

Impact of Cluster Policies on Structure and Management of Cluster Organisations in Czechia and Slovakia

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Abstract: *Evaluation of an impact of cluster policies on cluster organisation performance is a research challenge. The establishment and development of cluster organisations (hereafter "COs") are the result of many factors which work together over time. Second, some COs are results of national or regional government initiatives, while others emerge spontaneously without public support. This paper presents a development of cluster policies and current stage of COs in Czechia and in Slovakia in terms of different approaches to cluster policy. The lack of convincing arguments for positive impact of public support on COs development in previous research and published studies was a reason for selection of these countries as they shared the same history as former members of Czechoslovakia (dissolution in 1993) and a lot of political, socio-economic and cultural similarities. In spite of their common historical development, the distinct differences in the way of establishing and developing cluster concept can be identified. For the comparison of the current stage of COs in these two countries, the secondary data for analysis of cluster strategies, documents, programmes and implementing bodies of public support were analysed, and primary data obtained from managers of COs using structured interviews was gathered, analysed and compared. From December 2015 to August 2016 research in more than 130 COs was carried out and then evaluated. Research findings confirmed that cluster policies are implemented in both examined countries in a different way what is manifested in different results in a number of COs, their structural characteristics and management level. Example of Czechia with strong and long-term public support shows that implementation of cluster-based policy plays an important role in evolving the cluster concept in the country, while evidence from Slovakia with weak support for cluster initiatives and COs' establishment and development confirms, that inadequate governance and financial framework for the COs-related support in Slovakia did not bring a comparable level of COs development measured by structural characteristics and management quality as is in Czechia.*

Keywords: cluster organisation, cluster support, cluster policy, structural characteristics, management quality, Czechia, Slovakia

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Introduction

Clusters stimulate and revitalize cooperation in the business environment. Entrepreneurships cooperating within such a network can gain multiple benefits derived from various activities. As the competitiveness of entrepreneurships strongly depends on their level of innovativeness, companies feel the need to provide sophisticated methods and tools that enhance the innovation technology development in the company. According Porter (1998), clusters stimulate competitive pressure even among indirectly competing or non-competing participants, which has a motivating influence on entities, who are thereby more likely to co-locate R&D, cooperate on production, co-monitor and rapidly perceive customer needs, carry out common marketing activities, etc.

According previous research (Saxenian, 1994; Pinch & Hendry, 1999; Feldman, 2001; Zander, 2003) two leading approaches, in which clusters emerge, could be distinguished:

- 1) Bottom-up approach – where clusters emerge due to the initiative of groups of parts of the Triple Helix model, i.e. university, industry, government (Leydesdorff & Etzkowitz, 1998) without a concrete political impetus,
- 2) Top-down approach – where clusters emerge as a result of the activities of public policies.

A third approach may appear where clusters emerge due to a combination of both specified approaches and/or due to the historical conditions (Hendry *et al.*, 2000).

The concept of clustering provided the basis for development of innovation, competitiveness and regional development policies as a tool for decreasing regional disparities. As clusters join numerous diverse entities from different spheres i.e. industry, education, science, government, etc. into a consistent structure, it becomes necessary to take into account all the measures affecting their existence when defining a cluster policy. The core of a cluster policy lies in a series of different activities, strategies, programmes and procedures, etc., which pose a focal point for increasing the socio-economic benefits as a result of the existence and development of clusters. These steps are consistent with a certain plan and designated budget and are fulfilled during a defined time frame (usually several years). A cluster policy can be explicitly focused on clusters or it can indirectly affect clusters within a strategy focused on boosting competitiveness or general economic development. The existence of clusters is well accepted, but the ability to influence their formation and growth through purposeful action remains controversial (Wares, 2008). According to the Polish Agency for Enterprise Development (PARP), about 75 percent of supported cluster entities failed to meet the promised objectives (PARP, 2012). France experienced a similar “success” ratio as Poland, while Finland, Germany and the UK reached at least 75-80 percent of cluster support effectiveness as measured

by achieving setting cluster goals (Czyewska, 2013). In fact, there is a lack of convincing arguments for positive impact of public support on COs development. Previous studies try to confirm that clusters development efforts may have positive impacts on an economy. These studies usually focus on clusters just only in the form of case studies describing specific COs, or comparing numerous COs using a survey of COs all around the world (Sölvell, *et al.*, 2003; Ketels & Sölvell, 2006; EC, 2007; Sölvell & Lindqvist, 2011; Kuhn *et al.*, 2011; Müller, *et al.*, 2012). Due to different historical development, economic conditions, political decisions and socio-economic and cultural factors which vary from country to country, conducted researches and their results have limitations. Czechia and Slovakia have been selected for research of evaluation of cluster policy impact on structure and management of COs. These two examined countries shared the same history as former members of Czechoslovakia which split in 1993. Both countries have a common tradition of public policies, have some cultural similarities, and joined the EU in the same year (2004). They have experience of the transition from centrally-planned to market-oriented economy. In both these countries there are huge regional disparities mostly between the capital city and the rest of the country (Skokan, 2007; Tvrdoň & Skokan, 2011). In spite of their obvious similarity, the distinct differences in the way of establishing and developing cluster concept can be identified.

The research objective is to compare the results of evolving the COs in Czechia and in Slovakia respectively as there are clearly evident different approaches to formulation and application of cluster policy supporting COs establishment and development. The results are based on description, analysis and comparison of cluster policy, strategies, documents, public financial support and stage of development and level of management of COs. It was observed that Czechia currently has strong, systematic and long-term cluster policy and Slovakia still a weak and non-systematic approach. The results are based on a comprehensive research study of the current development stage of cluster policy and COs in both countries, carried out between December 2015 and August 2016. The paper contains literature review concerning cluster concept, approaches to clustering, cluster policy and Cos structural and managerial issues. Methodological part describes dimensions of analysis) on the level of governments and agencies supporting COs development within the national and regional dimensions using study of documents, programmes and reports, and ii) on the level of COs including primary data collection and survey process among cluster managers. This survey was based on structured interviews with COs managers enabling to obtain data and test hypotheses related to structure and management quality of COs in Czechia and Slovakia. The results of research confirmed positive impact of systematic and long-term support on some structural characteristics and quality management of COs.

1. Literature review

The trend towards clustering has been one of the major issues in recent innovation strategies in Europe and in the rest of the world. Clusters can be the result of targeted strategies of companies in the private sector or a public intervention. An organised effort to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and the research community is defined as cluster initiative (Sölvell *et al.*, 2003). “Cluster initiatives are increasingly managed by specialised institutions, known as COs, which take various forms, ranging from non-profit associations, through public agencies to companies” (EC Communication, 2008, p. 8). The European Commission (2005) faithfully reflects the essence of a cluster policy which usually “*is not an isolated, independent and well-defined discipline. It embraces all policies that affect the development of clusters, taking into account the synergies and interchanges between these policies. Many policies labelled under different headings (regional policy, industrial policy, innovation policy, etc.) are in fact cluster policies.*” According to the Whitebook (Andersson *et al.*, 2004), different categories of cluster policy can be distinguished such as broker policies, demand side policies, training policies, measures for special promotion of international links and framework policies, which are complementary to specific cluster steps and which assist in accelerating the clustering processes. The study “A Practical Guide to Cluster Development” (DTI, 2004, p. 46), underlines the importance of access to finance as it “*contributes to the successful development of clusters through supporting the growth and expansion of cluster-related activities*”. Among the potential sources of financing public and private R&D funding, specialist resources (financial services), venture capital, business angels and investor networks can be distinguished.

The level of implemented cluster policy strongly depends on the capacity of country resources and also on the interest of policy-makers. The European Union plays a major role in financial support of COs and cluster initiatives as it creates the basis for cluster policy development in individual countries. Cluster policy on the EU level offers numerous programmes and initiatives with the possibility of obtaining funding. Specifying one method for creating COs is impossible because each of them is a combination of many different social, historical, economic, political and other factors (Jankowiak, 2012). It could be indicated who initiated the creation of the CO. A survey of cluster policies carried out in 31 European countries in 2008 (Oxford Research AS, 2008) noted that the majority of European COs have tended to be “bottom-up” initiatives driven primarily by the private sector. A natural way to the formation of the cluster in Porter’s sense is initiative from below, a bottom-up, which comes from the private firms. The creation of such COs is the most reasonable costs and strengthening cooperation between regional firms and institutions. The establishment of COs called top-down, derived from regional or national level. The governance regimes of top-down COs result from political decisions, which must often embrace a bundle of different, and sometimes controversial, interests.

Bresnahan et al. (2001), discuss the lack of cluster dynamics of top-down COs which are financed mainly by public funds. According Fromhold-Eisebith and Eisebith (2005), the governance regimes of privately initiated bottom-up clusters can be more closely adjusted to the interests of certain subgroups.

Meier zu Köcker (2008) emphasise that entrepreneurs, who seek to benefit from cooperation within regional COs, are willing to pay membership fees to cover the costs of the CO management. Rosenberg (2002) reflects certain scepticism on whether COs constructed artificially can be successful. The study conducted by Van der Linde (2003) points also to a state influence, which tend to play a role in less competitive COs. According Porter (1998) although the development of COs has to be driven by the private sector, there is a crucial role for government in facilitating the establishment of COs. Due to the diversity of national conditions, the approach to cluster policy may differ. Nonetheless, common goals and characteristics can be pinpointed such as the role of public and semi-public organisations as catalysts or mediators in stimulating clustering processes among companies. With their focal point on supporting the flow of information and knowledge, macro-level foundations and infrastructure as well as often ensuring financial assistance, these authorities attempt to assure an adequate environment for clusters/cluster initiative development. According Sölvell and Lindqvist (2011), cluster programmes can play an important role in the process of increasing competitiveness and the reviews of individual programmes found positive returns for the participants. Dependence on a single source of funding can be a weakness of a CO. Organisations with multiple sources of roughly equal size is less susceptible to changes in the funding situation. Kuhn et al. (2010) have made peer group comparisons of Danish companies active in cluster projects and those that are not. They considered growth in gross profit and the number of employees both before and after programme participation in Danish subsidy scheme. They also argue that participants in cluster projects register better performance in subsequent years.

Academics and practitioners broadly discuss why some COs succeed and others fail. Within the context of public support, the performance of publicly initiated COs often is doubted (Bresnahan *et al.*, 2001). There are empirical studies which show that top-down COs, in fact, are less sustainable than bottom-up COs. Enright (2003) ascertains that only 10% of all publicly initiated top-down COs are able to survive when the public funding programme finishes. To evaluate results of cluster policy's impact, various characteristics of COs could be applied. They range from basic descriptive statistics (age, size, structure, governance, services provided, sector focus, objectives, cluster manager background, financing, board etc.) to input on bridging of innovation gaps and performance (Meier zu Köcker, 2008; Ketels *et al.*, 2012). There is discussion about which COs should be supported. Most obvious cluster programmes are devoted to strengthening the existing COs in less advanced economies and regions (Ketels & Memedovic, 2008; Landabaso, 2001). Ketels et al. (2006) conducted a study focused on COs selected by the type of economy where the COs take place: developing economies, transition and advanced economies. The findings suggest that there are considerable differences between them. COs operate

in transition economies are considerably younger than in advanced economies. This reflects the fact that the cluster concept became popular in advanced economies earlier than was adopted in transition economies. The establishment of the majority of COs started in Europe at the end of the 1990s, e.g. in Austria, Germany and Finland (Müller *et al.*, 2012). The central and eastern European countries, including Czechia and Slovakia, started to implement the cluster concept later, many of them after their accession to the European Union. It brought access to EU structural funds which enabled financing of cluster initiatives (Skokan *et al.*, 2012). The size of a CO can be measured by the number of members that participate actively. Some COs have only a few participants while others can have more than a hundred (Ketels *et al.*, 2006). In a comprehensive study performed by van der Linde (2003), data of 773 COs from 49 countries, mainly from Great Britain, the USA, and Germany were analysed. COs show a great variety with regard to size, two fifths of the identified COs had less than 100 companies. Müller *et al.* (2012), in their international analysis based on benchmarking of more than 260 COs from 23 European countries, argue that the size of a CO does not necessarily depend on the size of the national economy.

According Ketels *et al.* (2006) only 40% of COs have more than 20 company participants (with a median of 18). COs also differ widely in the type of industry focus they have, ranging from agriculture to “high-tech” industries like ICT and biotechnology. In relation to a selection of industry some COs initiated by the business sector itself target industry is given from the outset. But when the government is the initiator, the industry needs to be selected. Ketels *et al.* (2006), found that in transition economies government does not initiate tourism-related COs, is more often targeting capital intensive manufacturing and basic industries. Business-initiated COs often occur in “high-tech” industries, similarly as in advanced economies. A share of committed SME COs members was a part of a group of indicators in the benchmarking study of the most innovative clusters in Germany, carried out by Meier zu Köcker (2008) on the sample of 107 clusters. Findings of the study revealed that 50% of all cluster investigated contained a share between 45-69% of SMEs. The share of SMEs depends on the industry when biotech clusters had a higher share of SMEs than energy clusters. COs often play an important role as service providers for the support of their members (Meier zu Köcker, 2008). The crucial parameter is the CO management and the level of its quality and professionalism. Recently, management of COs has become a professional work. An organisation for cluster accreditation (ESCA) was established and many cluster managers have been trained in cluster schools (Ketels *et al.*, 2012). According Christensen *et al.* (2011), a majority of cluster programme owners focus on cluster management instead of on the number of COs.

2. Objectives and methodology of the research

The basic research objective is to compare the results of evolving the COs in countries with different approach and intensity of cluster policies supporting establishment and development of COs. To achieve the main objective of this

research, the theory of comparative study was used. According to Landman (2008), the comparison of two countries shares many of the same assumptions as the comparison of many countries. In both cases countries represent units on which comparable data and information can be collected and then features of the countries that are similar can be measured. There are a number of limitations to the methods for comparing two countries including the lower level of conceptual abstraction, the strength of the results, attention to the deeper context of each country, the intensive focus on variation within countries rather than on variation between countries. In order to make stronger results, the rule is to raise the number of observations (King *et al.*, 1994), which means more observations within a smaller sample of countries. Czechia and Slovakia with very similar political, socio-economic and cultural similarities, but different cluster policy approach for this comparative study were selected and analysed. The public support of COs in Czechia is long-term and systematic due to regular operational programmes formulated on state level. Amount of financial budget allocated to the programmes is higher than in Slovakia. The support of COs in Slovakia is not systematic, it started later with a small budget. For evaluation of current state of cluster policy development and impact on COs in Czechia and Slovakia deep analysis was carried out. The analysis of development and current situation of cluster policy and COs respects the following dimensions:

- a) The level of the analysis:
 - The level of governments and agencies supporting the development of COs within the national and regional dimensions, and
 - The level of COs.
- b) The data collection and survey process:
 - The secondary data for research were extracted from government strategic documents content analysis and utilizing statistical data concerning financial support (existing programmes),
 - The primary data were collected as a result of the survey that was conducted in a form of questionnaire and structured interviews of the managers of COs.
- c) The scope of the analysis:
 - The description of the cluster policy historical development (strategies, documents and implementing bodies),
 - Description of the existing funding programmes,
 - Analysis and comparison of development and a current state of the COs in both countries in the context of the approach to cluster concept implementation.

2.1. Data collection techniques

The first step was to identify all existing and registered COs in examined countries. For this purpose, detailed analysis of information sources, websites, professional publications, studies, registers and the experience gained from the operation of COs in Czechia and Slovakia were conducted. Altogether, 133 COs were identified, from that 90COs from Czechia and 43 COs from Slovakia were

subjects of interest. To verify a current activity of COs, a telephone interview, was utilized as the first contact. After verification procedures 57 COs were removed from the original sample (38 from Czechia and 19 from Slovakia). Excluded group of COs is a result of a time-limited project, COs are inactive, or the CO initiatives do not have the structure of COs.

The overall aim of the questionnaire survey was to better understand how COs operate under different public support in examined countries. In the beginning main features of COs (basic characteristics of COs) were described, such as name and its acronym, legal form, predominant industry, contact, existence of web site and its updating. Survey using questionnaire in written form was performed by the research team of the Faculty of Management and Economics, Tomas Bata University in Zlín in cooperation with the National Cluster Association in Czechia from December 2015 to August 2016. Respondents, i.e. COs' executive managers, provided their responses by fulfilment of an electronic version of the questionnaire sent by email accompanied by telephone call or interview with the particular CO manager, depending on his/her preference. In overall 63 CO managers (41 in the case of Czechia and 22 in the case of Slovakia) participated in the survey, allowing the research team to achieve a response rate of 82,9%. 13 remaining respondents (11 from Czechia and 2 from Slovakia) stated that CO is in the initial phase of development, or CO is currently under process of reconstruction.

To compare the different approach to cluster policy following characteristics of CO, based on the literature review were applied:

- i) *Structural characteristics* consisted of:
 - number of COs
 - size of COs, measured by the number of COs members
 - proportion of technological and industrial COs on the whole number of COs
 - share of committed SMECOs members
 - continuous distributed development of the CO
- ii) *Formulated CO strategy* as an indicator of CO's management quality.

According to Pavelková *et al.* (2016), COs from both examined countries were divided in terms of the predominant specialization to six groups as follows: 1) agro-food industries, 2) manufacturing, 3) services, 4) ICT, 5) creative and cultural industries, 6) KETs⁴ and R&D.

2.2. Hypotheses setting and testing

The hypotheses recognise two levels of comparison between Czech and Slovak COs: The first level is focused on the structure of the Cos and time-span of their development (hypotheses H1, H2, H3, H4 and H5). Hence, number of all active

⁴Key Enabling Technologies, i.e. nanotechnologies, micro- and nano-electronics, photonics, advanced materials and biotechnology (European Commission, 2009).

COs from both examined countries were used for hypotheses testing. The second level of the comparison was focused on COs' management quality, specifically to its association with a presence of formulated strategy documents (hypothesis H6), being considered as primary condition for developed COs in accordance with the ESCA label evaluation process and different studies, namely Pavelková (2015). The hypothesis H6 is tested on the sample of the COs participating in the questionnaire survey.

The hypotheses were set as follows:

H1: *The number of COs will be at least 150% higher in Czechia than in Slovakia* owing to i) Rusnak and Lehocký's (2016) statement, i.e. a larger population generates a larger market, where this market supports the entry of more companies and offers consumers a wider range of products, thus making the market even bigger; using this framework this hypothesis postulates that the number of COs in Czechia should be at least 50% higher than the doubled total population as well as GDP (both nominal and purchasing power standard) in case of Czechia, and ii) the long-term and constant support of COs from the programmes of the Ministry of Industry and Trade, where the first call was directly focused on the mapping and the emergence of cluster initiatives and subsequently their transformation into a legal entity in the form of a CO (Pavelková *et al.*, 2013). Hence, for proving this hypothesis the equation was defined as follow:

$$\Delta_n = (N_{cze} - N_{svk}) / N_{svk} \times 100, \quad (1)$$

where

Δ_n = relative difference between number of Czech and Slovak COs

N_{cze} = number of COs in Czechia

N_{svk} = number of COs in Slovakia

H2: *The number of members of the COs will be at least 150% higher in Czechia than in Slovakia* owing to the same two factors as they have been stated in hypothesis one. Thus, the formula for proving this hypothesis was derived as follow:

$$\Delta_{memb} = (Memb_{cze} - Memb_{svk}) / Memb_{svk} \times 100, \quad (2)$$

where

Δ_{memb} = relative difference between the number of members within Czech and Slovak COs

$Memb_{cze}$ = number of members of COs in Czechia

$Memb_{svk}$ = number of members of COs in Slovakia.

H3: *Share of technological and industrial COs on the whole number of COs will be higher in Czechia* as a result of the support of selected industries in the framework of cluster policy focused on traditional industries with Edison type

research (Varga *et al.*, 2012) producing innovative outputs in the form of patents and utility models, i.e. measurable outputs. The Two Proportion Z-test without continuity correction was employed to evaluate this hypothesis, i.e. whether the observed proportion of manufacturing COs in Czechia (p_{cze}) is greater than the observed proportion of manufacturing COs in Slovakia (p_{svk}) applying formula:

$$z = (p_{cze} - p_{svk}) / \left(\sqrt{\frac{p_q}{n_{cze}}} + \sqrt{\frac{p_q}{n_{svk}}} \right), \quad (3)$$

where

p_{cze} is the proportion of manufacturing COs observed in Czechia with size n_{cze}
 p_{svk} is the proportion of manufacturing COs observed in Slovakia with size n_{svk}
 p and q are the overall proportions.

H4: Higher share of SMEs in the Czech COs is supposed to be performed due to the requirement to have 60% of SMEs among CO members as a prerequisite for cluster support in the all cluster related funding programmes in Czechia. The Wilcoxon Rank-Sum Test in its one side form was applied to reject or accept the alternative hypothesis.

H5: In the case of Slovakia, a continuous distributed development of COs will be expected in a time lag compared to Czechia, where the predominant period of the formation of COs was related to the appropriate grant title from the particular the EU Structural Funds operational programme under the first call to support their establishment. A multiple line graph was used for visualisation of the hypothesis confirmation.

H6: Relating to long-term public support of the Czech COs, it is supposed to expect an association between presence of strategy documents of the surveyed COs and selected countries, i.e. Czechia and Slovakia. Hence, measurement of association employing Bernard's unconditional test due to small sample size and 2×2 contingency table was applied to prove the association between presence of strategy documents of the surveyed COs as a proxy for comparison of the COs management quality and the examined countries.

3. Results and discussion

In comparison with Western-European countries, neither Czech nor Slovak cluster development has had such a rich history yet. Currently, COs operate in both countries, with very different public support. In contrast to Slovakia, in Czechia the significance of clusters and COs has been well recognised by the government. Due to lack of understanding of benefits of cluster concept and the lack of a partner at the ministry level, no explicit cluster policy exists in Slovakia. These different approaches manifest into different current stage of cluster initiatives and COs development in these countries.

3.1 Development of cluster policies and cluster organisations in Czechia and Slovakia

Based on deep study of cluster related strategies, documents, and programmes in both countries, several key aspects can be defined and compared. The findings show that the implementation of cluster policies does vary in compared countries. Czechia is the country which has implemented cluster policy most decisively, while Slovakia has only sporadically and not systematically supported cluster initiatives.

Cluster policy strategy and cluster initiatives

The concept of clusters in **Czechia** was firstly introduced in 2002 when the Investment and Business Development Agency – CzechInvest has implemented a pilot project focused on northern Moravia. The aim of this project was to discover the significant potential of clustering in the region (Fronková, 2012) with the need to address problems related to the country's transition economy. The feasibility study led to the establishment of the first CO in 2003. Czechia has created the systematic support mechanisms for cluster development. The first step was undertaken with the implementation of the National Cluster Strategy in 2005 followed by the continuously designed operational programmes. The strategy supported all stages of the cluster development and all industrial sectors. However, the National Cluster Strategy for the years 2005-2008 resulted in wide popularization of the cluster phenomenon in the country, was gradually losing the necessary attention and was no more updated. The first CO in **Slovakia** was established in 2004, the formation of COs in Slovakia has been initiated mostly by private sector and regional authorities, with great influence of the involvement of foreign companies, and predominantly in two sectors, namely automotive and electronics.

There has been evident no pro-active cluster policy concept or strategy in Slovakia. The cluster concept has been included in different government strategies, mostly related to innovation, SMEs and direct foreign investment. The first official policy document, in which COs were mentioned, was the National Strategic Reference Framework 2007-2013. The strategy was one of the most important documents defined priorities of Slovakia financed from Structural funds EU and clusters were considered as an important development factor.

Programmes supporting the development of cluster organisations

Simultaneously with the National Cluster Strategy, the attention of the **Operational Programme Industry and Enterprise (OPIE)** for the years **2004-2006** has been focused on the issue of clusters. Within the so-called **CLUSTERS Programme**, support explicitly focused on clusters and cluster initiatives has been provided, thus, stimulating their development in the country. The

Programme focused on two phases. The first mapping phase was devoted to the identification of existing potential and searching for suitable companies for clusters (a profound analysis of the given sector and the facilitation of the actors towards cooperation within clusters), whereas the second phase focused on the establishment and development of a cluster organisation.

The **Operational Programme Enterprise & Innovation (OPEI) with the programme COOPERATION-Clusters** (2007-2013) shifted the emphasis on the long-term sustainability of the COs (CzechInvest, 2013). It concentrated on strengthening the innovative potential and the use of new technologies as well as improving cooperation between enterprises and research institutions. This new programme was broadened in comparison with its predecessor being less restricted in regards to the industry sphere (Bialic-Davendra *et al.*, 2014); however, cluster mapping was no longer provided. The programme also introduced support for the participation of COs in international projects (e.g. the ERA-NET, the CORNET). The OPEI has been followed by the **Operational Programme Enterprise & Innovation for Competitiveness 2014-2020 (OPEIC)**, with the programme **COOPERATION-CLUSTERS**. The main task is to promote business investment in innovation and research, improve the quality of R&D infrastructure and create links between enterprises and R&D institutions. It supports collaborative research, open centres for research, development and innovations, cluster internalisation and cluster organisation management. The applicant must submit an application for a joint development project with a foreign partner. In **Slovakia**, no official cluster mapping exercise has been provided. In 2009, the Slovak Innovation and Energy Agency conducted the study which verified the existence and functionality of the COs in the country. The result of the study was identification of seven COs. The first financial support for COs in **Slovakia** was linked with activities in the field of scientific and technical services in applied research and development. The subsidy given in the year 2012 was the first possibility for COs to apply for the aid from the state budget. Support in the form of subsidies was focused on the best technological COs operating within the country. In 2013, the *Scheme de minimis* devoted to industrial COs was launched. The Scheme was announced also in the next three years with the similar conditions. Table 1 and 2 show the amount of funds allocated to explicit cluster support. Czechia has relatively large funds dedicated to COs in comparison with the support of COs in Slovakia.

**Table 1. Review of cluster-supported operational programs in Czechia
(status in 2016)**

Operational programme	Cluster supporting programme	Allocation (in 1000 EUR)	Min.-max. budget per project (in 1000 EUR)	No. of applications	No. of supported cluster projects	Total amount of support (in 1000 EUR)
OP Industry & Enterprise	CLUSTERS, Mapping	17 390	8-40**	67	41	1260

**Impact of Cluster Policies on Structure and Management
of Cluster Organisations in Czechia and Slovakia**

2004-2006	CLUSTERS, Establishment & Development		120-1800 ***	18	12	7 921
OP Enterprise & Innovation 2007-2013	COOPERATION Clusters 1 st call	40 000	120-3 200	30	17	22 910
	COOPERATION Clusters 2 nd call	30 000	120-3 200	20	22	28 535
	COOPERATION Clusters 2 nd call-prolongation	20 000	240-2 400	43		
OP Enterprise & Innovation for Competitiveness 2014-2020	COOPERATION Clusters 1 st call	18 505	19-593	52	n/a*	n/a*
	COOPERATION Clusters 2 nd call	1 480	19-555	3	n/a*	n/a*
	COOPERATION Clusters 3 rd call	15 185	19-1 480 ****		n/a*	n/a*
Total amount					92	60 626

Source: own development based on data retrieved from CzechInvest and API websites

* Within the programme Clusters decisions of a subsidy are not issued to date, therefore data are not available; ** Aid is granted with 75% of eligible costs covered by a grant;

*** Aid is granted with the max level of eligible costs covered by a grant (1st year 75%, 2nd year 65% and 3rd year 55%) for each of the three years as of the project launch. In the case of the real establishment and development subsidy could be 3 – 45 mil CZK; **** Applications are expected in the last quarter of the year 2016

Table 2. Review of programmes supported COs from the state budget in Slovakia (status in 2016)

Cluster supporting programme	Allocation (in 1000 EUR) planned	Min.-max. budget per project (in 1000 EUR)	No. of applications	No. of supported cluster projects	Total amount of support (in 1000 EUR)
Subsidy for scientific and technical services 2012	250	20 - 80	n/a	5	250
Regional Operational Programme (2007/ 2013)	86	136 - 285	n/a	4	86
The Scheme of aid de minimis DM 3/ 2013	200	10 - 40	n/a	6	161
The Scheme of aid de minimis DM 18/ 2014	113	10 - 20	7	7	128
The Scheme of aid de minimis DM 18/ 2014 , app. forf.y. 2015	130	10 - 20	12	7	130
The Scheme of aid de minimis DM 18/ 2014 , app. forf.y. 2016	280	10 - 50	10	7	242

Total amount	36	997
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Source: Own development based on data retrieved from Ministry of Education, Science, Research and Sport of the SR and SIEA websites

3.2. Comparison of structure and quality of management of Czech and Slovak COs

Structural characteristic as i) size of COs, measured by the number of COs members, ii) proportion of technological and industrial COs on the whole number of COs, iii) share of committed SME COs members and iv) continuous distributed development of the CO. The average **number of CO** members within the sample in **Czechia** is 27 (median = 21), which is more than in **Slovakia** where the average number of members is 19 (median = 15).

In Czechia 31,7% of COs have more than 10 CO members, only 29,3% have more than 20 participants.

In Slovakia 33,3% of COs consist of more than 10 CO members, 19,1% have more than 20 CO participants. In comparison with previous research in European COs the number of COs members in Czechia and Slovakia is in most COs very low.

The most represented category of CO's members in both countries are SMEs with 68% share of all CO's members in Czechia (60% is the minimum share of SMEs that is needed to obtain financial public support) and with 41% share in Slovakia. The share of SMEs in Czechia is very similar to COs structure in developed countries (as shown in study of Meier and Köcker (2008)).

The second largest group consists of representatives of the academic community and research; in Czechia 19% and in Slovakia 24%. The largest difference between countries is shown by the category of public institutions - in Slovakia they represent 20%, in Czechia only 1%. The sample of the study shows the prevalence of manufacturing in Czechia (22 COs, e.g. 53,6%) and the prevalence of the service sector, especially tourism, in Slovakia (9 COs, e.g. 40,9%). Division in terms of the predominant specialization of COs according selected methodology is shown in Table 3.

Table 3. Comparison of predominant specialization of COs in Czechia and Slovakia

Predominant specialization/country	CR		SR	
	No.	%	No.	%
Information and communication technology	4	9,8	3	13,6
Key enabling technologies and R&D	4	9,8	1	4,6
Creative and cultural industry	1	2,4	1	4,6

**Impact of Cluster Policies on Structure and Management
of Cluster Organisations in Czechia and Slovakia**

Agro-food industry	4	9,8	1	4,5
Service industry	6	14,6	9	40,9
Manufacturing, energy and	22	53,6	7	31,8
Total amount	41	100	22	100

Source: own processing

This research in Czechia confirmed findings of Ketels et al. (2006), who found that in transition economies government does not initiate tourism-related COs, is more often targeting capital intensive manufacturing and basic industries and business-initiated COs often occur in “high-tech” industries, similarly as in advanced economies. High share of COs in service (mainly tourism) in Slovakia can be explained by the increasing efforts of business entities and municipalities to present regions on the domestic market as well as abroad. As Falt’an (2004) emphasizes, there is the need for clustering in relation to the growing competition not only of business entities, but also of municipalities and regions. To compare results of cluster policies setting in Czechia and Slovakia the following findings of hypotheses testing are provided. The first five hypotheses dealt with the structure of COs in both investigated countries.

The first hypothesis stating that *the number of COs will be at least 150% higher in Czechia than in Slovakia* was not confirmed. The number of COs in Czechia was higher than in Slovakia just about 116,7%. Thus, neither larger population nor economic size were recognized as factors influenced number of COs.

The second hypothesis stating that *the number of members of the COs will be at least 150% higher in Czechia than in Slovakia* was accepted. In this case, larger population and economic size play a role within comparison of number of CO members, where the Czech COs reached 165,8% more members than the Slovak ones. Therefore, we can conclude that the limit of 15 members as minimum for financial support of CO could have positive impact along with the two previously defined factors.

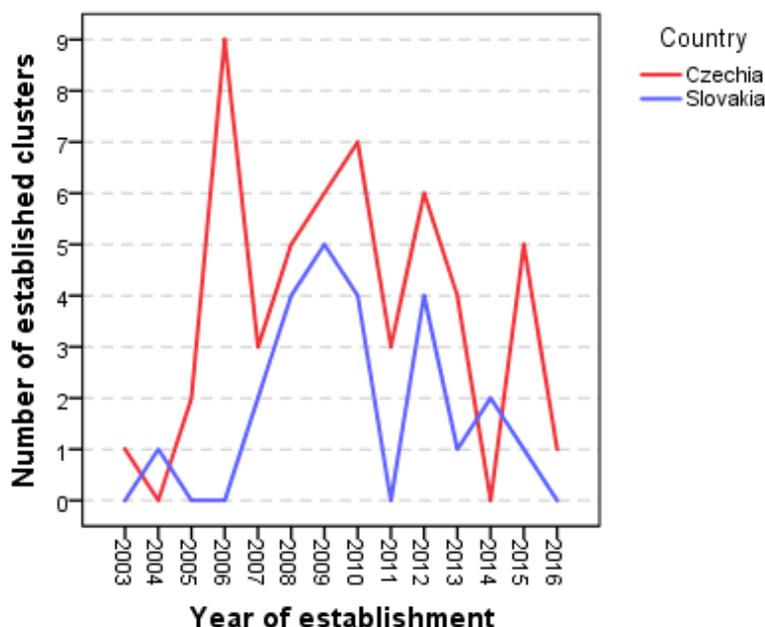
The results of the Two Proportion Z-test without continuity correction can be treated as confirmation of the alternative hypothesis (H_a) under examination of the third hypothesis, i.e. observed proportion of *technological and industrial* COs in Czechia (p_{cze}) is greater than the observed proportion of *technological and industrial* COs in Slovakia. However, reached p-value (0.049, where $p < 0.05$) suggests that using different significance levels such as $p < 0.01$ or $p < 0,001$ would lead to rejection of the stated alternative hypothesis. Hence, the findings support results that OP Enterprise & Innovation 2007-2013 as well as OP Enterprise & Innovation for Competitiveness 2014-2020 have proved its effectiveness relating to Edison type research outputs, i.e. patents, although it is supposed to expect that full effect of current innovation projects under the OP Enterprise & Innovation for Competitiveness 2014-2020 will met with time lag in range of two or three years.

The investigation of the fourth hypothesis stating that *higher share of SMEs in Czech COs is expected due to the requirement to have 60% of SMEs among*

members of COs as a prerequisite for cluster support in the all cluster related funding programmes in opposite to Slovak Cos resulted in the finding that higher share of SMEs in Czech COs opposite to Slovak ones was confirmed($p < 0,000$). Hence, the long-term requirement for Czech COs public support, i.e. to have at least 60% of SMEs in CO had significant impact on COs in Czechia, which complies with the EU SMEs support as a driver of change relating to local and regional employment and performance.

The fifth hypothesis stating that *in the case of Slovakia, a continuously distributed development of the CO will be expected in a time lag compared to Czechia* has to be accompanied with the introductory analysis, where the development of the surveyed COs measured by length of trading on the given market showed median 7,5 years in Czechia and 6,5 years in Slovakia. Thus, the age of COs is low in comparison with developed countries as it is declared in the study of Ketels et al. (2006). However, the Figure 1 proved the influence of the OP Industry & Enterprise 2004-2006 relating to Clusters Establishment & Development programme on stages of COs development in Czechia between given years as confirmation of the fifth hypothesis. However, both lines, i.e. Czechia and Slovakia, show the same trend relating to establishing COs, thus their downward trend detected from 2007 for Czech COs and 2010 for Slovak ones. Hence, this could be linked with global economic trajectories such as financial crisis in 2008 and 2009 followed by rising awareness of clustering as a tool of increasing international competitiveness and, in Czechia solely, as a result of long-term public support. In addition, the figure 1 presents the end of the ‘booming era’ of COs in both countries after 2013, which is corresponds with the end of the EU programming period 2007-2013. Conversely, the establishment of the Czech and Slovak COs since 2014 have been linked to those industries thus providing higher added value, namely creative, key enabling technologies and agro-food ones, where the last category is related to those oriented to implementing cutting edge technologies or developing those agro-food products having been set as a result of regional smart specialisation strategies.

Figure 1. Number of established COs in Czechia and Slovakia between 2003-2016



(Source: Own development)

The result of the sixth hypothesis expecting *association between presence of strategy documents of the surveyed COs and selected countries, i.e. Czechia and Slovakia* was confirmed as the significance level of the association resulted in $p < 0,05$. Thus, relating to the examined variables, it can be considered that the long term requirements for providing public subsidies within Czech COs leads to their more responsible management, i.e. quality, compared to Slovak COs.

5. Conclusions

The research of the cluster organisations in Czechia and Slovakia demonstrates the development and the way of support of cluster organisations in two countries, which have a common history and very similar conditions of political and economic development (their separation took place in the year 1993). Based on the study and analysis of documents, support programs and the size of financial resources supporting the formation and development of COs as well as the analysis of results from the survey of the cluster managers of COs in Czechia and Slovakia the following differences were identified: In Czechia, an earlier and less uniform formation of cluster organizations took place. In comparison, when considering total population and the economic power the number of emerging COs is only slightly higher in CR than in SR. The number of members in Czech COs exceeds the expected value; this can be attributed to the condition for the minimal number of members required for the financing of the formation of a cluster organisation. Owing

to the conditions for financial support for the formation of COs, there is also evident a higher proportion of SMEs in the membership base of COs in Czechia.

The proportion of technological and industrial COs is higher in Czechia due to the orientation of financial support for the formation of COs of this type. Recently, in both countries there is a noticeable trend of formation of COs concentrating on creative industry, key enabling technologies and agro-food ones as a result of smart specialization strategies. The expected delay in formation of COs in Slovakia in comparison with Czechia was confirmed. In both countries fluctuations in the formation of COs owing to the economic cycle were also observed. The quality of management as evaluated according to the compiled strategy of expansion of COs is higher in CR than in Slovakia.

The research in the above-mentioned areas has confirmed that goal-directed support, which is oriented towards formation and development of clusters, will have a positive effect on the acceleration of this process and attaining some of the structural characteristics of COs, which are part of the financing conditions (e.g. minimum number of members, structure of the COs members). These factors were found to also contribute to the quality of management of cluster organisations.

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