 2016.

4.1. Spatial concept ($C_{1,2}$)

MKICT: *This criterion can be assessed as fulfilled*. The Mazovia Province can be described as the national leader in the share of enterprises classified in the ICT technology sector (over 29% of the national population). The situation is similar for all the enterprises and newly established entities in which the predominant type of activity is information and communication as well as professional, scientific and technical activities (respectively: 8.0% and 17.3%, 8.0% and 17.9% of all entities in the province). The specialization of the Mazovia Province in the ICT sector is confirmed by the location factors (LQ_1[5] and LQ_2[6]). For employees in non-financial enterprises in the information and communication industry $LQ_1 = 1.93$ (in the case of newly created entities: $LQ_1 = 2.04$), while for those working in the industry: professional, scientific and technical activities $LQ_1 = 1.45$ (also in the case of newly created entities: również w przypadku nowo powstałych podmiotów: $LQ_1 = 1.45$), and for enterprises from the ICT industry $LQ_2 = 1.60$ (CSO – GUS 2017a, Table 4, 2017b, Table 2, Table 3, 2017c, Table 39).

WKICT: *This criterion cannot be assessed as fulfilled*. The total number of enterprises registered in the Lubelskie Province/Voivodeship as well as newly established enterprises in case of which the predominant type of activity is information and communication or professional, scientific and technical activity did not dominate the ICT sector (respectively: 3.5% and 11.1% and 4.9% and 8.9% of the total number of entities in the province; in both categories the indicators determined for the Lubelskie Province were below the national indicators of 4.7% and 13.3% respectively, and 5.5% and 12.3% of all entities in the country). Regional enterprises classified in the ICT sector cover less than 2% of the national population. Values of location coefficients indicate the lack of specialization in the ICT industry in the Lublin region. For those working in non-financial enterprises in the information and communication industry $LQ_1 = 0.51$ (in the case of newly established entities: $LQ_1 = 0.53$), for those employed in the industry of professional, scientific and technical activities $LQ_1 = 0.81$ (in the case of newly created entities: $LQ_1 = 0.75$), and for enterprises in the ICT industry $LQ_2 = 0.40$ (GUS 2017a, Table 4, 2017b, Table 2, Table 3, 2017c, Table 3 GUS 2017a, Table 4, 2017b, Table 2, Table 3, 2017c, Table 399).

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[5] $LQ_1 = \frac{Lpbl_t}{Lpl_t} \cdot \frac{Lpk_t}{Lpbk_t}$, gdzie:
Lpl_t - number of employees in a particular location during the period t,
Lpk_t - number of employees in the country in the period t,
$Lpbl_t$ - number of employees in a given location in the industry in the period t,
$Lpbk_t$ - number of people working in the country in the industry in the period t.
$LQ_1 > 1{,}25$ indicates the concentration of a given feature.

[6] The coefficient is calculated according to the formula LQ_1 respectively for the data:
Lpl_t - number of enterprises in a particular location during the period t,
Lpg_t - number of enterprises in the country in the period t,
$Lpbl_t$ - number of enterprises in a given location in the industry in the period t,
$Lpbg_t$ - number of enterprises in the country in the industry in the period t.
The coefficient has been used as an alternative to the location factor due to the lack of data on the population of people working in the ICT industry in individual voivodeships/provinces.

The location of the participants of both clusters is not without significance. The spatial distribution of members included in the WKICT goes beyond the Lubelskie Province. The network includes entities representing, among others, Masovian and Kuyavian-Pomeranian provinces. The same applies to MKICT. In this case, the entities included in the cluster conduct their activities outside the Mazowieckie province, including in the Łódź, Lublin, West Pomeranian, Pomeranian, Silesian, Lower Silesia, Kuyavian-Pomeranian, Warmian-Masurian and Sub-Carpathian provinces. Naturally, spatial dispersion of members in the ICT industry is acceptable. However, in this case, a narrow specialization of enterprises intended to work in the global network should be expected. There is also a collection of members who belong to both groups. The analysis of the activity profile of individual cluster members does not give grounds for a positive assessment of this criterion.

4.2. Links among sectors (C_3)

In the case of both clusters, the criterion should be assessed as met entirely in terms of the overall structure and, in principle, the potential. However, taking into account the range of entities from particular sectors, the established networks with the public administration and the science sector cannot be assessed positively. In the first case (MKICT), the structure of entities representing the science sector is characterized by the lack of involvement of the leading units in the industry, while the participation of entities which have little relation to the ICT industry is dominant. On the other hand, in the second case (WKICT), the problem is rooted in a small share of public entities in the whole cluster leading to a territorial narrowing of the cluster's impact.

Companies which are members of both clusters mostly represent the ICT industry. Apart from them, within the cluster, there are also service companies from the financial, marketing, management and trade sectors, as well as manufacturing companies unrelated to the ICT industry. Both companies from the energy industry have a significant share in both clusters, with particular emphasis on RES – renewable energy sources, specializing both in the production of electricity and its distribution. At the same time, however, the cluster members lack many significant regional companies from the high technology sector related to ICT. However, the need for incorporating ICT into other industries cannot be excluded; for both clusters, there is a clear tendency towards organizational and personal involvement in the energy sector with a conservative attitude to the core business area. In this activity, conscious actions related to the RES policy[7], which were designed in the perspective of 2030, can be identified. The projects planned in this area are related to new aid programs, the basic element of which is the public financing of new initiatives.

[7] The concept of cluster appeared in the amendment to the RES Act of 2016, Dz.U. 2016 item 925.

4.3. Specialization (C_4)

MKICT; WKICT: *This criterion cannot be assessed as fulfilled*. The variety of the basic scope of activity of the entities constituting both clusters is their potential value. However, in the context of the desired specialization of the established networks, the very fact of becoming members of a cluster a group of many entities boils down to meeting the criterion of cross-sectoral links. However, as described in p. 4.2., these also raise many doubts.

4.4. Critical mass (C_5)

MKICT; WKICT: *This criterion can be assessed as partially fulfilled*. The essence of the networks functioning within the cluster does not require establishing relationships having a formal and legal dimension. In the case of both analyzed clusters, the networks operate based on an agreement. Therefore, it is not possible to determine whether belonging to the cluster guarantees factual and effective cooperation or whether it comes down to superficial and showy connections. For the cluster's leader, inclusion in the structure of a group of entities representing various sectors is necessary to establish a network. In turn, for cluster members, membership in the network determines obtaining a bonus in applying for grants. This condition gained value as part of the competitions under the financial perspective between 2014 and 2020.

4.5. Masa krytyczna (C_6)

MKICT; WKICT: This criterion can be assessed as fulfilled. Both clusters have more than 100 entities in their clusters, which in comparison with other national clusters makes the analyzed organizations the leaders in meeting the C_6 criterion. The condition considered, as in the case of the location coefficient, has a quantitative character, which by definition limits its desired cognitive value. The clusters of both clusters have been dominated by micro-entities, which in practice reduces the capital, organizational and personal potential of the network. Multiplication of the membership of a cluster member is embedded in the concept of building partnership characteristics of the vision of development defined by the EU institutions.

5. Discussion of results

Adopting a simplified quantification of the weights of individual features of the analyzed clusters, the potential of the characterized objects can be represented as:

$$CL_{MKICT} = 0.5C_1 + 0.95C_2 + 0.6C_3 + 0.6C_4 + 0.5C_5 + 0.85C_6 \quad (2)$$

$$CL_{WKICT} = 0.5C_1 + 0.15C_2 + 0.6C_3 + 0.6C_4 + 0.5C_5 + 0.85C_6 \quad (3)$$

Assuming the equivalence of individual features ($C_1 = C_2 = \ldots = C_6 = 1$), the MKICT fulfills the identification criterion at the level of just under 67%. In the case of WKICT, it is just over 53%. In the absence of a permissible limit of admissibility, both studied objects are formally clusters. However, on the basis of the conducted analysis, the established networks only partially meet the identification criterion (the proposed limit is at least 75%). This issue requires further clarification and then putting it in order. The freedom of association of individuals and enterprises does not impose the obligation to formalize the relations developed. Nevertheless, in a situation when this issue is related to public financing, a much stronger positive correlation between the formal and substantive dimension should be sought.

Creating clusters as entities filling the gap in the proposed development programs is, by all means, an understandable attitude in the dimension of entrepreneurship. If there are resources to be used, why not reach for them? The issue of clusters appears in the context of the conviction that this is another idea for obtaining public funds. The problem is, among others, the regulations which enable the cluster concept to be used to develop regional competitiveness, and, at the same time, contribute to the emergence of pathologies in the economic life, including an excess of subsidies granted to entities making them a permanent source of financing (Fuks et al., 2012; Jegorow, 2017). Raising the awareness of the creators of the national economic policy in the area of imperfection of support programs should become an urgent priority.

6. Summary

The analyzed clusters can be characterized as highly effective in creating a network of connections, new organizational entities as well as personal involvement in the functioning of many entities. However, the multiplication of personal as well as organizational links has a mainly quantitative dimension, which in no way guarantees the operational effectiveness of the established network. The conducted analysis proves that, apart from formal doubts regarding referring to the established networks of organizational links as clusters, not only do natural doubts appear concerning the effectiveness of these entities in the context of theoretical assumptions, but also the legitimacy and validity of financing such initiatives from public funds.

The established MKICT and WKICT networks are based on one group of creators for whom the criterion of localization was fulfilled in one case and not in the other. The conducted analysis confirms the doubts regarding the low effectiveness of quantitative methods in identifying clusters. Positive verification of the formal dimension of the established networks does not give grounds for translating this result into a qualitative dimension. In this respect, the analysis carried out raised many doubts. It is therefore advisable to conduct further research in this area, so that the case studies presented are not marginalized as unrepresentative. From the level of cluster members, it is important that both entrepreneurs and local government units, as well as

scientific institutions which joined the clusters demand the profits they were promised. To ensure that clusters have a real impact on local or regional development, all stakeholders of this concept must have knowledge about the effects of the established networks. Such expectations formulated towards organizations operating on the market for more than a decade are perfectly valid and justified.

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