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CLUSTERS AND THEIR ROLE IN THE NEW KNOWLEDGE ECONOMY

Annotation

Today the next development leads to building worldwide nets creating the product´s value. We can talk about the idea of clusters. Cluster is building the connections not only among the business subjects but also the other organizations and institutions. The main purpose of that is mutual effect. This article gives more details about the types, definitions and advantages of clusters. Building of clusters started in the Czech Republic in the Pilsen region as well and the feasibility study of the opportunity of clusters building was composed. The own methodology for formulating the feasibility study is described in this article as well.

1. INTRODUCTION

We start with a question. The answer for this question is very good introduction to clusters problems and understanding the huge connections.

Question: What have movies, broadcasting, ceramic tiles and surgical equipments and tools identical?

Answer: The main part of this world production is produced on relatively small area.

The movies are very often from Los Angeles (Hollywood). High-tech broadcasting comes from the locality of Kopenhagen. If you want to buy the set of ceramic tiles, this set will probably be from Sassuolo in Italy or Castellón in Spain. What about the surgical equipments and tools? Those are produced in Tuttlingen (Baden-Württemberg) and Sialkot (Pakistan).

We can call this phenomenon ***cluster***. Cluster is a regional concentration of companies, which part to similar and relative sectors. We can imagine the origin of clusters by following way:

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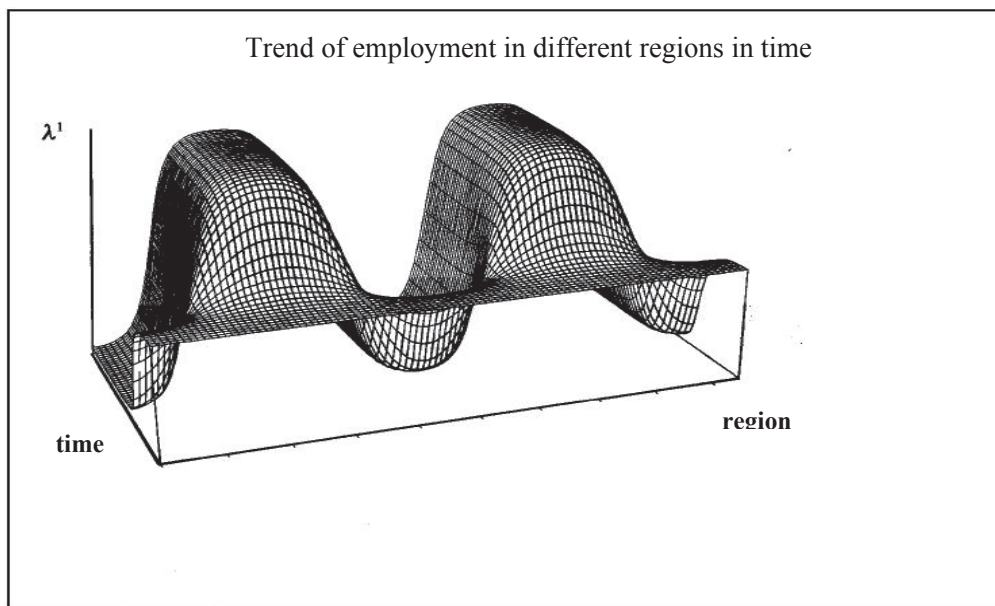
Fig.1. Ideal model of sector´s trend in the region [1]

This mathematical model with the graph shows us the typical idealized process view, which is visible almost in economies all around the world.

The company arises on the certain place, e. g. clothing production, and because the founder is businesslike and the situation on the market is advantageous the company starts to grow up fast. Individual managers are not satisfied with their role of manager by the time and on this base they establish their own company – in sector, which they know very well – in this case in clothing production. The other persons with the business feeling see in clothing production interesting customers and start to import and sell cloth, threads, buttons and many other items. Because the outlying producers are not able to react on the special wishes of local producers, they start to produce these products by themselves. Then we have new factories for buttons, weaving mill and other and other firms. Gradually those factories attract to the region the producers of textile colourings, weaving mills etc.

As the first producer had the big difficulties with finding of skilled workers, this situation is getting better. Now is possible to gain high-qualified engineers, technicians and workers in all possible relative sectors, which part to clothing production. Special schools are gradually founded. Skilled workers are grown up and trained in those schools. Often the laboratory is also founded, where the upcoming goods is tested with the material experiments and the **science and research** are developed.

Sometimes companies can establish the association to represent their interests. This association can offer service in many cases e.g. further education or market analysing. Regional government starts to understand the sector like the important one for the region and starts to support it.

Differently speaking: The cluster is following the historical development of market [1].

Nowadays clusters are becoming the world trend of economical development of the regions. The phenomenon cluster is often mentioned with national and regional systems of innovations,

knowledge economy and new economy. The main argument is the fact that the processes, which drive new and knowledge economy – technical know-how, innovations and information – disappear and develop by the best way if this development is concentrated or located on the certain place [2].

Clusters are common as in the United States and Canada as in Europe – mostly in the North Italy, Great Britain, Germany, Denmark, Finland, Sweden and the other European countries as well. The clusters problems are also the task for the research teams in OECD.

2. DEFINITION AND TYPES OF CLUSTER

The importance of clusters in industrial environment is getting higher. The clusters are established with the objective to gain competition´s advantage. In general that is the form of organizational and economical activities based on target cooperation of companies.

2.1. Clusters definition

Cluster is concerning with the important changes in supply chains, which result from the fact that manufactures concentrate on their core business, outsource increasingly and pass cost and innovation pressure down the supply chain to their suppliers.

M. Porter defines clusters as:
„ Clusters are a geographically proximate group of interconnected companies and associated institutions in a particular field linked by commonalities and complementarities. Clusters encompass an array of linked industries and other entities important to competition . . .including governmental and other institutions – such as universities, standard setting agencies, think tanks, vocational training providers and trade associations.“ [7]
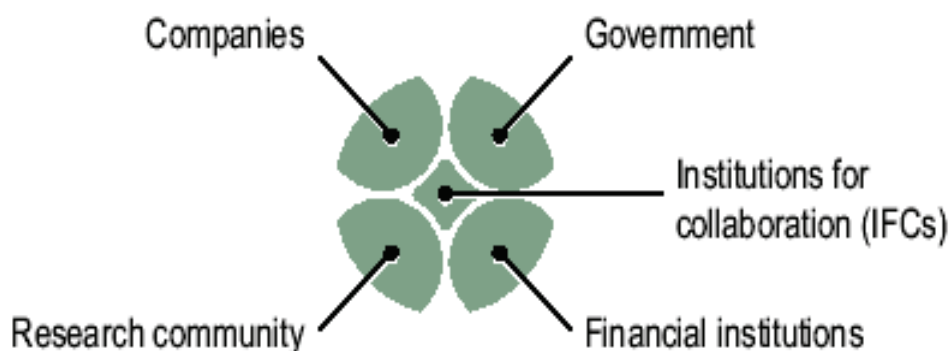

Fig.2. Five sets of actors composing a cluster [3]

The more simple definition says:
The cluster is (geographically proximate) group of interconnected sectors and their linkages strengthen and escalate their competition´s advantages.

The *competiton´s advantage* in this definition is the company´s ability to work on the global markets, *sector* is defined as the specific kind of goods (e.g. personal computer and not

information techniques, or enzymes and not biotechnology etc.) and service (e.g. financial aid) and *geographically proximate group* means accessible distance, area where is possible to travel in one working day.

Today clusters are becoming an important element of every regional economy all over the world. New cluster building initiatives - for example in Europe, America and Asia - are emerging with the aim of supporting traditional branches in the region. The concept of cluster building initiatives is understood as a set of activities leading both to the establishment of new clusters and support of existing of clusters. A cluster is a grouping of enterprises and institutions of the same and related branch. Important players in these initiatives are, in the first place enterprises which form the core of the cluster. No less important are the supporting organizations which contribute to the success of the cluster in the region and provide support for it. The state and the regional governments play the role of initiator and supporter of cluster initiatives in this process.

2. 2. Clusters types

We can recognize three basic types of clusters:

Horizontal clusters, which contain many producers, mostly from similar branch (e.g. leather or textile manufacturing) and their reasons for clusters building are as follows:

- better prices of buying materials,

- better selling conditions,

- collective presentation on fairs and abroad etc.
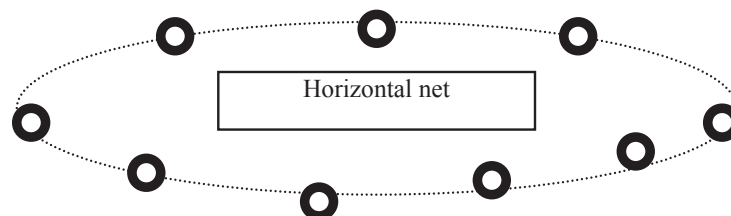
Vertical clusters, which are founded by connecting of many suppliers and institutions in the whole production with the certain bigger company to the strategic chain. The goal of this connection is to inform the suppliers about the strategic aims of producers in time. Then the suppliers would have enough time for research and development of new parts for innovative final products. The next possibility is in linkage of companies from the same branch but with different professions – e.g. strong building company will cooperate with smaller companies, which needs for its orders only sometimes like e.g. tinsmiths, roofers, plumbers, heating engineers, decorators but also planners, static engineers, energetic engineers, fire technicians, ecologists, lawyers, etc. The building company is able to represent itself like general supplier and the following effect is in the size of orders and in prices.
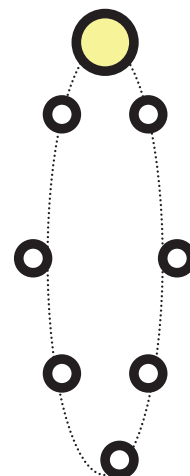
Lateral clusters are mostly in car industry. The base of lateral net is existence of many companies which complement, rebuild and tune the classical car models. Today the most good car factories offer the wide range of many modifications, which the buyer can order in spite of exist many companies which offer the buyers the special parts and components for standard cars, e. g. spoilers, tuning of fenders, engines and special lamps.


Big company, e.g. car factory
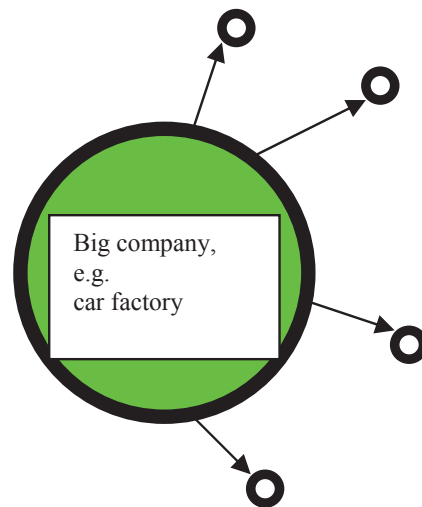
3. CLUSTERS ADVANTAGES

The market is impacted by cluster in three ways. The first one is higher **efficiency**. Transactions could be done without high logistical and transport costs. Communicational channels are getting shorter and market participants could have faster reactions. Cluster also produces resources (products, service), which are available for regional companies for lower price. In case of company is from another region it has to pay for access to service. Example could be **skilled powers** in region. It is possible to rent those powers simply and share them from one company to another. It also works with many other inputs: human resources, market knowledge and technologies.

Cluster creates also the **opportunities for innovations**. It is faster and less risk adapting of innovations and better and faster finding of innovation opportunities. If many companies and participants are concentrated on one place in market, the market gap is filled in faster and easier.

The advantage is the **access to capital** as well. Financial institutions which corporate with clusters have special skills – from wine – to car manufacturing – and could faster and better decide about risk capital.

Clusters could enable to **found new companies** faster. It is easier to enter the market. Companies get easier the capital and choose the important suppliers and customers.

In general we can define **the following advantages** for companies:

Advantages for production process
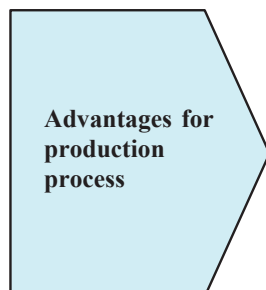
- synergic effect following from sharing the activities and resources of cluster,

- improvement of accessibility and using production resources and production savings,

- possibility of clearing the company form unnecessary activities (specialization support),

Advantages for information and knowledge
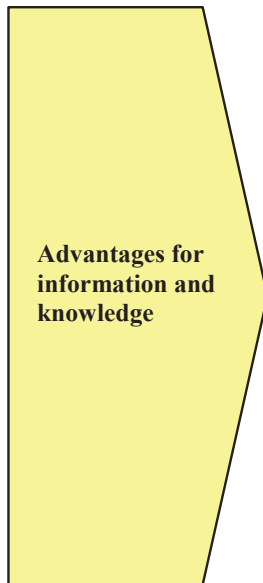
- sharing, transferring and exchanging information, knowledge and know-how of participants,

- better access to information,

- using compatible information channels and communication technologies,

- building constant information linkages among companies,

- extended communication with the other institutions,

- cooperation with universities (science and research, audits, market research, thesis, etc.),

- using advisory, consultantship and educational service of cluster,

Financial advantages

- better access to loans,

- possibility to receive subsidies and aids from the Czech Republic and European Union,

- higher potential for gaining foreign investments,

- cost organization and better possibilities in sectors:
  - research and development
  - advertisement, promo materials, www promotion
  - fairs and exhibitions
  - consultantship
  - employee´s education
  - law service
  - internet solution
  - export
  - logistic center – warehouses
  - distribution

Strategic advantages

- cooperation of small and midsized companies against strong companies,

- better position for purchase and sale,

- opportunities for expansion to new markets,

- fast reaction to market requirement,

- bigger orders gaining, which are unthinkable for separate companies,

- higher technology transfer,

- faster and less risk innovation adapting,

- managing development of business subjects in region (lobby possibility),

- cooperation with the other strong companies or clusters (home and foreign cooperation as well),

- own websites, e-business possibilities,

- cluster support the region development → the secondary advantages are followed:

  - total stabilization of small and midsized companies

  - sector on market,

  - better resistance and prospects in globalization,

  - infrastructure, education.

4. POLITICAL ADVANCEMENT WITH CLUSTERS USING

The new theory of creation of regional policy is developed, which needs cooperation among market, state and evolutionary progress. The management of social evolutionary process is essential and on creating of operating mechanism more state levels must participate. Necessary and important partners from power and expert sphere must cooperate.

Today the main task has to be active building of competition´s advantages and systematic building of skills for competition on global markets. Selective integration with the world requires ability and economical possibility to orientate on the world market as well. The small and midsized company is able to this orientation only exceptionally. The solution is cluster.

The idea of deriving the local and regional development from sector´s structures centred in the **"growing poles"** in the geographical area is implemented in regional theory for a long time. (Perroux, Hirschman) [4].

The current trend in the regional development planning especially with using of innovations is policy which uses **industrial clusters**. For problems interested in the regional development based on using clusters we use the idea **"clusters policy".**

The basic step to pursue of clusters policy is cooperation of business sphere and public area. Experience shows that the public area has duties and rights to development of the district and companies and entrepreneurs are still the more important participants of the public life. They influence the public life directly like employers and indirectly like participants of the district development. For companies and entrepreneurs follow advantages from the district development as well, e. g. if the district is attractive for citizens enough skilled labours are available. Where the business prospers the atmosphere for next companies and entrepreneurs is founded. It brings orders or lower costs because suppliers are not so far away etc. We can say that the public area meets its duty and companies and entrepreneurs can this way directly influence the life of district for their success. It is the reciprocal advantageous phenomenon [5].

The argument for those changes is not the fact, the governments could create clusters but they could help to create **business, innovative and institutional environment,** which supports clusters success and allows clusters forming like the important part of economic development.

5. CLUSTERS IDENTIFICATION IN THE PILSEN REGION

Clusters represent the world trend of enterprise development, which considerably strengthens the competitiveness of all cluster members and the region as a whole. Building clusters in the Czech Republic is therefore supported by many EU supporting programs (more information can be found on the Website of CzechInvest - www.klastr.cz).

The University of West Bohemia in Pilsen has been involved in the cluster issue almost two years. The impulse to build clusters in the Pilsen region was the project of creating the economic portal www.regioport.com, dating back to the year 2000. The aim of this portal was to create a joint Czech - German commercial, information and educational platform intended for small and medium-sized enterprises.

In addition to providing structured information, the portal has at its disposal a number of internet platforms which make it possible for the entrepreneurs to carry out business transactions, free of charge, electronically on the internet (corporation, enterprise database, vacancies).

The portal showed the imbalance between the Czech and German side. On the German side small and medium-sized enterprises have already been grouped in various economically stabilized branch clusters helping Bavaria in her effort to gain commercial exclusiveness. On the Czech side however there was no awaraness of the importance of cluster building. Many enterprises did not even realize the potential danger of this imbalance.

The project of building clusters started in September 2003, with a feasibility study of building cluster in the Pilsen region. This project was financed by the Regional office of the Pilsen region. The objectives of this project were as follows:

- To explore the economy in the Pilsen region from the point of view of cluster building.
- To identify the branches in the region, which are suitable for building regional industrial clusters.
- To identify the branches which from the point of view of the strategic development of the region could bring innovation and economic prosperity to the region.
- To prepare materials for a more detailed feasibility study which would make it easier to gain support from EU funds.

Special methodology for working out the feasibility study was created at the University of West Bohemia in Pilsen. This methodology was used by CzechInvest (an organization for supporting business and investment in the Czech Republic) for designing a national methodology of cluster searching.

Specification of branches appropriate for cluster building

According to M. Porter the main branches must be **internationally competitive**. To be so, they must meet the following criteria:

- ability to act at international markets and/or potential to do so in the future,
- innovative ability,
- potential for worldwide growth,
- regional importance,
- suitable production factors (raw materials, qualified employees, infrastructure, research and know-how).

The new methodology designed at the University of West Bohemia for the feasibility study is based on these and some other criteria. Its purpose is to verify that a given branch fulfils the criteria presented above.

5. 1 Methodology and analysis for the Pilsen region

The first step in the region analysis was the division of the regional economy into branches using the Industrial Classification of Economic Activities (ICEA).

The methodology has two phases:

1st phase - **SECTION analysis of ICEA** – i.e. identification of the main branches with a strong cluster building potential,

2nd phase - **SUBSECTION analysis of ICEA** – i.e. selection of branches.

The same methodology was used in both phases (extent of the analysis extent depended on the amount of acquired data). The data were taken from the "Technical innovation in the Czech Republic in the years 1999-2001" published by the Czech Statistical Office.

The results of the first phase of the analysis of the Pilsen region showed that the "manufacturing" industry plays a dominant role in this region. As this branch is also very innovative, it has the greatest potential to gain support from EU funds. For these reasons a detailed analysis will be carried out only for the "Manufacturing" industry.

5. 1. 1 Coefficient of localization (LQ)

a) Calculation of coefficient of localization

The basis of the above presented methodology is the coefficient of localization (LQ) described by M. Porter, who defined it for employment. In essence, it expresses employment concentration in the region according to branches. LQ compares the share of a specific branch **i** in local regional employment with the share of the national employment in the same branch.

Using this coefficient, the methodology is developed further.

The analysis carried out for the Pilsen region showed that the assessment of a branch according to employment does not necessarily express fully the importance of the branch.

On the basis of the analysis of data available for the calculation of LQ this coefficient was used also for **added value** and **income**.

Porter's coefficient of localization was generalized to give the following formula:

$$LQ_{x_i} = \frac{x_i \left/ \sum_{i=1}^{j} x_i \right.}{X_i \left/ \sum_{i=1}^{j} X_i \right.}$$

(1)

LQx_i... coefficient of localization according to index **x** in the branch *i* in the region,
x_i …number of units of the monitored index **x** in branch *i* in the region,
X_i ... number of units of the monitored index **x** in branch *i* in the country,
j …number of branches in the country.

Interpretation: The coefficient of localization shows the number of per cent by which the chosen index **x** is more or less represented in the region in comparison with its national representation.

The coefficient can have the following values:
1 : index **x** has equal representation in the region and in the whole country,
>1 : index **x** has higher representation in the region than what is the country average,
<1 : index **x** has lower representation in the region than what is the country average.

For the selection of branches suitable for cluster building the values are expected to be higher than **1**. For the evaluation of the importance of a branch it is desirable to assess the development of the coefficient in a period of time. In the methodology the coefficients of localization for the individual indexes are denoted: **LQe (for employment), LQav (for added value), LQi (for income).**

b) Results of Coefficient of Localization in the Pilsen region

The coefficient of localization was calculated both for the main subsections of the "manufacturing" industry and for the first stage of the digital code (section) of ICEA. On this basis we are able to analyse, which subsection has the biggest share in the results of LQ according to the employment, added value and income of the selected subsection of the "manufacturing" industry. Results obtained for this industry are presented in figure 1.

In the analysis of the Pilsen region the following coefficients were used:
- Porter´s coefficient: **LQe** coefficient of localization **according to the employment**.
New coefficients:
- **LQav** coefficient of localization **according to added value**.
This coefficient expresses the percentage by which a given subsection of the "manufacturing" industry is able to produce more or less added value in the region in comparison with the country branch average. The results are also presented also in figure 1.
- **LQi** coefficient of localization **according to income.**
The coefficient of localization calculated from the income from the products and services represent the regional concentration of the income value in a given branch in the Pilsen region.

Again it expresses the percentage by which the incomes in the Pilsen region are higher or lower in comparison with the country branch average. The results are also presented in figure 1.

Tab.1. Coefficient of localization in the most important branches of the "manufacturing" industry in the Pilsen region

Coefficient of Localization		LQ		
D	**Manufacturing industry**	**LQ$_e$**	**LQ$_{av}$**	**LQ$_i$**
DA	Manufacture of food products and beverages, tobacco products	**0,93**	**1,70**	**1,29**
15	Manufacture of food products and beverages	0,93	1,70	1,29
DD	Woodworking, manufacture of wood products except furniture	**1,18**	**1,70**	**1,74**
20	Woodworking, manufacture of wood, cork, wicker-work and straw products except furniture	1,18	1,70	1,74
DH	Manufacture of rubber and plastic products	**1,36**	**1,33**	**1,42**
25	Manufacture of rubber and plastic products	1,36	1,33	1,42
DI	Manufacture of other nonmetallic mineral products	**1,18**	**1,22**	**1,50**
26	Manufacture of other nonmetallic mineral products	1,18	1,22	1,50
DJ	Manufacture of basic metals, metallurgical and metal-working products	**1,05**	**0,98**	**0,85**
28	Manufacture of fabricated metal products, except machinery and equipment	1,12	1,20	1,04
DK	Manufacture and repairs of machinery and equipment	**0,96**	**1,13**	**1,21**
29	Manufacture of machinery and equipment	0,96	1,13	1,21
DL	Manufacture and repairs of electrical and optical instruments and equipment	**1,65**	**1,49**	**2,04**
31	Manufacture of electrical machinery and apparatus	1,77	1,56	1,69
32	Manufacture of radio, television and communication equipment and apparatus	1,85	1,60	4,01
33	Manufacture of medical, precision and optical instruments, watches and clocks	1,23	1,32	1,08
DM	Manufacture of transport means and equipment	**0,69**	**0,43**	**0,37**
34	Manufacture of motor vehicles, trailers and semi-trailers	0,67	0,39	0,32
35	Manufacture of other transport means and equipment	0,70	0,63	0,93
DN	Manufacturing industry	**1,02**	**0,74**	**1,09**
36	Manufacture of furniture, manufacturing	1,02	0,74	1,09

- The analysis of **LQ$_e$** showed that the branch "Manufacture of electrical and optical instruments and equipment" had the best prospects in the "manufacturing" industry in the Pilsen region. In 2001 it employed in the Pilsen region 55 % more employees than was the national average; in 2000 this index reached as much as 82%.

- The analysis of **LQ$_{av}$** showed that the branch "Manufacture of food products and beverages, tobacco products", which produced 82% more added value in comparison with the national branch average had the best prospects. The same result was also achieved by the branch "Woodworking, manufacture of wood products except furniture".

- The results of **LQ$_i$** are similar to those for the added value. Among the branches with very good prospects in the Pilsen region was the branch with the best prospects was "Manufacture of food products and beverages, tobacco products"; the branch "Manufacture of electrical and optical instruments and equipment" although this coefficient has been slightly thinking since 1999, in 2001 it reached an income 90% higher than the national branch average in the Czech Republic.

5. 1. 2 Regional percentage of the branch (RPB)

a) Calculation of the regional percentage of the branch

The data source for the calculation of the regional percentage of the branch is the numerator of the general formula of the coefficient of localization multiplied by one hundred. The reason for supplementary was the need to define the importance of the branch in the region. Index was introduced because the analysis ascribed good prospects to branches with importance from the point of view of their representation in the region.

The regional percentage of the branch (RPBx$_i$) can be defined as:

$$RPB_{x_i} = x_i \bigg/ \sum_{i=1}^{j} x_i * 100 \; [\%]$$

(2)

This index can again be defined for the employment (RPBe), added value (RPBav) and income (RPBi).

b) Results of the regional percentage of the branch in the Pilsen region

- **RPBe – regional percentage of the branch according to the employment**

This index is calculated after the calculation of the coefficient of localization. It shows in percent the employment share of the individual subsections in the "manufacturing" industry.

From table 2 it follows that the branch "Manufacture of electrical and optical instruments and equipment" has a 20% share of the total employment in the "manufacturing" industry in the Pilsen region and thus plays a very important role.

The branch is "Manufacture of basic metals, metallurgical and metal-working products", which has an 18% share of the total employment in the "manufacturing" industry is also important.

- **RPBav – regional percentage of the branch according to added value**

Table 2 presents the regional percentage of the branch according to the added value produced in the "manufacturing" industry in the Pilsen region.

The share in per cent in the produced added value demonstrates the important position of the branch "Manufacture of electrical and optical instruments and equipment". This result is mainly due to the subsections "Manufacture of electrical machinery and apparatus" and "Manufacture of food products and beverages, tobacco products".

The subsection "Manufacture of tobacco products" has no representation in the Pilsen region.

- **RPBi – regional percentage of the branch according to income**

This index expresses the regional share of the individual branches in the total income in the "manufacturing" industry. The branch "Manufacture of electrical and optical instruments and equipment" has the largest share in the income in the "manufacturing" industry (21%), it is followed by the "Manufacture of food products and beverages, tobacco products" (18%) and "Manufacture of basic metals, metallurgical and metal-working products" (13.5%).

Tab.2. Share of the most important branches in the "manufacturing" industry in the Pilsen region (in per cent)

Regional percentage of the branch		RPB		
D	**Manufacturing industry**	**RPB_e**	**RPB_{av}**	**RPB_i**
DA	Manufacture of food products and beverages, tobacco products	**10,11**	**17,71**	**17,89**
15	Manufacture of food products and beverages	10,11	17,71	17,89
DB	Manufacture of textiles, textile and wearing apparel	**6,18**	**3,79**	**3,80**
DD	Woodworking, manufacture of wood products except furniture	**6,05**	**4,69**	**5,17**
20	Woodworking, manufacture of wood, cork, wicker-work and straw products except furniture	6,05	4,69	5,17
DH	Manufacture of rubber and plastic products	**5,72**	**6,72**	**6,75**
25	Manufacture of rubber and plastic products	5,72	6,72	6,75
DI	Manufacture of other nonmetallic mineral products	**7,55**	**10,88**	**9,08**
26	Manufacture of other nonmetallic mineral products	7,55	10,88	9,08
DJ	Manufacture of basic metals, metallurgical and metal-working products	**18,08**	**15,96**	**13,50**
27	Manufacture of basic metals	5,10	4,06	4,76
28	Manufacture of fabricated metal products, except machinery and equipment	12,98	11,90	8,74
DK	Manufacture and repairs of machinery and equipment	**11,14**	**11,81**	**9,63**
29	Manufacture and repairs of machinery and equipment	11,14	11,81	9,63
DL	Manufacture of electrical and optical instruments and equipment	**20,03**	**17,67**	**21,30**
31	Manufacture of electrical machinery and apparatus	12,94	10,74	9,64
DM	Manufacture of transport means and equipment	**5,24**	**5,00**	**5,42**
DN	Manufacturing industry	**5,95**	**2,85**	**3,80**
36	Manufacture of furniture, manufacturing industry	5,95	2,85	3,80

5. 1. 3 Coefficient of the regional importance of the branch in region (CRI) and the multicriterial coefficient of the regional importance of the branch (MCRI)

1) Calculation of the coefficient of regional importance of the branch in region (CRI) and the multicriterial coefficient of the regional importance of the branch (MCRI)

a) Coefficient of regional importance of the branch in region (CRI)

This index is arrived at the multiplication of the coefficient of localization and regional percentage.

$$CRI_{x_i} = LQ_{x_i} * RPB_{x_i} = \frac{x_i \Big/ \sum_{i=1}^{j} x_i}{X_i \Big/ \sum_{i=1}^{j} X_i} * x_i \Big/ \sum_{i=1}^{j} x_i * 100 \tag{3}$$

After the multiplication:

$$CRI_{x_i} = \frac{\left(x_i \Big/ \sum_{i=1}^{j} x_i \right)^2}{X_i \Big/ \sum_{i=1}^{j} X_i} * 100 \tag{4}$$

CRIxi   coefficient of the regional importance of branch in the region (index **x** , branch **i**),

Xi   number of units of the monitored index **x** in branch **i** in the region,

Xi   number of units of the monitored index **x** in branch **i** in the country,

this coefficient expresses the real importance of branch in the region.

It is calculated for employment, added value and income. It is possible to calculate the contribution of particular branches in relation to mentioned quantities.

b) Multicriterial coefficient of the regional importance of the branch (MCRI)

On the basis of calculated coefficients of the regional importance of the branch in the region according to employment, income and added value we can count the multicriterial coefficient of the regional importance of the branch (MCRI).

Multicriterial coefficient of the regional importance of the branch (MCRI) integrates collectively all the coefficient of regional importance (CRI) according to employment, added value and income and allows on the basis of one value to figure out the rank of the importance of branches in the region.

This index is defined to give the following formula:

$$MCRI_i = \frac{\left(CRI_{e_i} + CRI_{av_i} + CRI_{i_i}\right) * kv}{3}$$

(5)

MCRI   Coefficient of the real importance of branch *i* in the region,
CRIei   Coefficient of the regional importance of branch *i* for the employment,
CRIavi   Coefficient of the regional importance of branch *i* for added value,
CRIii   Coefficient of the regional importance of branch *i* for income,
kv   Stress of coefficient of the real regional importance.

Stress of coefficient of the real regional importance allows influence the total importance of the branch in the region on the basis of expert´s statement. We are able to expose some priorities in given branch, which the region has to support or vice-versa, which the region has to strangle (for example environmental drain). It is possible to take some preferences of district, government, ministries into account. If there is no expert team, significance = **1**.

2) Results of the coefficient of the regional importance of the branch in region (CRI) and the multicriterial coefficient of the regional importance of the branch (MCRI) in the Pilsen region

- <u>Coefficient of regional importance of the branch "manufacturing" industry in the Pilsen region according to employment (CRIe)</u>

On the basis of calculated data for employment we can realize the calculation of coefficient of regional importance according to employment. This coefficient is caused by multiplication of coefficient of localization according to employment (CLe) and regional percentage of the branch according to employment (RPBe).

- <u>Coefficient of regional importance of the branch "manufacturing" industry in the Pilsen region according to added value (CRIav)</u>

On the basis of calculated data for added value we can realize the calculation of coefficient of regional importance according to added value. This coefficient is caused by multiplication of coefficient of localization according to added value (CLav) and regional percentage of the branch according to added value (RPBav).

- <u>Coefficient of regional importance of the branch "manufacturing" industry in the Pilsen region according to income (CRIi)</u>

On the basis of calculated data for income we can realize the calculation of coefficient of the regional importance according to income. This coefficient is caused by multiplication of coefficient of localization according to income (CLi) and regional percentage of the branch according to income (RPBi).

- <u>Multicriterial coefficient of the the regional importance of the branch "manufacturing" industry in the Pilsen region (MCRI)</u>

On the basis of calculated data from employment, added value and income we are able to formulate total multicriterial regional importance of the branches. This coefficient is calculated according to formula mentioned above. Significance for the calculation = 1.

Values of the coefficient of regional importance according to employment (CRIe), according to added value (CRIav) and according to income (CRIi) are represented in table 3. Multicriteral coefficient of the regional importance of the branches in the Pilsen region is mentioned in the last column and is marked as **MCRI**. The branches are ranked according to feasibility for building clusters in the branch "manufacturing" industry in the Pilsen region.

Tab.3. Total importance of the branches in the "manufacturing" industry in the Pilsen region according to employment, added value and income

Rank	Manufacturing industry		CRIe	CRIav	CRIi	MCRI
1.	Manufacture of electrical and optical instruments and equipment	DL	33,0	26,4	43,1	**34,2**
2.	Manufacture of food products and beverages, tobacco products	DA	9,4	30,2	23,0	**20,8**
3.	Manufacture of basic metals, metallurgical and metal-working products	DJ	18,9	15,7	11,4	**15,4**
4.	Manufacture of other nonmetallic mineral products	DI	8,9	13,3	13,7	**12,0**
5.	Manufacture and repairs of machinery and equipment	DK	10,7	13,4	11,7	**11,9**
6.	Manufacture of rubber and plastic products	DH	7,6	9,0	9,6	**8,7**
7.	Woodworking, manufacture of wood products except furniture	DD	7,2	8,0	9,0	**8,0**
8.	Manufacturing industry	DN	6,1	2,1	4,1	**4,1**
9	Manufacture of textiles, textile and wearing apparel	DB	4,0	2,5	3,2	**3,2**
10.	Manufacture of transport means and equipment	DM	3,6	2,2	2,0	**2,6**
11.	Manufacture of pulp, paper and paper products, publishing and press	DE	1,5	0,6	0,9	**1,0**
12.	Manufacture of leather and leather products	DC	0,2	0,2	0,2	**0,2**
13.	Manufacture of chemicals and chemical products	DG	0,2	0,1	0,3	**0,2**
14.	Manufacture of coke, nuclear fuels, refined manufacturing of oil	DF	0,0	0,0	0,0	**0,0**

5. 2 Summary of the analysis

The Feasibility cluster study in the Pilsen region analyzes all economic branches in the region. The branch "manufacturing" industry is the best branch. It could ensure other

development of the Pilsen region with its innovative potential. From this reason the substantial analysis of the "manufacturing" industry was carried out and the outcomes were presented above.

Electrotechnics, electronics and machinery are resulted from the analysis as the suitable branches for the building of clusters. Branches from the field of electortechnics, electronics and machinery create about 50% of the employment in the Pilsen region.

From the foreign experience results that is possible to use synergie of these branches and to build the strong cluster in the Pilsen region with the objective of Mechatronics and gain the branch, which would be important from the innovative view for the whole region and would find the strong partners in the regions of Austria and Bavaria.

The first phase of the project showed dominant position of **"manufacturing" industry** in the region and that is why it was analysed more precisely. Results mainly corresponded with historic development of the region. At the top was the branch mechanical engineering, which was greatly represented by the company Škoda Plzeň in the past. Important part is also electronics and electrotechnics. Also plastic material production has a good position in the Pilsen region and is represented by companies producing materials for car industry. Other world-known branches of the Pilsen region are food industry because of the brewery Pilsner Urquell and also ceramics production (company Lasessberger).

After finding these particular conclusions a difficult phase followed and that was to suggest suitable clusters which would be worth putting them to more detailed analysis so-called field research which is based on interviews, focus groups and concrete knowledge of the environment including the social capital in region (level of trust and cooperation between the subjects, cooperative feedback...).

After many discussions with experts from the Pilsen district, businessmen, politicians and supportive organizations from region and Prague following clusters were suggested. Perhaps the most important condition for choosing a cluster is innovative potential.

The cluster Mechatronics was chosen as the main cluster which should be successful in the Pilsen region in the future. Branches included in Mechatronics take about 60 % of all the indexes in the region (employment, added value, incomes). Besides that another advantage of Mechatronics is the fact that there are mechatronics clusters in the near border area (Cham, Linz), which tentatively showed interest in cooperation with future cluster in the Pilsen region. The arguments for cluster Mechatronics are in the following picture.
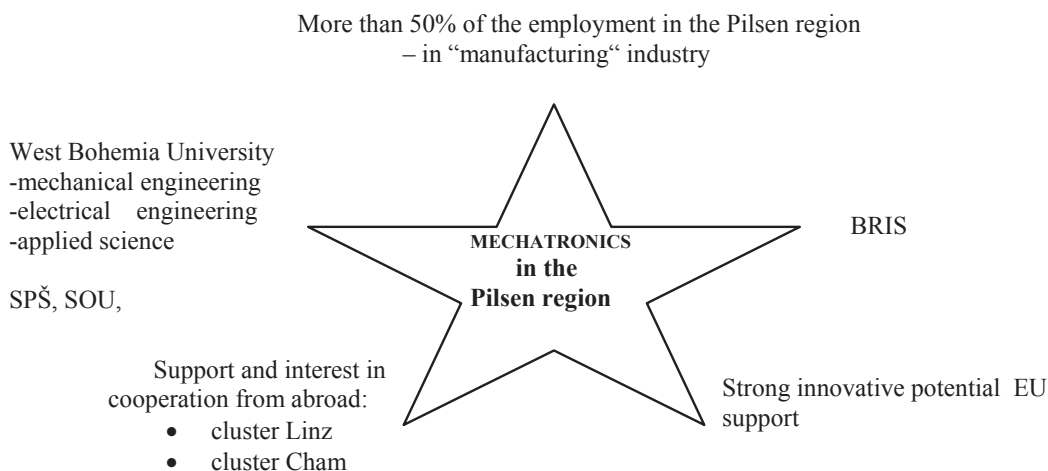

Fig.3. Mechatronics in the Pilsen region

The university is also important, it has departments which make the base of Mechatronics.

On the basis of negotiations with regional politicians appeared that their interest is to support businessmen in wide range of branches. Other four clusters were chosen which seemed to be very feasible. These clusters are from architecture, general mechanical engineering, services and renewable resources of energy.

6. CONCLUSION

The importance of clusters is growing up with subtleness of competition, knowledge growing and innovation intensity, what means that clusters are more popular where the economic development is existed and vice versa. Clusters support cooperation among companies and accelerate the innovation processes, which have the interactive character and present new efficient tool for the regional development [6].

7. ACKNOWLEDGEMENTS

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