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Czech Machinery Cluster and Its Role in Sustainable Development of Moravian-Silesian Enterprises during the Post-Transformation Era

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Abstract: The paper intends to contribute to the field of geographical economics by an extensive questionnaire survey carried out in Moravian-Silesian region, which represents one of territories of traditional industry in the Czech Republic. The purpose of this paper is to analyse and assess the co-operation among enterprises, educational institutions, and public administration from the perspective of sustainability in the Moravian-Silesian region during its post-transformation era. The article deals specifically with the Czech machinery cluster. The research question that lies behind the survey is as follows: Is the co-operation of entities present in the Czech machinery cluster beneficial to the parties involved? The contribution of the paper is in uncovering the role of this cluster in the sustainable development of Moravian-Silesian enterprises during post-transformation period. Since the Moravian-Silesian region is a typical old industrial region, which moreover underwent a difficult transformation process, there are numerous peculiarities in functioning of its enterprises. Machinery was traditionally one of the supportive pillars of regional industry and it is not surprising that the machinery cluster was created as the first one. Yet, regional characteristics lie behind specific trajectories towards economic sustainability. The above ways toward economic sustainability differ markedly from the concepts that are in vogue in developed western territories.

Keywords: enterprises; cluster; Moravian-Silesian region; sustainability

1. Introduction

Traditional functioning of the economy is being increasingly contested and the idea of “a cluster” represents one of possible answers to these challenges. Today’s cluster concept reveals the far-reaching importance of the co-operation in the corporate sphere and innovations. The cluster constitutes a framework for collaboration of companies and other institutions of different types and sizes that contribute to the performance of a regional, national, and global economy. The sustainable development of the regions is one of the main objectives of the economic policies of individual countries. Not surprisingly, individual actors in the regions are the engines of the growth of the entire national economy.

Economic growth is one of the important goals of the European Union, which wants to achieve the goal by building a knowledge society [1]. The economic trend is accompanied by concepts of competitiveness, corporate networks and clusters, regional development factors, and others. An important element of the knowledge society is the cooperation with three entities that form the backbone of the economy. These are the interconnections with businesses, educational institutions, and government. It is one of the most important and very effective instruments of economic

development contributing to the establishment of a business university, cluster initiatives, and immediate industrial clusters.

The purpose of this paper is to analyse and assess the co-operation among enterprises, educational institutions and public administration from the perspective of sustainability in the Moravian-Silesian region during its post-transformation era. The interaction of these subjects is evaluated using analytical methods and a questionnaire survey within the Czech machinery cluster (CMC).

2. Literature Review

The well-known new growth theory puts human capital as a determinant of growth at the forefront [2]. During the expansion of these models, the question of the promotion of knowledge, as a factor of economic growth, was raised more and more, especially the question of how best to use knowledge, e.g., from universities [2].

According to Skokan [3], innovation was previously a matter for the private sector and governments, as these entities were able to communicate more. However, in the knowledge economy, it was necessary to attach more importance to the tasks of universities, which often brought, and still bring, new innovations, but also have a positive impact on human capital and can be often perceived as a stimulus for the emergence of new companies. In the Triple Helix model, this modern system of relationships is analysed and given an exact form.

In the long run, World Economic Forum (WEF) [4] can only increase technological standards by living standards. This factor takes into account the investment aspects of research and development, particularly from the private sector. For economies, the cooperation of research institutions with universities and other scientific institutes is important, as partnership with them is essential for sustainable future growth. The Triple Helix model (see Figure 1), which was described by Etzkowitz and Leydesdorff [5–8], captures interactions in different fields of action between three main components of the system. It is an innovative model that examines interconnections between universities, businesses, and the state administration and, thus, contributes to the development of a knowledge society by jointly creating a new institutional framework through greater involvement of universities and, hence, the transfer and, above all, the application of new knowledge.

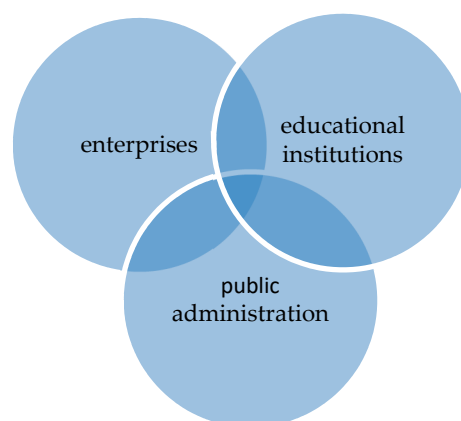


Figure 1. Triple Helix Model. Source: Etzkowitz [6].

The Triple Helix creates a potential for innovation and economic development in the knowledge society [8]. Etzkowitz [8] states that bilateral relations between the state administration and the universities, the academic sphere and the businesses, and the state administration and enterprises in this model are interconnected and they expand especially at the regional level. The common goal of these three entities is to stimulate knowledge-based economic development and their interaction shifts the limits of competitiveness to the knowledge society.

The business university is a central concept for the Triple Helix. Based on Stanford University research [9], it was found that within the business university, the knowledge obtained is the basis for creating new knowledge. It is a model enabling mutual communication via an interactive approach. If the individual actors engage in business university collaboration and share their knowledge, they increase their technological level. In this model, the state administration acts as a public entrepreneur and, together with universities, develops connections, combines individual parts of intellectual property, and uses them together.

An academic involvement in the knowledge triangle is the most important part of the business university, without which the aforementioned cooperation could not be achieved effectively [9]. Applying the principles of a business university according to the Triple Helix Research Group at Stanford University [9] also increases the students' abilities, as these principles provide them with new ideas, skills, and entrepreneurial talent. Students are becoming a new generation of professionals in various disciplines and are encouraged to continue their business and set up other businesses. This contributes to economic growth and job creation in society, which just asks for such results from a business university.

An important mission of a business university is, in addition to new ideas for existing businesses and universities, to combine research and teaching capabilities in new forms. These new forms are supposed to be the source of new companies, especially in advanced science and technology. Universities are increasingly becoming a source of regional economic development, and academic institutions are reoriented or set up for this purpose [9].

Inadequate connections in the knowledge triangle (the state administration, the universities, and the enterprises), and the fact that there is virtually no or negligible mobility between the academic sphere and business belong to the main problems of the innovation system in the Czech Republic [10]. This is in discordance with the situation in the majority of leading developed economies.

To draw on the solution of this issue, it is necessary to promote closer connections in the research and/or university, business, and public spheres. The public sector has a positive impact on the private sector by creating favourable conditions for the activities of private companies. The motivation of the public sector is to increase the living standards of the population.

According to Stejskal [10], a specific form of cooperation is the networking. The network economy connects economic entities into the so-called spider network, which is mainly driven by the development of information and communication technologies. We define network business as “the cooperation of a group of companies that use combined resources to cooperate on common projects” [10] (p. 31).

The enterprise networks also include agreements and contracts with research institutes, educational and training institutions and public authorities. Stejskal [11] also closely associates with business networks—clusters that are a significant part of the national economy and are considered to be the backbone of the economy and the driving force behind innovation, employment, and social integration. Closer clustering of clusters can be a tool that will further lead to higher goals—in particular the demand for innovation that is the key to long-term growth.

Several systematic literature reviews on the territorial approach exist, including Scaringella and Radziwon [12], Moulaert and Sekia [13], Bell et al. [14], Crescenzi and Rodríguez-Pose [15], and Scaringella and Chanaron [16]. It seems that Alfred Marshall was the first author who characterised clusters as a concentration of specialised industries in particular localities, which he termed industrial districts [17]. An industrial district is not simply a localised industry, as Marshall clarifies well [18]. A localised industry is ‘an industry concentrated in certain localities’ [18] (p. 268). The reasons for a geographical concentration of firms may be various: first, the needs of the manufacturers to be close to the resources on which they depend. Localisation is particularly related to physical conditions (such as climate, soil, mines, etc.) [19].

The term cluster was then developed by American professor M. E. Porter [20] (p. 156), which defines it as: “a geographically close group of interconnected companies and affiliated institutions in

a particular area whose common feature is complementarity in certain areas". Porter also describes the cluster development as a "geographic concentration of interconnected companies, specialized suppliers, service providers, related industries, affiliated institutions in individual areas; they compete together, but they also work together" [20] (p. 197). There are two basic elements in this definition. The first is to connect businesses with other institutions with certain common features that have the ability to complement each other. It may be a vertical (shopping and sales chain) or horizontal interconnection (providing additional products and services, using similar inputs, technologies, labour, etc.). The second element of the definition is an important geographical closeness where the cluster companies are concentrated spatially. Cluster is "dominating the landscape of every advanced economy, as its emergence is an essential part of economic development and offer a new way of thinking about the economy and economic development" [21] (p. 8). Clusters lead to increased economic growth, and help to gain competitive advantages in individual business areas, and are a feature of virtually every national or regional economy, especially in more advanced countries [21].

The European Commission [22] defines a cluster as a cluster of independent enterprises (small, medium, and large enterprises) and research organizations operating in a particular sector and region, and encourages innovation through intensive interaction—sharing facilities, exchanging knowledge and experience and, thus, effectively contributes to technology transfer, networking, and distributing information between businesses.

Enache, Vechiu, and Morozan [23] describe the cluster as a mechanism that leads its members to mutual relationships, transforms them into an integrated system in a competitive market, and forces them to act as a single competitor. Under this definition, each enterprise brings to the association what it thinks is the best, and understands that the activities that are implemented on cluster strategies are embedded in their own interests.

Malmberg and Power [24] define a "cluster approach", which has emerged in academic and political circles since the 1990s, and, hence, has a major impact on the economy. The cluster approach, according to the authors, has contributed to substantial progress in the analysis that has been dealt with by several economic geographers. However, this approach, as reported by Malmberg and Power [24], may be confusing at times, because it is an open concept with more interpretations and, so, different approaches and insights into this concept. The Cluster Concept promises to create innovation and competitiveness through interactive processes within spatial closeness to other actors.

According to Skokan [25], industrial clusters have become a global trend in the economic development of the regions at the end of the 20th century. This progress has contributed a great deal of clustering to the concept of a cluster with concepts such as national or regional innovation systems or a knowledge and new economy. The main reason for connecting these concepts is that processes driving a new knowledge-based economy, such as technological know-how, the creation of innovation, or the discovery of new information, are developing most effectively if it is concentrated in a particular location, preferably in a cluster.

The impact on the growth of the competitiveness of the enterprises, regions and states belongs to the basic economic effect of the cluster functioning. In its original meaning, the concept of competitiveness applied only to companies and their strategies. However, the concept of competitiveness does not only concern the microeconomic level, but also the competitiveness debate, both at the regional and the national levels. The discussion on this subject concerns the relation between the competitiveness of companies and their impact on the competitiveness of the countries and regions in which these companies are collocated.

In order to achieve the competitiveness growth, Skokan [25] considers the existence of both a favourable macroeconomic and microeconomic environment as important. Modern trends in strengthening the competitiveness of both national and regional economies have recently focused on clusters, as the relations and scope of cooperation within this system is the success of all economies.

The importance of clusters for competitiveness and economic growth is due to the fact that they contain three essential elements [25]. The clusters are a market environment in which economic efforts,

specialized resources, knowledge, companies, and institutions are concentrated. The clusters are linked by common elements of companies and other institutions, and these relations create the synergy based on knowledge and relationships of the competition and the cooperation. The clusters combine knowledge, technology, capital, business, innovation, and all these factors act as accelerators of the growth, the increased profits, the employment, the wealth, the prosperity, the quality of life, and the production of new knowledge [25]. The three basic elements of the clusters described above create a so-called competitive advantage based on knowledge. The clusters become an important and decisive factor in building a knowledge economy. The cluster is, thus, able to generate different benefits and effects for all involved entities. However, according to Pavelkova [26], the concrete benefits of the cluster are based on the visions, strategies, and goals, i.e., its overall character. “The clusters represent the defence of common economic interests; they can help at least partially improve the institutional environment in the region” [27].

The term cluster is also related to the term “cluster initiative”. Cluster Initiatives (CIs) are organized efforts aimed at increasing the growth and competitiveness of clusters in the region with the participation of the cluster companies, the governments and/or the research communities. The clusters have become a central element in improving the growth and competitiveness of territories, so state Sölvell, Lindqvist, and Ketels [28].

In the last few decades, there has also been an increasing effort to understand the possible links between the economic, environmental, social, and institutional dimensions of development and the term sustainable development is currently a very frequent term and a key concept, which seeks a balance among social, environmental, and economic sides. Although the question of whether the planet’s limited natural resources can continue to support human development indefinitely goes back at least as far as the late eighteenth century to the Reverend Thomas Malthus [29], scholars and politicians started to address this issue more in the second half of the 20th century when the problems associated with the growth of the human population, economic growth, and the utilization of non-renewable resources arose. The most frequently-used definition of sustainable development is from Our Common Future, also known as the Brundtland Report [30]: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

In 2013, Dvorakova and Zborkova conducted a survey entitled “Problems of sustainable development at the enterprise level and its impact on non-financial reporting of the enterprise” [31]. The integration of sustainability into company’s processes was evaluated in terms of three main areas of sustainable development and their impact on non-financial reporting of the enterprise.

3. Background

The background of the paper has much to do with the character of the region, where the investigated cluster and enterprises are collocated. The Moravian-Silesian region is situated in the northeast part of the Czech Republic. The region borders with Poland and Slovakia and covers an area of 5427 km². With a population of approximately 1.2 million, it is one of the most intensely populated regions in the Czech Republic. The socioeconomic character of the territory is affected by the attraction zone of Ostrava, which is currently the socioeconomic and administrative heart of the whole region with a population around 300,000 inhabitants. The complementary character of the Moravian-Silesian Region—industrial areas versus recreational or rural agricultural spots—ensures an intense integration of the relations in the framework of the whole territory. That is why there is a great deal of commuting for work, culture, and also recreation, which supports the interconnectedness of the whole region.

Ostrava agglomeration constitutes a typical old industrial region. Its trajectory started to ascend concurrently with the growth of coal mining and steel production. In contrast to the industrial regions in Western Europe, the Moravian-Silesian region had not undergone relevant changes after World War II, since its economic and spatial structure had been petrified by the socialist economic policy.

At the beginning of the restructuring in 1989, the region provided some 86% of Czechoslovak coal mining, 82% of coke production, and 70% of steel production. Approximately 52% of inhabitants worked in the secondary economic sector, 7% in the primary sector, and a mere 41% in the tertiary sector.

At the beginning of 1990s, the shock therapy of system changes took place in the Czech Republic. By 1990, the new post-communist government sharply reduced subsidies for coal mines and steel works and announced to the new enterprise managers that they are responsible for the further development of their companies. All large companies in the Moravian-Silesian region were badly hit by a dramatic reduction in demand in their traditional markets. The same applied to the domestic demand that shrank as a consequence of economic recession.

On the other hand, the strong currency devaluation in the same year created a barrier against imports of coal and steel from neighbouring countries. This gave them some time to adjust to the new situation and to look for new markets. The rate of unemployment remained at a negligible level just for the sake of quick, small privatisation and the restitution of previously-nationalised smaller production and service units.

The government of the country did not pay sufficient attention to gradually accumulating regional problems and did not launch any relevant regional policy. From the wider perspective, the central government largely omitted not only regional policy, but also housing policy and physical planning. Consequently, any spatial policies were characterised by the preference of ad hoc political decisions to the detriment of long-term strategic visions. In this situation short-sighted approaches have developed, with local governments applying their own strategies, often incorporating elements from before 1989.

Not surprisingly, the key actors in the Moravian-Silesian region agreed upon the creation of an informal civil association called 'The Economic and Social Council of Ostrava-Karviná Agglomeration'. This association acted as a representative of the interests of regional institutions. The first activities of this association consisted in research studies that outlined the future developmental possibilities of the region. On the basis of this studies the Council submitted action proposals to the government, which were accepted and reflected in the Government Decree No. 245 of 1991, Measures for the Restoration and Development of the Ostrava-Karviná Agglomeration for 1991–1992 with an outlook until 1995. The Economic and Social Council of the Ostrava-Karviná Agglomeration thus essentially replaced functions of non-existing self-governing regions and co-ordinated and stimulated regional developmental activities.

Although many Czechs and Slovaks desired the continued existence of a federal Czechoslovakia, on 1 January 1993, two independent countries, the Czech Republic and Slovakia, were created by the dissolution of Czechoslovakia, known as the Velvet Divorce, a reference to the bloodless Velvet Revolution of 1989.

In 1993, Regional Development Agency, which was funded mainly by PHARE programme, was established in Ostrava. PHARE also provided funding for the Regional Entrepreneurial Fund that offered venture capital to entrepreneurs with promising business plans.

At the beginning of 1995, Economic and Social Council of Ostrava-Karviná Agglomeration was transformed into the Union for the Development of Northern Moravia and Silesia that strived mainly for deeper co-ordination of its own activities with the Regional Entrepreneurial Fund and the Regional Development Agency. The Regional Development Agency became essentially the executive institution of the regional developmental projects, which further showed the non-sustainability of the absence of the regional self-government.

In connection with a rather retarded introduction of self-governing regions in 2001, the whole set of relevant documents, such as the Strategy of Regional Development or the Common Regional Operation Programme, has been hastily created, hence, the postponed and, to a certain extent, constrained possibility of wider accomplishment of modern themes of regional development in the Czech Republic.

The development of new activities in the region was based primarily on the initiative of local actors. The Union for the Development of Northern Moravia and Silesia and its ancestors contributed, among others, to the establishment of the first duty-free zone in the country, further to the creation of

regional banks, as well as to the modernization of the railway corridor that facilitates the connection with the other regions. The Regional Development Agency stimulated the establishment of technology parks, regional innovation centres, or business innovation centres. With the support of the Ministry of Industry and Trade several smaller industrial zones have been established.

This unfavourable situation was caused mainly by the less advantageous investment incentives in comparison with neighbouring Poland (and Katowice conurbation). Moreover, special economic zones were introduced even in 1998, as a consequence of growing regional disparities.

Not surprisingly, clusters became one of pivotal themes of transformation in the region. Their characteristics are in compliance with the relational nature of traditional industries in the region, and since machinery was traditionally one of the supportive pillars for regional industry, it is far from surprising that the machinery cluster was established as the first one in the whole country. This took place already in 2003 (see also [32]).

The regional aspect is extremely important because it creates the relation between the region and the cluster. If there is a prosperous cluster in the region, it brings productivity and innovation capacity to the whole region. The regional aspect plays an important role for the cluster as individual cluster members can benefit from comparative advantages of the region.

The sector structure of the Moravian-Silesian region is characterized by a large proportion of engineering, which is considered as a supporting sector of the region. In the region, there is a base for many industrial companies that have an impact on the performance of the whole region. Members of the Czech Machinery Cluster dedicate their efforts to improving not only the engineering field, but they also pay attention to new fields employing a large number of workers in the region.

The CMC connects large companies with their suppliers, service and logistics companies, and specialized institutions in science and research, marketing, human resources development, and tertiary education. The cluster helps engineering companies to succeed in the global economy and enables companies to invest in modern technology, machinery, and equipment. Into the spillover effects, which increase the wealth of the whole region, is placed the principle of the entrepreneurial university, which is, nowadays, a rather resonating notion.

4. Materials and Methods

In practice, there are many methods and techniques that are used to collect different data, information, and knowledge for further research and analysis, e.g., surveys, input-output, production function, and econometric models [33]. For the purpose of our research, the questionnaire survey method focusing on the level of relations between the entities associated in the Czech Machinery Cluster was selected. In accordance with the reasons presented by Scaringella and Chanaron [16], this form of research seemed to be the most appropriate and the most affordable way for our analysis. Moreover, the questionnaire survey proved to be a practical and cost-effective method.

The survey with the whole basic set was carried out during the first three months of 2017 with 51 organizations associating in the Czech Machinery Cluster with its seat and competence in the Moravian-Silesian Region, the Czech Republic. At the beginning, the so-called piloting phase was executed. The purpose of the pilot test was to determine if the questions in the questionnaire were understandable and clear. After the piloting stage, the research, itself, could be carried out.

The Czech Machinery Cluster is a non-profit organization that associates engineering and other related industries. The cluster brings together engineering companies and related or performing engineering companies, linking the large companies with their suppliers, services, and logistics organizations, and the science and research institutions, marketing, and tertiary education. The role of the cluster is to support the creation of a prestigious and modern engineering base prepared from the point of view of human resources, new technologies, innovations in supplies for energy, metallurgy, the transport industry, and chemistry and ecology.

The core mission of the Czech Machinery Cluster is to raise the field of engineering in the spheres of innovation, science, research, and human resource development, including education. The CMC

also seeks to provide industry expertise, and create and optimize long-term, functional, and dedicated supply chains. This institution strives to succeed in engineering companies in a global competitive environment, allowing investment in modern technology, machinery, and equipment.

At the time, when the cluster was created, machinery suffered from a certain isolationism and that is why the establishment of the cluster should be perceived as a response that finally enhanced the economic sustainability of the whole region.

For research purposes, the above organizations were designated as the core set. The aim of the questionnaire was to obtain the basic information about the mutual relations, attitudes and interests of entities from the Czech Machinery Cluster. The questions were purposely focused on the area of the cooperation with educational institutions.

The sample is relatively small because of the number of entities involved in the Czech Machinery Cluster, therefore, we focused on the qualitative analysis of relational assets rather than the quantitative analysis based on statistical models. The number of questions was 14. Seven of them were formulated as open-ended questions. In that way, we gathered a great deal of specific and more detailed information because the respondents could write down their own opinion on the particular problems. However, the processing of these type of answers is usually very difficult and time consuming. The next half of questions were closed-ended ones with several possible variants of answers. The rate of return of the questionnaires reached 49%, which can be considered satisfactory.

5. Results

In terms of organizational structure, organizations providing services are mainly involved in the Czech Machinery Cluster. Their share reaches approximately 31%. In particular, these are the organizations providing services in the field of brokering, purchasing, interpreting, and similar, as well as processing organizations form a share of 23%. The suppliers of raw materials and energy partake in 14%, comparable to manufacturers of machines and equipment, at 13% of the cluster participation. The smallest share is made by educational organizations, i.e., 10%, and research, 9%.

In term of legal regulation, 49% of the members in the cluster are organizations with a legal form of a limited liability company, 33% are joint-stock companies, 12% have a different form, and 6% are interest-forming associations.

Not surprisingly, the high importance has the sector focus of selected members within the value chain. With 25% of the CMC members being organizations providing service functions, with a high share of steel, metal, metallurgy, and energy producing companies, they altogether form 56%, then 8% represent machinery and equipment companies, the high-tech industries represent 10%, and hydraulic companies, 1%.

As for the taxonomy of enterprises, according to Eurostat, 54% belong to small- and medium-sized enterprises, 36% to medium-sized enterprises, and the rest belong to the category of large enterprises. Others have analysed the typology of enterprises according to Act No. 47/2002 Coll. [34], the support of small and medium-sized enterprises in the current version.

Based on the taxonomy and monitoring, it is possible to state that the Czech Machinery Cluster is made up of small- and medium-sized companies. The greatest competitive advantage of these companies, not only in the Moravian-Silesian region but throughout the Czech Republic, is the quality of their products and services.

The spillover effects are such effects that increase the wealth of the entire region. Except the knowledge transfers and the key resources, they also include innovation cooperation and the business university principle. The CMC members are delivering their energy, nuclear, chemical, petrochemical, metallurgical, and ecological engineering industries. Their focus is on exporting their products and developing their activities among priority territories, such as India, Turkey, and Russia, where these products are of great interest.

According to Pavla Břusková, the president of the National Cluster Association in the Czech Republic [35] (p. 2), the Moravian-Silesian region is “the first region in the Czech Republic where

in 2002, at the initiative of CzechInvest, the concept of clusters was tested as a solution to complex problems related, e.g., to the unemployment or the impact of industrial restructuring and orientation enterprises in a market economy". As it turned out, clusters are important devices for the economic sustainability of the Moravian-Silesian region.

Among the functions that support the creation of the entrepreneurial university concept include the extension of the cooperation between member companies with Czech, as well as foreign technical universities, scientific and research organizations, and also the state administration bodies. The main objective of CMC is to achieve increased competitiveness of members in domestic and foreign markets.

Of the selected respondents, it was found that 78% of them cooperate with the research and educational institutions. In terms of time horizon, this cooperation was in most cases longer than five years, i.e., in 90% of cases; a period longer than 10 years was found in 33% of respondents. Twenty-two percent of respondents, who have not yet cooperated with the research or educational institutions, have been interviewed the selected delegate and it was found out that there are preparations for this cooperation. For four companies, there are no plans of potential cooperation organizations in the short term.

The evaluation of the cooperation with educational institutions is classified positively, 54% of respondents evaluate the cooperation with educational institutions as excellent and 43% evaluate the cooperation as good. Only 3% of respondents evaluate the cooperation with educational institutions as sufficient. Based on the survey, it can be said that the cooperation with the educational and research institutions is positively assessed and it is beneficial to the parties involved. More detailed results of the question focused on the benefit of being a member of the Czech Machinery Cluster can be seen in Figure 2.

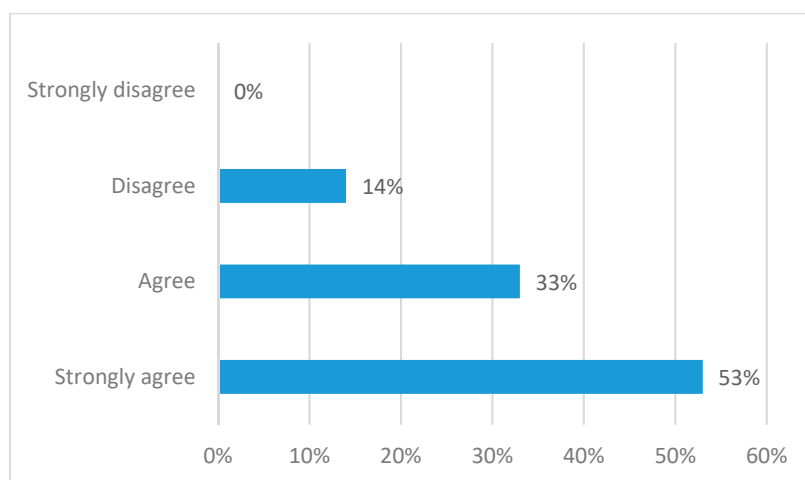


Figure 2. Evaluation of the question: Is the co-operation of entities present in the Czech machinery cluster beneficial to the parties involved?

Some impulses for cooperation are in most cases initiated by private parties, i.e., business organizations, from a bottom-up approach in order to increase efficiency of operation.

The cooperation is mainly in the areas of the training projects in 43% of cases, the research projects in 29%, the technical projects in 23% and in 7% the commercial projects. There is also some kind of crossing of the different project types.

The research has shown that the interconnections between businesses and educational institutions are particularly relevant to the educational projects, including the internships, professional practices, business excursions, and the involvement in the research in the context of the final work and improving the quality of teaching. To the second most frequent type belong the research projects, which also include projects of an innovative nature. This group represents a 29% share. These include

science, research, and development activities aimed at discovering new methods or directly producing new progressive products, innovation and grant programs, and the research and promotion of new progressive technologies. The cooperation with universities in this type of project leads to a number of indispensable functions, because in many cases the initial ideas of innovation come from the university side.

The engineering projects with a 23% share are related to the company's activities, especially from a technical point of view and to related project activities. Commercial projects had the lowest representation, which has a positive impact on both educational and research institutions, business, and the state administration.

Knowledge, innovation, and education are the key to long-term growth. Putting greater emphasis on the innovative approach based on the private-public partnerships contributes to raising the level of innovation that drives the performance of the whole system and the national economy. There are many benefits that cluster membership provides for businesses, universities, and regional governments.

The cluster membership offers companies a large number of concrete benefits. The cluster provides businesses with economies of scale and cost reductions; reduces constraints on smaller companies and increases the specialization; increases the local competition and rivalry and, thus, the global competitive advantage; increases the speed of information and technology transfer; increases the power and voice of smaller companies; and it encourages governments to invest in specialized infrastructure and enables effective interconnection and partnership.

The benefits of a cluster for universities are seen in the possibilities of improving knowledge and understanding of business processes and needs. The graduates of universities are thus better prepared for industry, and study plans are better adapted to students. Connecting the university with the business community enables a better focus on research and development activities.

The increasing image of the cluster attracts foreign direct investment that can fill in the capacities gap and deepen or expand the existing cluster. The regional and local programs, among others, provide appropriate framework policies and further develop policy tools for education, public procurement and competitions, and provide incentives for the corporate networks to organize themselves at the regional level.

The most common reason that encourages respondents to work with educational facilities is the motivation to acquire some professional employees. Other themes were the access to new technologies, the competitiveness, the financial motive, or some kind of prestige.

The cluster members evaluated their involvement in this organization as beneficial. The specific economic benefits of cluster membership include, first of all, financial benefits such as: the drawing of subsidies for education and employees' development, the preferential prices for services, and the joint purchases and subsidies from the European Structural Funds. Other benefits, notably of a non-financial kind, can be identified: the visibility of subjects on foreign markets, the promotion of the institution on the market, the close contact with other cluster subjects and, thus, the deepening of mutual cooperation on various projects, participation in professional seminars, courses, and fairs.

Due to the mutual cooperation of companies, schools, and public sector institutions, it is possible to gain access to public funding. In the period of redistribution of funds from the Structural Funds, it is this strategically-important connection, according to Stejskal [11]. It allows getting quality information about the conditions for drawing on EU funds. If the public administration institutions are also involved in the cooperation of the knowledge triangle, then some of the activities targeted by the entities fit into the PPP—Public-Private-Partnership—or the partnership of the public and private sectors [11].

The institutional cooperation in the knowledge triangle brings new innovations. It has a positive impact on the human capital and it is often a stimulus for the emergence of new businesses. Over time, the view of the economy has shifted from a previously dominant industrial society to a knowledge-based society. The basic building blocks of the knowledge society are growing relationships between universities, industry, and government. The purpose of connecting these three

entities is to create the potential for the innovation and the economic development. The factor that drives the knowledge economy forward is seen in the cooperation of these designated institutions. The cooperation between these three elements is monitored in the Triple Helix model, the inherent element of which is the factor of a business university. The knowledge society is advancing the symbiosis between science, economics, and politics, which is the business university. For the business university principle, it is important that a third, the most important, component of the university is involved in the effective cooperation of the companies with the state administration. On the basis of the results obtained, it is possible to state that the respondents are actively involved into the cooperation with school facilities. It can be said that the cooperation of respondents with the higher and secondary schools, as well as with the state administration bodies, is at a high level.

6. Discussion

Previous surveys in other regions show that clustering has positive influences on firms' growth as knowledge accumulated by one firm would help the technology evolve in other firms [36]. Regionally-specialised industries would benefit from the within-cluster transmission of knowledge and, therefore, should grow faster on the whole of being together [37].

In November 1999, a countrywide study on U.K. business clusters was launched by the Department of Trade and Industry (DTI) and the first assessment was completed in 2001 [38]. The results of the study showed the strategic importance of clusters in the British economy.

As it turned out from our survey, the unfavourable situation in machinery of the Moravian-Silesian region in the post-transformation period became an underlying cause of the creation of the Czech machinery cluster. At the time the cluster was formed, there was very limited research and development support, and virtually no stimuli for any innovations in the region. Thus, the cluster served as a formalization of the networking among relevant regional actors involved in the machinery.

Newly-created clusters undoubtedly enhanced the vivification of the traditional regional industrial sector. In the framework of the cluster, it was proven, that 76% of respondents actively collaborated with educational institutions in the region. Moreover, on the basis of their experience, they want to prolong and widen that co-operation.

The survey has shown that 52% of respondents assesses the aforementioned co-operation as very good, a further 43% as good, and the remaining 5% as sufficient. It is worth noticing that no one evaluated it as bad. Subsequently, hypothesis formulated at the beginning of the article cannot be eliminated.

Further on, it has been found, that the first impulse to the co-operation among the entities participating in the triple helix is based on enterprise initiatives. This fact is not so surprising since it corresponds to companies' urge to live.

The membership in the cluster brings different advantages and benefits to firms, universities, and public administration.

As for enterprises, the membership in the cluster stimulates economies of scale, as well as scope, lowering the costs, especially transaction ones. It also promotes co-operation among firms, the speed of the transfer of information, and technologies. It turned out that collaboration of enterprises and schools is considered as one of the deepest benefits of the membership within the cluster. Enterprises are able to attract and employ talented students and gain better access to technologies, on the one hand, however, benefits are tangible also from the perspective of universities, on the other.

As for educational structures, there are further benefits, such as the materialization of research and development activities and better perception of the needs of the practical sphere. Subsequently, university graduates are better equipped for the needs of practice. Moreover, practically-orientated curricula can enhance further attraction of students to educational institutions. Thus, the answer to the research question posed at the beginning is clear: the role of collaboration among firms and educational institutions in drawing on the sustainability of Moravian-Silesian enterprises during the post-transformation era is a distinct one.

These results are largely in consonance with previously-published studies that stress the positive feedback of clustering [36–42]. Agglomeration or external economies promote the growth of incumbent firms and attract the entry of new firms. This growth and entry increases the intensity of agglomeration and so promotes further growth and entry, which begins to accelerate once a cluster has reached a critical mass. As indicated, the role of public administration is somehow subdued in comparison with enterprises and universities. Nonetheless, the distinct benefit lies in the improvement of the image of the region of traditional industry. Actors involved within the cluster positively influence the whole region they are operating in.

It is worth noticing that 63% of entities present in the analysed machinery cluster can see a distinct growth of their competitiveness and 24% of them see a fine rise in their competitiveness. In other words, clusters fortify the conditions for sustainable economic development of the majority of actors participating in the cluster.

7. Conclusions

Our questionnaire survey was focused on the Czech Machinery Cluster located in the Moravian-Silesian region in the Czech Republic. Although it was carried out under the specific conditions of the traditionally industrial region significantly influenced by severe economic transformation from a centrally-planned economy into a market economy, we can conclude that the results of our survey comply with the findings from other countries: clusters play an important role in regional sustainable development. The cluster provides considerable advantages to enterprises, e.g., sharing knowledge, information and technologies, lower costs through proximity of entities and economies of scale/scope, fostering innovation, higher power and importance supporting larger investments to infrastructure by government, etc. Our research question was: Is the co-operation of entities present in the Czech machinery cluster beneficial to the parties involved? Based on the results of our survey, we can conclude that 86% of respondents of our questionnaire survey consider the co-operation of entities as beneficial. On the other hand, mere 14% of respondents do not agree the co-operation is beneficial to the parties involved.

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References

1. Malý, J. Od Lisabonské strategie ke strategii Evropa 2020: Podobnosti a rozdíly, očekávání a skutečnost. In *Vyhodnocení Lisabonské Strategie: Vliv na Konkurenceschopnost EU a Členských Států; Vzdělávací Středisko na Podporu Demokracie*: Prague, Czech Republic, 2011; pp. 13–40. ISBN 9788090428164.
2. Romer, P.M. Increasing returns and long run growth. *J. Political Econ.* **1986**, *94*, 63–69. [CrossRef]
3. Kislíngrová, E. *Nová Ekonomika: Nové Příležitosti?* C.H. Beck: Prague, Czech Republic, 2011; ISBN 9788074004032.
4. Skokan, K. The Role of Clusters in the Regional Policy of the Czech Republic. In *Proceedings of the 2nd Central European Conference in Regional Science*; Technical University of Košice: Košice, Slovakia, 2006; ISBN 9788080739577.
5. World Economic Forum. Available online: http://www3.weforum.org/docs/WEF_GCR_Report_2011-12.pdf (accessed on 12 December 2017).
6. Etzkowitz, H.; Leydesdorff, L. The triple helix-university-industry-government relations: A laboratory for knowledge-based economic development. *EASST Rev.* **1995**, *14*, 14–19. [CrossRef]

7. Etzkowitz, H.; Leydesdorff, L. A Triple Helix of University-Industry-Government Relations. *Ind. Higher Educ.* **1998**, *12*, 197–201. [CrossRef]
8. Etzkowitz, H.; Leydesdorff, L. The dynamics of innovation: From National Systems and “Mode 2” to a Triple Helix of university-industry-government relations. *Res. Policy* **2000**, *29*, 109–123. [CrossRef]
9. Etzkowitz, H. *The Triple Helix of University-Industry-Government Implications for Policy and Evaluation*; Working Paper; Swedish Institute for Studies in Education and Research: Stockholm, Sweden, 2002.
10. The Triple Helix Concept. Available online: http://triplehelix.stanford.edu/3helix_concept (accessed on 12 December 2017).
11. Stejskal, J. *Průmyslové Klastry a Jejich Vznik v Regionech*; Linde: Prague, Czech Republic, 2011; ISBN 9788072018406.
12. Scaringella, L.; Radziwon, A. Innovation, entrepreneurial knowledge, and business ecosystems: Old wine in new bottles? *Technol. Forecast. Soc. Chang.* **2017**. [CrossRef]
13. Moulart, F.; Sekia, F. Territorial innovation models: A critical survey. *Reg. Stud.* **2003**, *37*, 289–302. [CrossRef]
14. Bell, S.J.; Tracey, P.; Heide, J.B. The organization of regional clusters. *Acad. Manag. Rev.* **2009**, *34*, 623–642. [CrossRef]
15. Crescenzi, R.; Rodríguez-Pose, A. An “integrated” framework for the comparative analysis of the territorial innovation dynamics of developer and emerging countries. *J. Econ. Surv.* **2012**, *26*, 517–533. [CrossRef]
16. Scaringella, L.; Chanaron, J. Technological Forecasting & Social Change Grenoble—GIANT Territorial Innovation Models: Are investments in research infrastructures worthwhile? *Technol. Forecast. Soc. Chang.* **2016**, *112*, 92–101.
17. Belussi, F.; Caldari, K. At the origin of the industrial district: Alfred Marshall and the Cambridge school. *Camb. J. Econ.* **2009**, *33*, 335–355. [CrossRef]
18. Marshall, A. *Principles of Economics*, 8th ed.; Macmillan: London, UK, 1920.
19. Marshall, A. *Industry and Trade*, 3rd ed.; Macmillan: London, UK, 1927.
20. Porter, M.E. *The Competitive Advantage of Nations*; The Free Press: New York, NY, USA, 1990; ISBN 0029253616.
21. Porter, M.E. *On Competition*; Harvard Business School Press: Boston, MA, USA, 1998; ISBN 9780875847955.
22. European Commission. Community Framework for State Aid for Research and Development and Innovation. In Official Journal of the European Union. Available online: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2006:323:0001:0026:en:PDF> (accessed on 12 December 2017).
23. Enache, E.; Vechiu, C.; Morozan, C. The Cluster Association: A Form of Business Development. Available online: <http://store.ectap.ro/articole/393.pdf> (accessed on 30 November 2017).
24. Malmberg, A.; Power, D. A severe case of conceptual headache. In *Clusters and Regional Development: Critical Reflections and Explorations*; Asheim, B., Cooke, P., Martin, R., Eds.; Routledge: New York, NY, USA, 2010; ISBN 9780415578622.
25. Skokan, K. *Konkurenceschopnost, Inovace a Klastry v Regionálním Rozvoji*; Repronis: Ostrava, Czech Republic, 2004; ISBN 80-7329-059-6.
26. Pavelkova, D. *Klastry a Jejich Vliv na Výkonnost Firem*; Grada Publishing: Prague, Czech Republic, 2009; ISBN 9788024726892.
27. Vysoká Škola Báňská—Technická Univerzita Ostrava, Ekonomická Fakulta. Ekonomický a Sociální Význam Průmyslu pro Moravskoslezský Kraj—ve Faktech, Datech a Skutečnostech. Available online: http://www.socialnidialog.cz/images/stories/Vyznam_prumyslu_pro_MSK_final.pdf (accessed on 14 December 2017).
28. Sölvell, Ö.; Lindqvist, G.; Ketels, C. *The Cluster Initiative Greenbook*; Ivory Tower: Stockholm, Sweden, 2003; ISBN 9197478318.
29. Steer, A.; Wade-Gery, W. Sustainable development: Theory and practice for a sustainable future. *Sustain. Dev.* **1993**, *1*, 23–35. [CrossRef]
30. World Commission on Environment and Development. *Our Common Future*; Oxford University Press: New York, NY, USA, 1987.
31. Dvorakova, L.; Zborkova, J. Integration of Sustainable Development at Enterprise Level. *Procedia Eng.* **2014**, *69*, 686–695. [CrossRef]
32. Legerský, J. Národní Strojírenský Klast. Available online: http://www.rr-moravskoslezsko.cz/file/3819_1_1 (accessed on 14 December 2017).
33. Drucker, J.; Goldstein, H. Assessing the regional economic development impacts of universities: A review of current approaches. *Int. Reg. Sci. Rev.* **2007**, *30*, 20–46. [CrossRef]

34. Act No. 47/2002 Coll. Available online: <https://www.mpo.cz/assets/dokumenty/26693/31130/331757/priloha001.pdf> (accessed on 14 December 2017).
35. Národní Klastrová Asociace—National Cluster Association (NCA). NCA Udělila ZLATÝ Klastř 2013. Available online: <http://www.nca.cz/upload/zlaty-klastr.pdf> (accessed on 14 December 2017).
36. Baptista, R.; Swann, G.M.P. A comparison of clustering dynamics in the US and UK computer industries. *J. Evol. Econ.* **1999**, *9*, 373–399. [[CrossRef](#)]
37. Swann, G.M.P.; Prevezer, M.; Stout, D. (Eds.) *The Dynamics of Industrial Clustering: International Comparisons in Computing and Biotechnology*; Oxford University Press: Oxford, UK, 1998.
38. Kuah, A. Cluster Theory and Practice: Advantages for the Small Business Locating in a Vibrant Cluster. *J. Res. Mark. Entrep.* **2002**, *4*, 206–228. [[CrossRef](#)]
39. Pandit, N.; Cook, G. The benefits of industrial clustering: Insights from the British financial services industry at three locations. *J. Financ. Serv. Mark.* **2003**, *3*, 230–245. [[CrossRef](#)]
40. Dziwiński, P. Restructuring of small and medium-sized enterprises—The European perspective. In Proceedings of the 3rd International Conference on European Integration 2016, Ostrava, Czech Republic, 19–20 May 2016; Kovářová, E., Melecký, L., Staníčková, M., Eds.; VŠB—Technical University of Ostrava: Ostrava, Czech Republic, 2016; pp. 190–196.
41. Barcik, A. Mechanizm compliance: Pytanie o miejsce i zasadność w strategiach CSR współczesnych organizacji. In *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu (Research Papers of Wrocław University of Economics)*; Wydawnictwo Akademii Ekonomicznej im. Oskara Langego we Wrocławiu: Wrocław, Poland, 2016; Volume 419, pp. 9–20; ISBN 9788376955643.
42. Stverkova, H.; Humlova, V. Assessment of the competitiveness of SMEs through BEE model in the Moravian-Silesian region. In Proceedings of the 1st International Conference Contemporary Issues in Theory and Practice of Management 2016, Częstochowa, Poland, 21–22 April 2016; Okręglička, M., Gorzeń-Mitka, I., Lemańska-Majdzik, A., Sipa, M., Skibiński, A., Eds.; Wydawnictwo Wydziału Zarządzania Politechniki Częstochowskiej: Częstochowa, Poland, 2016; pp. 423–429.



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