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DEVELOPING AN INNOVATION ECONOMY THROUGH CLUSTERS

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Summary: The development of an innovation economy is a priority of the most highly developed countries. Poland also belongs to a group of countries whose goal is to create and strengthen the innovation of the economy and numerous activities are undertaken to achieve this. Cooperation between science and business, and cooperation between enterprises and open innovations are elements that promote innovation in the economy. The purpose of the article is to present the importance of clusters in the development of an innovation economy in Poland. Using the method of desk research, literature review, reports and data analysis and the current cluster policy in Poland are presented. Additionally, supporting cluster development as part of the Intelligent Development Operational Program is discussed, and the internationalization of clusters in Poland is presented as an important element contributing to the development of an innovation economy.

Keywords: innovation, development, cluster, internationalization.

Streszczenie: Rozwój innowacyjnej gospodarki to priorytet większości wysoko rozwiniętych państw. Polska także należy do grupy krajów, których celem jest tworzenie i wzmacnianie innowacyjności gospodarki. W związku z tym podejmowane są różnorakie działania mające na celu podnoszenie innowa-

cyjności gospodarki. Współpraca nauki i biznesu, współpraca przedsiębiorstw, otwarte innowacje to elementy, które sprzyjają innowacyjności. Celem artykułu jest przedstawienie znaczenia klastrów w rozwoju innowacyjnej gospodarki w Polsce. Wykorzystując metodę analizy literatury przedmiotu, raportów oraz danych, przedstawiono aktualną politykę klastrową w Polsce oraz omówiono wspieranie rozwoju klastrów w ramach Programu Operacyjnego Inteligentny Rozwój. Ponadto przedstawiono umiędzynarodawianie klastrów w Polsce jako istotnego elementu przyczyniającego się do rozwoju innowacyjnej gospodarki.

Słowa kluczowe: innowacje, rozwój, klastry, umiędzynarodawianie.

1. Introduction

The expansion of innovation as the main driver of economic development has become one of the fundamental governmental priorities among highly and well-developed countries (Lehmann and Menter, 2018). The importance of innovation in economic development is becoming increasingly important. Accelerating the pace of innovation in many countries can improve their performance and well-being, and together facilitate the global economic growth (Feldman, 1994).

Innovation is often a result of systematic, cost-intensive research, which involves the collaboration of many actors or even specialized teams representing various disciplines of knowledge. Nowadays, most innovative enterprises are those that have effectively used team cooperation throughout their organization (Sawyer, 2006). Innovation is evolving in a new direction, demanding a reconsideration of the current concepts underlying innovation. This reflection is the basis for innovative fourth generation models that have the following characteristics: open innovation, cooperation between science and business and entrepreneurship (Berkhout, Hartmann, Von Der Duin, and Ortt, 2006). The collaboration, creating economic and organizational relationships, has become the fundamental determinant of the modern innovation economy and one can agree with the opinion that innovation emerges in networks (Bengtsson, Hinttu, and Kock, 2003).

Clusters have become a significant element in creating and developing an innovation economy (Vlasceanu, 2014). One of their element is the creation of an appropriate innovation environment. This requires the involvement and cooperation of different entities representing particular sectors: public authorities, enterprises, business environment institution, and R&D institutions. Therefore, the task of policy makers is to create a great potential for innovation in the field of economic ties.

An excellent opportunity for the diffusion of innovation is international cooperation, knowledge transfer, exchange experience, and acting more precisely. Another chance for the diffusion of innovation is creating and enhancing internal cooperation between different entities located in clusters. According to Porter new influences of clusters on competition have taken on growing importance in knowledge-based economy and clusters represent a new way of thinking about national and local economies (Porter, 2000), who recommended that widespread

cooperation between companies result in the spillover effect, which may contribute to accelerate the Polish economy to the innovation-driven stage (Bednarz and Markiewicz, 2015).

The aim of the article is to present the significance of clusters in the development of an innovation economy in Poland. To achieve the main goal of the article the following specific aims are met: a literature review to check the significance of the cluster concept vs. innovation economy; an analysis of the cluster policy in Poland; an analysis of internationalization of clusters in Poland and the activities undertaken under the Intelligent Development Operational Program in 2014-2020.

In order to compile the basic information, the authors conducted desk and field studies and used the method of deduction and inference to indicate the significance of clusters in the development of an innovation economy. The authors also analyzed the Intelligent Development Operational Program in 2014-2020 in the context of supporting the development and internationalization of clusters in Poland.

2. Development of an innovation economy via the prism of the cluster concept

In the academic, business and public environment, more and more attention is being paid to innovation. In the academic environment, there are studies about the sources and nature of innovation. The research focuses on the similarities and differences in the organization of innovative activities at national level, as well as concentrates on the role of globalization in determining technological changes (Archibugi, Howells, and Michie, 1999).

The concept of innovation has been developing over the years and currently innovation is not only related to the production process in industrial companies, but it consolidates all the activities undertaken in production, research and development, as well as marketing, management and organization (Berkhout et al., 2006).

Since the end of the 1980s, there have been many studies on National Innovation Systems (NIS) and Regional Innovation Systems (RIS) and their influence on building an innovation economy. The concept of NSI was first introduced by C. Freeman in 1987, however in the literature one can find different definitions e.g. Lundvall, Nelson, Patel and Pavitt, Metcalfe and others (Jankowiak, 2017).

Most of the studies emphasize the role of the organizations and institutions directly related to searching and exploring innovation, such as R&D departments, universities, and public institutes, especially on the regional level (Cooke, 2001). Innovation arises through the application of existing knowledge or through new combinations of knowledge, and it is important to note that innovations are introduced through a network of different entities based on the institutional framework (Asheim and Coenen, 2005).

Understanding the importance of innovation in competitiveness and economic growth is becoming more and more important (Feldman, 1994). Furthermore,

capabilities created through innovation, derived from the creative learning processes and allow to multiply potential avenues to success (Cantwell 2009). There is a multitude of the research related to competitiveness and its impact on economic development (Fagerberg, 1998; Krugman, 1995; Porter, 1985).

Many different theoretical frameworks have been developed to analyze the geographical dimension of innovation and its consequences for business grouping (Breschi, 2001). Therefore, the next issue considered in the paper refers to clusters which are seen as a central element of economic activity for firms, regions and national economies (Njøs and Jakobsen, 2016). The cluster concepts draw on Marshallian districts (Marshall, 1920). Academics have developed the notion of a cluster and as a result of their research numerous definitions and divisions exist, see: (Miszczak, 2010). One can find numerous descriptions of the phenomenon related to the spatial concentration of enterprises, representing the same, similar or related branches, with defined connections (Mempel-Śnieżyk, 2012), and often surrounded by universities and other institutions, including local government. One of the most popular and cited in the literature definition was presented by Porter (1998) who is regarded as the precursor of the cluster term in the economic aspect. He defined a cluster as a geographically concentrated group of enterprises in a particular domain and associated institutions (Porter, 1998).

The next important notion related to the aim of the paper is innovative clusters which has emerged as a result of rapidly strengthening the collaboration between firms for achieving knowledge-based advantages. This type of spatial structures is described by Hart, who specified local innovative clusters and presented their types and characteristics (Hart, 2000). Freeman (Freeman, 1991) introduced and coined the notion of network innovators and different types of innovation networks can be distinguished (Knell, 2011). Innovation networks through spreading innovative technologies, and good practices create benefits for both their members as well as for entities from outside the network (Ahuja, 2000). Networks and enterprise cooperation contribute to positive effects (Ginevičius, 2010) for the entities operating there. Additionally, clusters are perceived as contributing to knowledge locating, and technology-intensive investment in the area where they are functioning. As attributes one can distinguish the strong relations between companies and the infrastructure supporting the stimulation of the innovation process. Furthermore, the geographic proximity of companies, the education and R+D sector, and financial institutions contribute to the development of the effectiveness of clusters. In addition, the larger the cluster in terms of the number of companies and employees, the greater its independence, which translates into the fact that fewer functions need to be purchased outside the cluster (Voyer, 1998). In the literature of the subject, numerous of benefits resulting from functioning in clusters are highlighted: easier access to means of production, distribution channels, human resources, lower costs, increased exports, higher innovativeness, better expansion of knowledge and technological

progress, enhancing competitive advantage, and faster productivity growth related to the concentration of the resources of innovation absorption capacity (Plawgo, 2005).

Clusters contribute to the increase of the level of innovation by providing links between previously dispersed scientists and researchers, by linking the right scientists with the right industry, which translates into linking science with the market. Clusters also combine the diverse competences of entrepreneurs themselves and favour the inclusion of local enterprises in the network of transnational corporations and their global supply chains. It is thanks to high-performance clusters that human capital, its skills and funds are integrated into one network to create an innovative environment. (Drelich-Skulska, Jankowiak, and Mazurek, 2014).

The ongoing globalization processes have developed and strengthened clusters as one of the key factors in the development of regional and national economies. However, the issue of clusters is discussed by academics from different point of view (Martin and Sunley, 2003).

A number of activities aimed at accelerating process of increasing innovation and the competitiveness of the European economy through clusters are realized in particular countries and regions in the European Union (EU). Establishing clusters is seen as the driving force of economic development. Policy makers, aware of the role of clusters in fostering innovation, continued supporting their development through implemented projects. As the result of the cluster policy, a new stage in the development of clusters is promoted – the stage of foreign expansion and transnational cooperation.

Polish clusters also follow new directions recommended and initiated by the EU and as a result of the undertaken activities the projects were started (Table 1).

The Polish cluster policy resulting from the innovation policy, previously was also found in research referring to industrial policy. A change occurred in 2011 when the Polish Agency for Enterprise Development and the Ministry of Economy established the Working Group for Cluster Policy, who defined the directions and objectives of cluster policy in Poland (Dzierzanowski, 2012). The policy concentrated on supporting the establishment of clusters has changed and currently several actions to support the development of the existing clusters are being undertaken. At present, the cluster policy is understood as an important element of coherent public policies pursued by the state, including education, industry, technology and innovation policy.

One of the most important actions regarding cluster policy was the establishment in 2015 of National Key Clusters (NKC). This kind of clusters are characterized by the enhanced cooperation of cluster members, including entrepreneurs and scientific units, which increases their research capacity and positively influences the development of innovation. It is also worth noting that a coordinator of NKC is entitled to apply for public financial support under the Smart Growth Operational Programme, designed to strengthen the international expansion of the NKC. Previously seven Key National Clusters were selected: Aviation Valley Cluster, Interizon Cluster, Metalworking Cluster, Mazovia ICT Cluster, Polish Aluminium

Cluster, Eastern Constructing Cluster, West Pomeranian Chemical Cluster “Green Chemistry”, (Ministerstwo Przedsiębiorczości i Technologii 2018). Every year the Polish Ministry organizes rounds of competitions to award the status of NKC by other actors. Thus it can be said that clusters important for the country’s economy and with high international competitiveness are supported. One of the reasons for strengthening the chosen clusters is the better allocation of financial resources, internationalization of clusters, higher level of development of the chosen structures, broadening their experience, and finally enabling Polish clusters to act in the international arena.

In order to achieve NKC status, clusters’ development is assessed in six areas related to critical mass, development and innovative potential, existing and planned cooperation such as: human and organizational resources, infrastructure and financial resources, economic potential of the cluster, creation and transfer of knowledge, and activities for public policies (Ministerstwo Przedsiębiorczości i Technologii, 2018).

3. Internationalization of clusters in Poland

In Poland, there is an initiative under the Intelligent Development Operational Program, where among other activities the internationalization of NKC is financed. The goal of this action is to finance comprehensive services supporting the adaptation and introduction or strengthening the cluster’s products on foreign markets or those of its members, with particular emphasis on technologically advanced products. The maximum support may amount to PLN 8,000,000 (support will amount to 80% of the project value, which means that the cluster’s own contribution is at least 20% of the total cost of the project).

Activities like consultancy services and training in the field of operations on foreign markets, participation in fairs as an exhibitor, access to foreign research and development infrastructure, promotion of brands and products abroad undertaken by key clusters can be financed under this programme. Examples of realized projects are presented in Table 1.

All the activities mentioned in Table 1 are significant and will allow Polish clusters to diffuse knowledge and acquisition of know-how as well as establish business cooperation with international partners.

Clusters can give voice to companies because they are in a unique position to share their success stories and inspire other organizations to circulate. Clusters can act as change factors in favor of the circular economy. The planned effects of the internationalization of clusters contribute to the creation of an innovative economy by:

- access to knowledge that can be used in new products and services,
- access to new markets,
- access to key elements of innovative infrastructure,
- access to new partners for cooperation,

Table 1. Supporting internationalization of clusters by the Intelligent Development Operational Program in 2014-2020

Year	Cluster / name of the project	Aim/ activities of the project	Project value / value of the grant in PLN
1	2	3	4
2016	The Association West Pomeranian Chemical Cluster "Green Chemistry" Internationalization of the West Pomeranian Chemical Cluster „Green Chemistry”	International activities for members and friendly companies in the form of numerous economic missions, study visits or exchange of experience between individual companies from abroad	2 000 900,00/ 1 484 120,00
2016	Eastern Development Agency Co. Internationalization of Eastern Cluster ICT	Facilitating collaboration, information sharing and the provision or management of specialized business support services. Cluster marketing to increase the participation of new enterprises or organizations and increase the Cluster’s visibility. Training programs, workshops and conferences to support knowledge sharing, networking and transnational cooperation. Advisory service regarding entrepreneur internationalization	2 074 500,00/ 1 332 000,00
2016	Innovation and Development Promotion Center Intelligent „Super Factory” – Increase in the international competitiveness of the Metalworking Cluster	Comprehensive actions to introduce new innovative services and products to international markets. Participation in international specialist industrial fairs, access to foreign research and development infrastructure, consultancy services related to the internationalization of the entrepreneur related to the introduction of entrepreneur’s products on selected foreign markets, training related to the internationalization of the entrepreneurs	5 898 100,00/ 3 703 620,00
2016	Interizon Foundation Internationalization of Interizon Cluster	International extension of the cluster	5 776 100,00/ 4 059 760,00
2016	Polish Advisory and Consulting Association SHOW YOURSELF – Polish construction products on the international market	Participation in international fairs and economic missions in: India, Germany, Finland, Mexico, Czech Republic, Sweden, UK. Latvia, Cambodia, Russia	6 136 716,00/ 4 237 960,00

Table 1, cont.

1	2	3	4
2016	Waste Management and Recycling Cluster – not for profit system sp. z o.o. Internationalization of the Waste Management and Recycling Cluster through Cluster partners and introduction of new eco-products to foreign markets	Supporting the international expansion of the Cluster in conjunction with its R&D and innovation activities.	6 522 776,86/ 3 836 240,00
2016	Board of Baltic Cluster Initiatives Intermodal, multimodal, electricity – internationalization of products of the North-South Logistics Transport Cluster	introducing new products to foreign markets	3 896 700,00/ 2 476 060,00
2016	Wrocław Technology Park Expansion of the image of the NUTRIBIOMED Cluster and its members from the life-science sector on international markets – NBMgrowth	International expansion of the cluster	5 159 173,00/ 3 200 478,30
2016	Bydgoszcz Industrial Cluster InterBKP – expansion of the Bydgoszcz Industrial Cluster to international markets	Conducting, strengthening and increasing the visibility of the cluster's offer on foreign markets, internationalization and international cooperation, including the exchange of knowledge and creation of an international network of contacts	1 917 814,00/ 1 134 390,00
2016	Socio-Economic Development Association "Knowledge" Internationalization of the Masovian ICT Cluster	Activation of the Cluster to facilitate cooperation, cluster marketing to increase the participation of new enterprises or organizations and increase the Cluster's visibility. training programs, workshops and conferences to support knowledge sharing, networking and transnational cooperation	4 893 411,00/ 3 651 455,50
2017	Advisory Institute Ltd. Sustain Infrastructure on the International market – product and services presentation in the intelligent construction energy-efficient field	Maintaining, strengthening and increasing the visibility of the cluster's offer on foreign markets in the intelligent construction energy-efficient field	6 129 947,17/ 4 193 871,64
2017	Silesian Aviation Cluster International activation of the	Participation in international fairs, establishing cooperation with research	7 217 561,00/ 3 828 620,00

1	2	3	4
	Silesian Aviation Cluster through promotional and business activities in conjunction with research and development and innovation activities of the associated members of the Cluster	and development units and access to foreign research infrastructures, diffusion of knowledge and acquisition of know-how in the field of aviation and automotive technologies, establishing business cooperation with international partners	
2018	Waste Management and Recycling Cluster – not for profit system sp. z o.o. Internationalization of the Waste Management and Recycling Cluster	International expansion, participation in international events (fairs, conferences, etc.)	11 231 103,18/ 6 573 580,20
2018	Upper Silesian Agency for Entrepreneurship and Development Ltd. MedSilesia Go Global	Internationalization of common products of the Cluster and its individual members. Development of a training and consulting platform (COIN) supporting companies' competences in the field of export development to selected markets, taking into account the specifics of the medical industry, in particular medical devices and devices and ICT solutions	3 643 760,38/ 2 619 848,17
2018	Board of Baltic Cluster Initiatives UWE – Export support services for innovative companies and products of the North-South Logistics Transport Cluster	Increasing the number of contracts, and introducing new products to foreign markets	6 956 074,17/ 4 064 852,34
2018	Silesian Aviation Cluster Internationalization of the products of the Silesian Aviation Cluster through promotional and business activities of the Cluster's entrepreneurs	establishing cooperation with research and development units and access to foreign research infrastructures. diffusion of knowledge and acquisition of know-how in the field of aviation and automotive technologies, establishing business cooperation with international partners	12 105 325,74/ 6 968 187,00
2018	Eastern Development Agency Co. Internationalization of Eastern Cluster ICT II	Facilitating international collaboration, Training programs, workshops and conferences to support knowledge sharing, networking and transnational cooperation	6 251 475,00/ 3 867 250,00
2018	Innovation and Development Promotion Center SF4.0.KOM – Intelligent Super Factory	Increasing the Cluster's recognition on international markets by implementing and introducing new products and services of the cluster	9 958 175,58/ 6 106 547,09

Table 1, cont.

1	2	3	4
2018	Socio-Economic Development Association “Knowledge” Internationalization of space sector companies	Individual consultancy in the field of entrepreneurial internationalization for 12 enterprises in the cluster	5 295 751,00/ 382 084,60
2018	Socio-Economic Development Association “Knowledge” Internationalization of the Masovian ICT Cluster in the energy industry	Activation of the Cluster to facilitate international cooperation Training in the internationalization of the entrepreneurs	5 692 760,00/ 3 646 375,00
2018	Board of Baltic Cluster Initiatives Export Accelerator	Internationalization of the cluster	4 792 018,89/ 3 639 085,20
2018	Bydgoszcz Industrial Cluster InterBKP 2.0 – expansion of the Bydgoszcz Industrial Cluster to international markets	Activation of companies in the area of R&D&I and development of international cooperation	3 093 669,28/ 1 865 265,64
2019	Socio-Economic Development Association “Knowledge” Expansion to the foreign market of entrepreneurs from the Masovian ICT Cluster	Conducting, strengthening and increasing the visibility of the cluster’s offer on foreign markets, internationalization and international cooperation	5 259 284,00/ 3 447 310,00
2019	Upper Silesian Agency for Entrepreneurship and Development Ltd. MedSilesia Go Global 4.0	introduction of joint offer on foreign markets under the sign of MadeInMedSilesia and advanced technologies and products of its participants	4 775 930,54/ 3 571 846,49
2019	Polish Advisory and Consulting Association Show Yourself – Polish construction products on the international market – IV edition	participation in international fairs and economic missions in: France, Russia, ZEA, Norway, China, Kazakhstan, USA, Sweden, Germany, UK, Ukraine, Italy, Estonia, Belgium, Belarus, Vietnam, Algeria	9984 100,00/ 7 068 380,00
2019	Innovation and Development Promotion Center Intelligent Super Factory ISF 4.0 KOM2	Internationalization	9530 442,84/ 5 232 808,92
2019	Board of Baltic Cluster Initiatives UAE – Export support for members of the North-South Logistics and Transport Cluster on the United Arab Emirates market	Conducting, strengthening and increasing the visibility of the cluster’s offer on UAE market	11 646 466,48/ 6 571 160,76

1	2	3	4
2019	Federation of Aviation Companies Bielsko Business and promotional activities for the internationalization of the products of the Silesian Aviation Cluster	Participation in international fairs and foreign missions, establishing cooperation with research and development units and access to foreign research infrastructures	11 546 895,00/ 6 577 111,00

Source: own research on the basis of (PARP).

- acquiring new partners from the R&D sector for the implementation of research projects,
- linking science and business: implementing advanced, innovative solutions on foreign markets,
- increasing of the cluster's economic potential and innovation, including an increase in the number of knowledge transfers made within the cluster or joint R&D projects.

Polish clusters are also supported by their participation in international projects. They participate in EU initiatives such as the European Strategic Cluster Partnerships for smart specialisation investment (ESCPS3), the European Strategic Cluster Partnerships for Going International (ESCP4I), and in Clusters for excellence (Cluster Excellence Programme n.a.).

In the first call of proposal six projects were created, composed of clusters representing various countries. In one of them participated the Polish cluster Mazovia ICT Cluster. The consortium envisaged concrete follow-up activities, such as the creation of the first European Strategic Cluster Partnership (ESCP) on digital cultural and creative industries. In the second edition, five project were created and in two of them Polish clusters participated. The EAST ICT Cluster took part in the consortium which realized the project CLUSGRID – Clusters for the Smart Grid project. Resulting from the undertaken activities, one can find local and international workshops, study visits and training. The project enables all members to improve the management of their organizations and provide top-quality services and support to SMEs (EU Cluster Partnerships, 2019).

The cooperation, in only two years 2016-2017, resulted in the engagement of 150 clusters and organizations from 23 European countries. They have developed and implemented joint strategies and enhance international cooperation.¹

¹ E.g. 2000 European SMEs have been involved in activities targeting generating international third markets, 85 concrete business cooperation cases with international partners, 370 Cluster-to-Cluster events were organised, 3010 Business-to-Business events have been conducted, and 45 collaboration projects implemented between EU clusters and international peer organisations.

Table 2. EU Cluster Partnerships Initiatives

Sectors/ Partnership	Priority areas
Agricultural Inputs and Services (TRACK)	Sustainable innovation: Sustainable agriculture
Textile Manufacturing (TEX4IM)	Manufacturing & Industry Textiles: wearing apparel & leather& related products
Biopharmaceuticals (S3martMed)	Human health & social work activities: Human health activities (medical services)
Aerospace Vehicles and Defense (EACP-EUROSME)	Aeronautics & space aeronautics
Automotive (EACN)	KETS: Advanced manufacturing systems
Food Processing and Manufacturing (DIGICLUSTERS)	Information & Communication Technologies (ICT): Computer programming, consultancy & related activities
Lighting and Electrical Equipment (CYBER SECURE LIGHT)	Digital Agenda: ICT trust, cyber security & network security
Food Processing and Manufacturing (Connsensys)	Manufacturing & Industry: Food, beverage & tobacco products
Biopharmaceuticals (AI4Diag)	Manufacturing & Industry: Biotechnology

Source: own elaboration based on: (European Cluster Collaboration Platform, 2019).

The participation of Polish clusters in international innovative projects enables knowledge transfer and increases the cluster's economic potential and innovation. As a result, innovative clusters contribute to the development of an innovative economy.

4. Conclusion

The conducted research helps to explain and understand the importance of clusters in the development of an innovation economy. The desk research led to confirm that clustering is one of the answers to achieve economic growth in accordance with knowledge-based economy assumptions.

It is worth noting that the future economy will be based on innovative solutions, and clusters are the places where these innovations are created. Clusters ensure the continuous development of new technologies, resulting first of all from the possibility of cooperation between different actors and involvement in research of scientific units. An additional advantage of clusters is the strength that the integrated units have in dealing with the public side and the competition.

Participation by Polish clusters in international initiatives gives them the opportunity for further activity, and allow clusters' managers to understand

international trends and to match them with the market opportunities that are emerging.

Due to the recognized phenomena the authors find justified further research of clusters' functioning in Poland with particular attention to the creation, maintenance and nurturing of participating in international projects, as they may be a key explanatory factor for the development of an innovation economy.

Clusters are considered as hubs of innovation and growth. During the past decades, recognizing the importance of clusters in facilitating innovation, policy makers from different countries have initiated cluster policies to enhance innovation and productivity.

Clusters can use their knowledge and experience to boost an innovation economy. They are well placed to translate technological developments in different fields into opportunities for companies within their clusters. The importance of the cluster internationalization trend is also confirmed by the multitude of research concerning the activities contributing to the internationalization of clusters. The cluster policy in Poland contributes to strengthening the position of Polish clusters in the international arena, and the conditions to fulfil in order to obtain NKC status forced them to their improvement. The authors' findings provide insights to policy-makers and cluster management organizations concerning the process of developing an innovation economy by policy-driven cluster initiatives in transition countries.

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