Contribution of Clusters to the Competitiveness of Companies: Revelation and Evaluation

Asta Malakauskaite, Valentina Navickas

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Introduction

Evaluation can be described as a systemic process that determines value, relevance, weight, etc. of an object in comparison to the chosen standard, while using appropriate (definite, clear) evaluation criteria and methods. It must be emphasized that competitiveness evaluation process fits in this definition, yet it has its own specifics – it is often hard to define the standard of competitiveness, hence the ability to compete in terms of growing GDP per capita, favorable business climate, positive international trade balance, high economy-related quality of life, etc. (macro level factors) or innovative business solutions, high quality standards, wide choice and favorable cost-benefit ratio of consumer goods and services, etc. (micro level factors) are relative.

The concept of competitiveness and various measures to gain, maintain and improve competitiveness is a problem of various scientific works (Bresnahan, Gambardella, 2004; Snieska, Draksaite, 2007; Brown, 2000; Rutkauskas, 2008; Porter, 2000, 2008; Snieska, Bruneckiene, 2009 et al.), yet, it is also important to evaluate or measure competitiveness. Different approaches towards measurement of competitive position exist, but most researchers agree that methods and models of competitiveness evaluation must be flexible and very detailed (Porter, 2004; Blanke, Paua, 2004; McArthur, Sachs, 2002 et al.). The major international organizations in the field of economics have suggested their own guidelines or methods for competitiveness evaluation (Massachusetts Technology Collaborative, 2010; International Institute for Management Development, 2010; World Economic Forum, 2010; Heritage Foundation, 2010; OECD, 2010, etc.). Yet, these guidelines and methods often do not take into account such competitiveness factors as clusters, networks or other interorganizational structures, even though many academic (theoretical) works are dedicated to the analysis of clusters and prove their contribution to the competitive potential of companies, sectors, regions and countries. This study aims to integrate this significant contribution into the process of competitiveness evaluation.

The object of the study is the contribution of clusters to the competitiveness of companies and sectors.

The aim of the study is to analyze the methodological aspects of cluster-related competitiveness evaluation.

The objectives of the study are:
1. To define the concept of competitiveness evaluation.
2. To analyze and compare the models of competitiveness evaluation.
3. To integrate the influence of clusters into the model of competitiveness evaluation.
The methods of the study are:
- Logical and comparative analysis of literature.
- Synthesis and deduction.
- Graphical methods.

The methodology of the research was based on holistic and systematic approach.

**Competitiveness Evaluation: Various Practical and Methodological Aspects**

Different theoretical and applied literature sources tend to explain the conception of competitiveness in a variety of– sometimes even conflicting – ways. According to World Economic Forum (2010), competitiveness can be perceived as a capability of a country to secure the growth of GDP per capita (economy-related quality of life). On the other hand, National Competitiveness Council (2001) defines the term of competitiveness as a country’s ability to successfully and efficiently operate, compete in international markets, at the same time maintaining a high quality of life and well-being of its citizens. As must be noticed, these concepts embrace the macro- level, yet the concept of competitiveness can be defined on the micro- level as a potential of companies and business ventures to compete locally, regionally, nationally and internationally (Navickas, Malakauskaite, 2007, 2008, 2009a, 2009b; Malakauskaite, Navickas, 2010). Evaluation of competitiveness is a complex multi-stage process which must take into account different quantitative and qualitative factors that determine the ability of companies, sectors and countries to gain and maintain competitive advantage with regard to analogical units. As various partnerships, relation networks (including clusters) gradually become a requisite, concurrent and integrative part of competitive knowledge-based economy, their contribution to competitiveness must not be ignored.

Popa and Pater (2004) suggest that competitiveness of companies (sectors, regions, countries) can be expressed by a function (1) of various competitiveness constituents.

The main advantages of this evaluation model:
- Evaluation model embraces both quantitative (material and financial resources, etc.) and qualitative (social and cultural resources, etc.) factors of competitiveness.
- Evaluation model embraces inner (company) and outer environment, micro- and macro- competitiveness.

The main disadvantages of this evaluation model:
- Qualitative competitiveness factors are subjective, thus they are difficult to evaluate in quantitative indicators.
- Competitiveness factors differ in various features such as relevance and influence, but their weight is the same in a formula.

\[
C = C_{nat} + C_{dsk} + C_{par} + C_{tec} + C_{tmi} = CR_{nat} + CR_{hum} + CR_{soc} + CR_{mat} + CR_{inf} + CR_{fin} \quad (1),
\]

where

- \(C\) – competitiveness evaluation (in points) as a sum of points attributed to the constituents.
- \(C_{nat}\) – natural competitiveness, which is characterized by natural environment.
- \(C_{dsk}\) – demo-social competitiveness, which is characterized by demographic and socio-cultural environment.
- \(C_{par}\) – political, administrative and regulative competitiveness, which is characterized by political environment.
- \(C_{tec}\) – technological (innovative) and economic competitiveness, which is characterized by business environment.
- \(C_{tmi}\) – technical-militaristic competitiveness, which is characterized by militaristic environment.
- \(CR_{nat}\) – competitiveness formed by natural resources used by (accessible to) a company (economy sector).
- \(CR_{hum}\) – competitiveness formed by human resources used by (accessible to) a company (economy sector).
- \(CR_{soc}\) – competitiveness formed by social resources used by (accessible to) a company (economy sector).
- \(CR_{mat}\) – competitiveness formed by material resources used by (accessible to) a company (economy sector).
- \(CR_{inf}\) – competitiveness formed by information resources used by (accessible to) a company (economy sector).
- \(CR_{fin}\) – competitiveness formed by financial resources used by (accessible to) a company (economy sector).

Even though the competitiveness evaluation model by Popa and Pater (2004) does not identify the contribution of clusters in the form of competitiveness constituent, it might be treated as part of Ctec, for the influence of clusters first of all manifests itself through the formation (development) of new companies, business ventures, growth of innovative potential, entrepreneurship and efficiency of operation.

On the other hand, clusters might be treated as a higher level factor of competitiveness which shapes the estimation (in points) of other competitiveness constituents – CR hum, CRinf, CRfin, etc. According to scientific literature (Porter, 1990, 1998, 2000, 2008; Hakanson, 2004; Christensen et al, 2002), clusters enable companies to access qualified labour force or specialized resources. They also create the needed preconditions to gather and concentrate financial resources of various companies to carry out joint marketing projects.

It must be noted that clustered regions also form the base for the development of information networks that enable to communicate know-how and formal (informal) information among the cluster companies. Therefore, the estimations of the competitiveness constituents would vary in clustered and non-clustered regions. To summarize, the formula (1) suggested by Popa and Pater (2004) could be modified and adjusted to measure the influence of clusters if some of the competitiveness constituents were evaluated before joining a cluster and after joining it (on annual, etc. basis).
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### Competitiveness analysis level

<table>
<thead>
<tr>
<th>System level</th>
<th>Economy level</th>
<th>Environment level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supra-system</td>
<td>Macro</td>
<td>Inner</td>
</tr>
<tr>
<td>System</td>
<td>Mezzo</td>
<td>Outer</td>
</tr>
<tr>
<td>Sub-system</td>
<td>Micro</td>
<td></td>
</tr>
</tbody>
</table>

### Competitiveness life cycle

- Ephemeral (short-term)
- Temporary (moderate-term)
- Continuous (Long-term)

### Components of general competitiveness

- **General competitiveness**
  - Global competitiveness
    - (position in global markets)
  - Economic competitiveness
    - (efficiency of resource usage)

<table>
<thead>
<tr>
<th>Systematic</th>
<th>Partial</th>
<th>Systematic</th>
<th>Partial</th>
</tr>
</thead>
<tbody>
<tr>
<td>General results in all environments</td>
<td>Partial results in some environments</td>
<td>General results</td>
<td>Operation costs</td>
</tr>
<tr>
<td>Productivity</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### Competitiveness evaluation method

<table>
<thead>
<tr>
<th>Qualitative</th>
<th>Quantitative</th>
<th>Relative</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>(comparison with chosen standard)</td>
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</table>

### Competitiveness hierarchy

<table>
<thead>
<tr>
<th>Global</th>
<th>Continental</th>
<th>National</th>
<th>Regional (local)</th>
<th>Cluster-level</th>
<th>Company-level</th>
<th>Business unit/activity level</th>
</tr>
</thead>
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**Figure 1. Competitiveness evaluation levels and criteria**

Source: the authors, 2010

Popa and Pater (2006) suggest that competitiveness of objects (countries, clusters, companies, business units, etc.) that belong to different hierarchy levels might be evaluated according to their dependence to a system (supra, sub). For instance, company competitiveness can be estimated in the context of global, continental, national, regional, local, and cluster economy (see Figure 1).

Event though competitiveness is rather often evaluated with the help of quantitative methods, it is possible to apply qualitative and relative methods.

The main advantages of this evaluation model:

- Evaluation model introduces clusters as an element of competitiveness (level of competitiveness hierarchy).
- Competitiveness evaluation is treated as a complex and multi-stage process.
- Competitiveness evaluation takes into account various relevant evaluation elements, including: analysis level, evaluation methods, hierarchy, life cycle, etc.

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**Figure 2. Competitiveness evaluation levels and criteria**

Source: the authors, 2010

- Basic conditions:
  - Human resources
    - Education level
    - Specialized skills
  - Innovativeness
    - Investment in R&D
  - IT development level
    - Application of Internet
  - Entrepreneurship
    - Investment level
    - Venture capital level

- Operation results:
  - Human resources
    - Personnel, working with hi-tech (%)
  - Innovativeness
    - Formation of knowledge economy
  - IT development level
    - E-commerce revenue and general revenue ratio
  - Entrepreneurship
    - New companies/products

- Economic results:
  - Creation of new jobs
  - Expansions of export
  - Growth of wages
  - Growth of productivity

**MEASURABLE EFFECT OF CLUSTERS ON THE REGIONAL (COUNTRY) ECONOMY**
The main disadvantages of this evaluation model:
- Evaluation model is chaotic: separate competitiveness elements are not connected to one another or integrated in the system of evaluation.
- The authors do not offer definite, systematic, and clear competitiveness evaluation guidelines for each object. The evaluation model identifies clusters as a hierarchy level rather than competitiveness determinant. Therefore, it might only serve as guidelines for creation of an integrative competitiveness evaluation method.

Cluster influence on the competitiveness of companies (economy sectors, etc.) might be evaluated separately from the influence of other competitiveness determinants. Andersen (2006) carried out important researches in this field that are identified in Figure 2. In order to estimate the contribution of clusters, it is relevant to evaluate the competitiveness of companies before and after joining a cluster. Basic primary conditions that must be taken into consideration are: human resources (quality and accessibility), investment in hi-tech, application of Internet and IT solutions in daily operations, current innovation, venture capital level, entrepreneurship and education level, etc.

The main advantages of this evaluation model:
- Evaluation model is designed to measure the influence of clusters on the competitiveness of companies, etc.

- The author sets definite and clear evaluation criteria to measure the contribution of clusters: human resources, innovativeness, entrepreneurship and IT usage level.

The main disadvantages of this evaluation model:
- Limited number of competitiveness evaluation criteria.
- Different evaluation criteria used for the evaluation of competitiveness before and after joining a cluster.
- Precondition that economic results and competitiveness of a country (region) might improve because of a total effect of competitiveness factors is ignored.

The model suggested by Andersen (2006) embraces a number of relevant aspects that are characteristic of cluster influence, thus it can serve as the basis for the formation of an integrative competitive evaluation model.

Integration of Contribution of Clusters into the Competitiveness Evaluation Model

Various authors (Porter, 1990, 1998, 2008; Strandskov, 2006; Andersen, 2006; Christensen, 2002; Hakanson, 2004 et al) emphasize that the main fields of cluster influence on the competitiveness of companies (regions, countries, etc.) are: productivity, innovativeness, creation of new business ventures. The aforementioned criteria have been chosen as the cornerstone of the evaluation model (see Figure 3).

![Figure 3. Principal evaluation model of cluster contribution to the competitiveness of companies (economy sectors)](image)

The model integrates three additional factors: company image, brand awareness and human resources (Figure 3). It must be noted that the first four factors (cluster influence of productivity, innovativeness, entrepreneurship and creation of new businesses, characteristics of human resources) are quantitative, that is quantitative characteristics, such as the
number of new goods (services), are to be compared before and after joining a cluster. The last two determinants (brand awareness and company image) are qualitative; therefore 2 alternative methods of evaluation might be applied: surveys (polls) and expert evaluation.

Moreover, while it is important to compare the results before and after joining a cluster, it is also recommended to compare the economic results of cluster companies with the average economic sector indicators, such as added value or innovation application level, etc. (Zvirblis, 2007).

It can be deduced that the contribution of clusters may be vital to gain and maintain competitiveness; therefore the influence of clusters must be evaluated. That would enable companies to make a logical and reasonable decision about joining a cluster or inducing the formation of a new cluster. However, it must be noted that the influence of clusters can not be separated from the contribution of other factors (see the criticism of the model suggested by Andersen, 2006).

Competitiveness function may be expressed as shown below (2):

\[
\text{Competitiveness} = f(CF_1, CF_2, CF_3, CF_4..., CF_n) \quad (2), \quad \text{where } CF_n \text{ – competitiveness factor, } n = [1;k]
\]

According to the function, which is provided above, it must be noted that competitiveness is a dependant variable and its value is determined by the combination of different competitiveness factors (CF1-CFn). Competitiveness may be expressed through competitiveness indicators (CI1-CIg), such as GDP per capita, the level of AVAT usage, number of newly created products and services (see Figure 3), etc.

In other words, competitiveness factors (determinants) directly influence the values of competitiveness indicators. It is the general basis for the formation of competitiveness evaluation model that integrates the influence of clusters.

The factor CF1 signifies clusters in Figure 4; CF2-CFn stand for other possible competitiveness determinants, like low labor cost, well-developed access to natural resources, etc.

Figure 4. Competitiveness evaluation model that integrates the influence of clusters

Clusters (CF1 in the model, see Figure 4) contribute to the values of competitiveness indicators CI1-CIg. Between CI2 and CIg, there are g-3 indicators that are influenced by CF1 (empty bubbles in Figure 4). In addition, other factors at the same time contribute to the values of indicators CI1-

Clg, thus the influence of clusters must be treated as part of synergy effect.

In conclusion, the evaluation of cluster contribution to the competitiveness of companies and economy sectors is a complex multi-layer process that should embrace a number
of criteria, quantitative/qualitative methods; and must take into account the contribution (impact) of other determinants of competitiveness.

Conclusions

1. The contribution of clusters on the competitiveness of business sectors and companies possesses at least three dimensions: productivity, innovation, entrepreneurship (creation of new business ventures). Clusters also make good incubators of innovative ideas or new companies. Moreover, clusters provide the basis for joint activities and operations, especially in the field of R&D, product development, information exchange, and marketing. It is generally recognized that cluster companies are more inclined to invest in qualitative development since they are able to accumulate extra funds with their partners – other organizations in a cluster.

2. Most competitiveness evaluation models either ignore the contribution of clusters or analyze them separately from other competitiveness factors. This approach is to be considered wrong for competitiveness determinants altogether generate the effect of synergy. It means that each competitiveness indicator is influenced by a large number of competitiveness determinants, or factors. A combination of various competitiveness factors usually manifests an increased impact and greater influence on the competitiveness of companies and business sectors, when compared with the influence of single factors.

3. The evaluation model suggested by the authors of this research treats clusters as an integrative part of various competitiveness factors. The impact of clusters can be measured with the help of quantitative methods; only a couple of qualitative methods (polls, expert evaluation) are recommended for the evaluation of specific criteria – company/brand awareness, company image. Clusters have to be treated as part of competitiveness evaluation model that includes n competitiveness determinants, or factors (CF1-CFn ), and k competitiveness indicators – CI1-CIk. For example, clusters (CF1) contribute to the productivity of companies or sectors (CI1) that may be expressed as the added value (EUR) created per hour or innovativeness of companies or sectors (CI2) that may be expressed as new registered inventions, patents, etc. per a chosen period of time.

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Klasterių indėlis į įmonių konkurencingumą: rašta ir vertinimas

Santrauka