

## On Methodological Issues in Allocating Cross-border Clusters

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### Abstract

*The article addresses the actual problem of ambiguity in the methods of cluster identification and mapping in contemporary geo-economic context. A critical analysis of existing methods of cluster identification is held. Given the research objective, all of the methods were structured into three major groups, depending of the type of data and analytical tools being used: quantitative, qualitative and complex approaches. The applicability of the presented methods with regard to cross-border clusters is critically assessed.*

**Keywords:** cluster mapping, cluster identification, cross-border cluster, cross-border regionalization

### 1. Introduction

Over the past quarter of century, the study of spatial forms networking in the framework of growing cross-border processes of regionalization around the world has become an urgent task of the applied research. Since the 60-70s of the twentieth century, scientists record the formation of cross-industry network linkages of business entities whose members are interconnected both within the value chain and in collaborative processes of generation and commercialization of new knowledge with the actors located outside the administrative-territorial boundaries of the region(s) of single country. Among the most interesting forms of international economic cooperation and integration in the prospects for the development of European border regions is the phenomenon of cross-border cluster (CBC).

Cross-border cluster as a variation of international cluster is "a network of sustainable interactions between a wide range of interrelated, interdependent, mutually reinforcing and competing stakeholders, which are localized border areas of neighboring countries, operate in related industries, possess similar level of development of skills and techniques, and are involved in joint process of value creation, which provides a synergistic effect in the development of the relevant areas and the diffusion of innovation among them" (Mikhaylov & Mikhaylova, 2012, p.66). One of the first empirical example of the phenomenon of cross-border cluster formation was mentioned by M. Porter (1998), who noted the existence of CBC of chemical industry between Germany and Switzerland. It was later discovered and studied a significant amount of CBC in cross-border regions of North America and Western Europe (see Brunet-Jailly, 2008; Johnson, 2009; Mikhaylov & Mikhaylova, 2014; Scott, 1999; Trippl, 2008). While in the countries of Southeast Asia, a similar form of interaction can be considered the concept of 'growth triangles' (see Kettunen, 1998), which is able to more clearly reflect the aspects of cross-border clustering in maritime complex of coastal areas.

Positive spillovers from the activities of CBCs on the level of socio-economic and innovative development of the border peripheral areas have caused the interest of public authorities not only to promote the establishment of CBCs via public-private partnership framework (i.e. organized, planned clusters), but also to provide targeted support to existing clusters, operating in the priority areas of the economy. Programs of state support are usually developed at the national and supranational (e.g., pan-European – EU) levels and amply financial support for the cluster in the form of grants after its 'formalization', i.e. after the formation of a formal non-profit body representing a cluster (e.g. the Association of cluster members in one form or another). The result of the formalization of the cluster is the cluster organization (CO) with its members and the board, which provides not only a representative function of the cluster as an economic entity in its relations with the authorities and other bodies (e.g., universities, Chamber of Commerce, and others), but also gives the relative clarity with respect to geographical boundaries of its spatially-network interactions.

Most Western European organizations providing assistance to the clustering use the data of cluster organizations (including of CBC) as the main criterion in the identification and mapping of clusters, i.e., an approach of 'self-proclaimed membership'. In particular, the study held by Walerud and Viachka (2007) on the identification of cross-border interactions of cluster organizations is entirely based on a comprehensive analysis of data provided by organizations to

the European cluster observatory, to programs and activities conducted by the European Commission (for example, Europe INNOVA or European Cluster Conference), polls of formal cluster initiatives (usually funded within the framework of Interact / Interreg theme), and open source information available on the Internet. This method enables to get a detailed understanding of the structure and characteristics of CBC, however, almost completely ignores the existence of the self-financed cluster formations (i.e. organic or latent clusters), and is highly dependent on the competence of experts. In this regard, we consider a number of methods for the identification of latent clusters and their applicability with respect to allocation of cross-border clusters.

## **2. Cluster Identification and Mapping: Methodological Shortfalls**

Russian as well as foreign scholars have identified numerous methods that differ in their approaches to data collection and its subsequent analysis, as well as to the type of statistical, analytical, historical and other information used. All of these methods can be conditionally divided into quantitative, qualitative and complex types (see Mikhaylov & Mikhaylova, 2012). The first group of methods – quantitative, which includes the following techniques on cluster identification and mapping.

The method based on the coefficient of localization (CL), i.e. the level of specialization of the region under study within a certain type of economic activity (i.e. industry). The most commonly used threshold ratio is 1.5, which means a region has 50% more specialized economy structure as compared to the national average (or another parent population). With respect to the identification of CBCs, it is proposed to correlate the CL of the neighboring regions with a comparable level of specialization in the same or adjacent industries. Despite the advantages of this method, such as data availability, ease of calculation, the possibility of carrying out a comparative analysis and of combining it with other methods, we shall underline a number of significant shortcomings. These include: unaccounted cross-sectoral linkages within a cluster, absence of a consensus in the selection of the threshold values of the CL (different scholars argue for different values that might indicate highly specialized economy of a region), the high degree of dependence of the research results on the choice of the geographical boundaries of the region (i.e. study area) and field of comparison (i.e. reference area), as well as the clusters of high-performance industries remain largely neglected (highly sophisticated technologies require less manpower, thus, will not have a significant impact in CL studies).

The method based on the data of export accounts, which also forms only a probabilistic representation of key economic activities in the region and does not reflect the interaction within the cluster formations. In addition, the availability of the necessary statistical data in the context of individual regions and economic activities is limited.

The method of inter-industry balances based on the Input – Output tables (i.e. IO tables), which received a widespread application in the world due to the use of data on the final output in the analysis, enables to determine the presence of real interactions of industry sectors and the size of transactions. However, this method is not focused on defining the localization (i.e. agglomeration) of industries, and considers only the movement of commodity flows, which does not reflect the role of related institutional structures inherent to clusters. That is, its narrow focus on the 'buyer – seller' relationship does not enable to take into account the collective cross-organizational collaboration and linkages with other stakeholders (e.g. government bodies, universities, NGOs, and others) that are typical for cluster formations. In addition, these tables are constructed with respect to relatively aggregate industries, which does not allow to identify highly specialized clusters (e.g. wine cluster, GameDev cluster, etc.). The possibility to detect CBCs is further hampered by the fact of belonging of the industries of the two regions to a single cluster (i.e. the international cooperation takes place within a cluster). Thus, the results obtained in this analysis can only reveal the 'anchor' economic activities in a particular region. In the analysis of sales performance and traffic between different companies of a number of economic activities (i.e. industries) in order to identify the proportion of products and services being used by one industry and purchased from representatives of all other industries, does not allow to determine interaction of companies of adjacent regions involved in a single value chain.

New geographical method or the method of Ripley-K (including its various modifications: L-function of J. Begas, M-function of E. Marcon, Q-function of G. Linkvita, etc.) solves one of the methodological problems inherent in the method of CL, through the use of a more flexible approach to the definition of the boundaries of the interactions of economic agents. The results of a study held using this method could reveal the presence or absence of local over-concentration within globally-oriented industries. The disadvantages of the method in identifying CBC can be attributed the need for 'drawing up' a detailed map showing the location of the majority of firms in analyzed regions, as well as the need for specialized software to perform the calculations. Moreover, same as all quantitative approaches based on statistical data, the method is able to detect a degree of geographical concentration of enterprises, but not the degree of interaction between them.

The second group of methods – qualitative, includes:

The method of expert assessments, including its variations (for example, the 'snowball'), enables to identify and classify the clusters by using different tools: focus groups, questionnaires, interviews of both external experts and key representatives of the companies of the cluster organization. The method enables to obtain detailed information about the studied object, but has a number of deficiencies in the study of CBCs. These include: given the insufficient number of experts, there is the risk of a subjective opinion; a technique is hardly amenable to standardization, thus, the comparative analysis of the regions is difficult to perform; the limitations of generalizing data of the studied border areas prevents the identification of interrelations; lack of a single reasoned form of interviewing.

The method of the genealogical tree (including the method of cases) is one of the most effective in the study of the development stages of the cluster and acts as an instrument of the retrospective analysis of individual clusters. Drawing genealogy of a cluster is a time-consuming and expensive process that often requires inaccessible specific information of economic and historical nature, which is generally available in limited quantities and in printed format. The subsequent comparative analysis is complicated by individuality of each study, the subjectivity of both the information and its interpretation.

The third group of methods – complex methods, which include a set of quantitative and qualitative methods combined. An example is a meta-method of 'case studies' aimed at the reproduction of the studied events, not separating them from the context. This enables to take into account significant factors of formation and development of the cluster using a phased approach in the selection of research tools.

### 3. Conclusion

The aforementioned methods reflect the actual problem of equivocality (i.e. ambiguity) in identifying the boundaries of the spatial-network forms of interaction between actors in the contemporary geo-economic context. Formation of CBCs questioned the disposition of resource-dependent and local industries, and also forms the need in working out the appropriate methodological approach to the identification and subsequent assessment of the interactions between the participants of the cross-border cluster. Existing methods for the identification of clusters at the regional level are rather probabilistic in nature, so the issue of their applicability in the context of identifying CBCs seems to be an important methodological problem that requires a comprehensive study with subsequent approbation in the following scientific research.

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