A STATISTICAL PRESENTATION OF COOPERATION WITHIN THE FRAMEWORK OF CLUSTER INITIATIVE FOR INNOVATIVE ACTIVITY

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Abstract

The data on cooperation within the framework of cluster initiative for innovative activity are collected in accordance with the Eurostat and OECD methodology (The Oslo Manual 2005) on the basis of forms developed by the national statistical offices of the European Union Member States and Norway. In these forms (reports on innovations in industry and service sector) the concepts of "cooperation" and "cooperation within the cluster initiative" are distinguished and cluster partners are identified – using the binary response scale (yes, no, "x" mark) (e.g. other enterprises within a related group of enterprises, suppliers, competitors, clients, consultants, universities) and its territorial range (domestic, foreign). The adopted solutions deserve criticism not only in terms of scope, but also the method of data collection (the first purpose of the article). Their major shortcomings take the form of deficiencies in the construction of formulated questions and answers. These observations were considered a sufficient premise for making the proposal to modify reports on innovations in industry and service sector (the second purpose of the article).

Key words: innovative activity, cooperation, cluster

JEL Code: C18, L26, O31

Introduction

Cluster structures increase the productivity of enterprises operating within them, improve the capacity to develop and implement innovations and also create favourable conditions for the establishment of new companies, which contributes towards strengthening the competition of specific spatial arrangements [Porter, 1998]. These qualities cannot be ignored in the development of mature innovation policy, whereas its foundations are formed by e.g. the correctly collected data on cooperation within the framework of cluster initiatives for the benefit of innovative activity. The assessment of the adopted solutions in this area (Community Innovation Survey – reports on innovations in industry and service sector,

respectively: PNT-02, PNT-02/u), along with the proposal for their possible modification, were adopted as the objectives of the presented discussion.

1. Cooperation vs. cluster initiative for innovative activity – a definitional approach

Innovative processes include all activities of a scientific, technical, organizational, financial and commercial nature, which result in or are intended to result in the implementation of new or significantly improved solutions [OECD / European Communities, 2005]. These activities can be undertaken by individual enterprises and also within the framework of cooperation, including cluster initiative.

The concentration of diverse activities for innovation within a single entity does not seem entirely possible, or at least is significantly limited, which results from the characteristics of these processes. Among them the following are listed [Guinet, 1995]:

- interaction (internal and external in the system of enterprises, research and development sphere and support institutions),
- much broader nature than just the technological one (technological know-how determines innovation in a few cases only; its determinants are knowledge, education, experience, contacts with suppliers, users and other participants of innovative activity),
- location in a specific space (the unique resources, culture, traditions and the system of values are the source of innovation),
- integration of activities for the development, absorption and diffusion of new or significantly improved solutions,
- the need to learn (identifying innovation with the learning process),
- cost and risk associated with the uniqueness of the carried out activities.

Many of the listed characteristics, typical for innovative processes, remain in harmony with the idea of cooperation. Therefore enterprises can interact along the supply chain, involving customers and suppliers in joint efforts aimed at creating new solutions (e.g. exchange of technological and business information), or carry out coupled development work with other companies or non-commercial institutions (e.g. joint development of new technologies, marketing strategic alliances). These interactions result in the development of knowledge and information flow channels, initiate synergy effects, facilitate mutual learning, and increase the possibilities for funding innovative activity along with reducing potential losses (specified part of the risk transferred to a cooperation partner).

Cooperation in the sphere of innovation is one of the three possible types of relationships occurring in the course of innovative processes. In this case, as opposed to open sources of information, as well as knowledge acquisition and external technology, the interaction between an entity implementing a new or significantly improved solution and the units participating in its development is always present. This participation, however, must take an active form. The mere commissioning of work outside, lacking active interaction with other entities does not fall into the category of cooperation. Taking this perspective, the cooperation for the benefit of innovative activity occurs only when an enterprise participates actively in joint innovative projects and undertakings with other entities. Independent enterprises or non-commercial institutions [OECD/European Communities, 2005] can represent such units.

Cluster initiative is a specific form of cooperation focused on innovative activity. Its meaning can be interpreted and approached in different ways, however, it is most frequently adopted that a cluster is understood as:

- the geographically close companies, combined by vertical and horizontal relations, connected with the local infrastructure of business support, having a joint vision of development, however, not only cooperating, but also competing with each other [Cooke, 2001; Alcácer & Zhao, 2015],
- the geographical cluster of interconnected companies, specialized suppliers, service providing units, companies operating in connected sectors and the related institutions (e.g. universities, standardization units, trade associations and financial institutions) in specific areas, competing with each other, but also the cooperating ones [Porter , 2001],
- the geographically concentrated group of enterprises representing the same or related sectors, as well as different institutions and organizations integrated in the network of vertical and horizontal correlations, both competing and cooperating with each other [Gordon, McCann, 2000].

In the light of the quoted definitions, the distinctive cluster characteristics can be identified and compared to other forms of cooperation. Among them the following can be listed: spatial concentration, interactions between various entities, the shared vision of development, links with business support institutions as well as research and development units, but also cooperation and its antonym – competition.

The terminological distinction between cooperation and a cluster initiative for innovative activity may turn out difficult. Following the statistical nomenclature it is adopted that cooperation takes place in the case of active interaction involving at least two entities in

joint projects, whereas a cluster initiative occurs when a specified group of partners meets the criteria of cluster definition based on Porter's approach, with the stipulation that cooperation type of relationships present between them are formalized by a letter of intent, an association agreement, an agreement on a consortium establishment and similar documents [CSO, 2017a; CSO, 217b].

2. Cooperation within the framework of cluster initiative for innovative processes in the context of the Community Innovation Survey (CIS)

The research on enterprise innovations is conducted as part of the Community Innovation Survey based on model forms developed by the national statistical offices of the European Union Member States and Norway. These studies apply the Eurostat and OECD methodology described in the Oslo Manual [CSO, 2017c].

The reports on innovations in industry and service sector (PNT-02, PNT-02/u) pay relatively little attention to cooperation under the cluster initiative for innovative activity. In general terms, these studies come down to identifying cooperation partners and their geographical origin (Table 1).

The guidelines presented in the Oslo Manual (the level of recommendations' mapping) and pragmatic considerations related to the needs of public statistics users (usefulness of the collected information) are adopted as the basis for assessing the applied solutions in terms of data collection on cluster initiatives for innovative activity. Taking these perspectives into account it is worth referring to the main factors which can be considered in the research on cooperation for innovation processes. Among them the following can be listed: reference to the types of innovation, potential cooperation partners, geographical dimension of relationships, binary or ordinal scale of responses [OECD/European Communities, 2005].

Cluster initiatives give grounds for various types of relationships, which remain different in terms of e.g. the subject of cooperation. The objective of cumulative projects can take the form of activities focused on implementing product, process, organization or marketing oriented innovations. These variants are not taken into account by CIS research, which seems justified due to frequent problems in separating the particular innovation types. For example, the implementation of new products is often accompanied by introducing new processes and can also be combined with new marketing and organizational methods. Such integrity seems to undermine the sense of combining cluster cooperation for innovation with innovation types. It should also be highlighted that the Oslo Manual allows the option of collecting information

about cooperation regarding overall innovative activity, as well as its individual or grouped types [OECD/European Communities, 2005; De Marchi, 2016; Zeng et al., 2010]. However, in each case it refers to it as innovative activity, which according to the statistical terminology is not always identical with the implementation of innovation, because it also includes the activities aimed at this specific goal (continued with an unknown result, interrupted or abandoned before the implementation of innovation) [Głuszczuk & Raszkowski, 2016]. The approach ignores the results of joint cluster initiatives for innovative activity.

Tab. 1: Cooperation within the framework of cluster initiative in the years 2014–2016

A. Did your enterprise, in the years 2014-2016, cooperate with other enterprises or institutions as part of a cluster initiative? *(If yes, please indicate the types of partner institutions by entering "x" in the relevant positions.)* According to M. E. Porter's definition, a cluster is a geographical proximate group of interconnected companies, specialized suppliers, service providing units, companies operating in connected sectors and the related institutions (e.g. universities, standardization units, trade associations and financial institutions) in specific areas, competing with each other, but also the cooperating ones. For the purposes of the presented study this question refers to a cluster initiative approached as cooperation relationships established in a formal manner based on a letter of intent, an association agreement, an agreement on a consortium establishment, etc.		– yes – no	1 2
Types of partner institutions within the framework of cluster initiative		Partners	
		from Poland	from other countries
Other companies included in your group of companies [a)]	01		
Suppliers of equipment, materials, components and software	02		
Private sector clients	03		
Public sector clients	04		
Competitors and other enterprises within the same field of activity	05		
Consulting companies (consultants), commercial laboratories, private R&D institutions	06		
Units of the Polish Academy of Sciences	07		
Research institutes	08		
Foreign public R&D institutions	09		
Domestic and foreign private research institutions	10		
Universities	11		
B. Did your enterprise participate, in the years 2014-2016, in formalized cooperation other than clusters e.g. chambers and associations of producers (including e.g. economic and commerce chambers), crafts and entrepreneurship guilds, etc.?		– yes – no	1 2

[a)] A group of enterprises covers two or more legally defined enterprises constituting a joined ownership. Enterprises in the group may operate on different markets in the geographical (as a national or regional division) and product related sense. The head office is also a part of the group of enterprises.
Source: [CSO, 2017a; CSO, 2017b].

The entities representing various environments may become cooperation partners within the framework of the cluster initiative focused on innovation processes. In extensively

generalized terms, they can be systematized by distinguishing: enterprises (beneficiaries of innovative activity), research and development sphere, including higher education, and support institutions (local government units, entities offering financial services, business incubators, technology parks, credit guarantee funds, regional development agencies, consulting companies, etc.). This list is not complete and can always be supplemented with other entities expressing their readiness to participate in joint initiatives. This opinion is not shared by the authors of the Oslo Manual in comparing an incomplete and closed set of potential cooperation partners. This mistake is replicated at the level of reports on innovations in industry and service sector (PNT-02, PNT-02/u) when identifying cluster structure entities (significant replication of the Oslo Manual suggestions and duplication of the shortcomings in the classification of cooperation partners; Table 2).

Tab. 2: Cooperation partners – the Oslo Manual suggestions vs. CIS (PNT-02, PNT-02/u)

The Oslo Manual	CIS
Other enterprises in the group of enterprises	
Suppliers of devices, materials, components, software or services	Suppliers of equipment, materials, components and software
Clients	Private sector clients
	Public sector clients
Competitors	Competitors and other enterprises in the same field of activity
Other enterprises performing the same type of activity	
Consultants/consulting companies	Consulting companies (consultants), commercial laboratories, private R&D institutions
Commercial laboratories	
State/public research institutes	Units of the Polish Academy of Sciences
	Research institutes
	Foreign public R&D institutions
Private commercial research institutes	Domestic and foreign private research institutions
Universities and other higher education institutions	Universities
Specialized public / semi-public supporting services	

Source: authors' compilation based on [OECD/European Communities, 2005; CSO, 2017a; CSO, 2017b]

Cluster initiatives for innovative activity are undertaken by entities located in a given space. Its boundaries are difficult to define unequivocally, but the majority of such structures are of local or regional dimension, or slightly wider than these systems. This regularity is not observed in the reports on innovations in industry and service sector (PNT-02, PNT-02/u), where the partners of pro-innovation clusters are divided into domestic and originating from other countries (Table 1). Such narrow systematics, deviating from the idea of a cluster is not provided for in the Oslo Manual. Within its framework it is suggested that the entities cooperating for the benefit of new or significantly improved solutions should be classified as

local, national and foreign by region, or by country [OECD/European Communities, 2005]. This suggestion is better than the applied solution (CIS), however, it is not free from certain shortcomings (ignoring a region in the territorial system of the country and slightly larger structures – supra-regional and smaller systems - supra-local ones).

A cluster, as the geographical agglomeration of cooperating entities is characterized by a multitude of interactions of diverse significance [Ketchen & Shook, 1996]. Capturing their rank is not possible when using a binary response scale (yes, no or entering "x" mark, de facto the synonym of confirmation or negation). Using it in the reports on innovations in industry and service sector only allows establishing mutual connections (e.g. between an enterprise and a university; see Table 1). Another, richer informational value is provided by the ordinal scale, which not only allows identifying mutual relationships, but also determining their weight (e.g. interactions: very important, important, rather important, rather unimportant, unimportant, definitely unimportant). This possibility is perceived and suggested at the level of the Oslo Manual, however, this proposal is not defined by any specific scale of assessment [OECD/European Communities, 2005].

3. Cooperation within the framework of cluster initiative for innovative processes – the proposal to modify the reporting forms used by enterprises

Critical observations regarding the statistical approach to cooperation under the cluster initiative for innovative activity seem to be a sufficient premise for the modification of reports on innovations in industry and service sector. The respective proposals are presented in Table 3.

The suggested statistical presentation of cooperation within the framework of cluster initiative for innovative activity:

- refers to all innovations (product, process, marketing and organization oriented), in accordance with one of the Oslo Manual presentation variants, practiced in public statistics,
- covers innovative processes finalised with the implementation of innovation, as opposed to the Oslo Manual and statistical practice (PNT-02, PNT-02/u), in the case of which innovative activity also includes continued and discontinued projects,

Tab. 3: Cluster initiative for innovative activity – the proposal of statistical presentation

A cluster – according to Porter – stands for a geographical proximate group of interconnected companies, specialized suppliers, service providing units, companies operating in connected sectors and the related institutions (e.g. universities, standardization units, trade associations and financial institutions) in particular areas, competing with each other, but also the cooperating ones. For the purposes of the presented study it has additionally been adopted that the cluster initiative covers cooperation relationships established in a formal manner based on a letter of intent, an association agreement, an agreement on a consortium establishment etc., which resulted in the innovation implementation.				
A. Did your enterprise, in the years ……., cooperate with commercial and/or non-commercial entities under cluster initiative for innovative activity? *If yes, please enter numbers from 1 to 6 in an appropriate position indicating the type of partner institution and its geographical location, where the subsequent numbers stand for value judgments about the importance of joint activities, i.e. 1 is the lowest and 6 the highest level of importance*.				
Types of partner entities	Geographical range of cooperation			
	local NUTS 3	more than NUTS 3, less than NUTS 2	regional NUTS 2	more than NUTS 2, including national and international
Subsidiaries (the respondent's capital group)				
Suppliers of equipment, materials, components and software				
Respondent's clients				
Competitors (other enterprises performing the same type of activity)				
Consulting companies				
Commercial laboratories				
Research and development institutions				
Research institutions				
Universities				
Local government units				
Entities offering financing services (e.g. banks, leasing companies, venture capital, etc.)				
Technology parks				
Business incubators				
Credit guarantee funds				
Development agencies				
Other, what kind?				
B. What number of entities did your enterprise cooperate with under the cluster initiative for innovative activity?				
Total	including by the geographical range of cooperation			

Source: authors' compilation

- follows the ordinal scale of responses identifying cluster initiative partners and their weight (importance) within the framework of joint activities for innovation,
- supplements and organizes the classification of potential partners involved in cluster initiatives for innovative activity used in reports on innovations in industry and service sector,
- changes the variants of geographical cooperation range in relation to the applied solutions (PNT-02, PNT-02/u), bringing them closer to the idea of a cluster.

Conclusion

The critical analysis of applied solutions (CIS, PNT-02, PNT-02/u) in the scope of collecting information on cooperation within the framework of cluster initiative for innovative activity and the recommendation of possible changes in this respect were adopted as the purposes of the presented article.

The carried out critical analysis of applied solutions has shown that in the reports on innovations in industry and service sector:

- the results of cluster initiatives undertaken for innovative activity are being ignored,
- the incorrect binary response scale is used,
- the incomplete, closed list of potential cluster partners is used,
- the possible variants regarding spatial dimension of cooperation are inadequate.

The aforementioned shortcomings seem to be eliminated by the proposed modification of the scope of collected data on cooperation within the framework of cluster initiative for innovative activity. It suggests collecting information about joint cluster initiatives finalised with the implementation of innovations, applying the ordinal scale of assessment – identifying cluster partners and also defining their importance in joint innovation processes, moreover, the list of potential cooperating partners in the network of mutual relations is defined and the spatial dimension cluster cooperation is clarified.

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