Evaluation of Factors of Regional Competitiveness

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Abstract

This article deals with actual questions of regional competitiveness and evaluation of its factors. The influence of individual factors on regional competitiveness is not possible to be generalized. It depends on current state of a region, presence of chosen factors in a region and their interference. On the basis of this fact we can generalize regions according to basic archetypes. Afterwords we are able to determine assumed impact of individual factors. We can take use of system dynamics.

Key words: competitiveness, factors of competitiveness, region, system dynamics

JEL Classification: R11, R15, R58, O18

1 Introduction

The process of the European Union enlargement creates, for new Member States, new development conditions and possibilities within the European and world economy. On the one hand, Member States are faced with a demanding competitive environment of the unified internal market of the European Union; on the other hand, they receive more options in the open global economy. We can say that competitiveness, the ability to compete in international markets and ensure the growth of wealth and living standards of inhabitants, becomes the main condition in successfully existing in this environment. Competitiveness is at the forefront of the interests of all states and integration coalitions, and far exceeds the extent of the European integration process.

Competitiveness and its periodic evaluation, is not only an issue advance countries (e.g. the USA, Canada, and others) deal with, many international organizations also deal with this issue. The concept of competitiveness frequently occupies a key position in European strategic programmatic documents. In this respect, it is necessary to address the regional extent of competitiveness, in particular a methodology to measure it in relation to states and regions (Melecký, Nevima, 2009).

The Czech Republic seeks to implement its regional policy, in the context of the European cohesion policy, in order to promote growth and employment. Another objective of the Czech Republic is to support competitiveness. It is clear that the alignment, to some extent, of contradictory objectives is no simple matter. In this respect, there is the problem of disposal of high-quality information related to regional competitiveness and the prediction of the factors that have an effect on the growth of competitiveness in a region. However, these effects cannot be generalized. It always depends on the current state of the region, the presence of selected factors in the region, and their interactions. Therefore, it seems appropriate to create a typology of regions for which it is possible to determine the impact of individual factors.

In order to address issues pertaining to the competitiveness of regions, it is necessary to use knowledge, including a systemic approach. The significant inward cohesion of individual subjects in a region, and its linkage with the external surroundings, is another reason why this approach is used. The behaviour of the discuss subjects, creates an impact on other elements in the system, leading to multiple influences and reactions between elements of the system. This creates a causal feedback. To assess changes in factors and their impact on the competitiveness of regions, it is necessary to examine the feedback through the use of simulations.

2 Competitiveness of regions

The concept of competitiveness itself raises many debates on its meaning and interpretation. What does competitiveness mean? How are we able to define who or what is competitive? Some authors question the advisability of this concept. They substitute this concept with: productivity, economic growth, sustainable development, and many other economic terms; they have doubts the use of competitiveness as an analysis tool. We will assume that the concept of competitiveness is semantically ambiguous, and therefore it is necessary to examine it in a wider context. This concept is based on various theoretical approaches, which is based on a number of definitions. E.g., in encyclopaedias[1], competitiveness is defined as the ability to compete successfully over time. We say that such a definition is focused on the outcome of competition; measured by standard quantitative methods, i.e. in the case placement based on GDP per capita, or in the case of firms, by their market share and profit. We can distinguish many attributes of this notion however the main attention is paid to regional competitiveness in this article.

Regional competitiveness is a concept that opens up space for other issues that are related to the definition and measurement of regional competitiveness. Many authors dealing with regional competitiveness agree that the term is difficult to grasp and controversial. However, the vagueness of the term does not reduce its popularity. E.g., The European Commission sees policies towards the improvement of the competitiveness of European regions as an achievement in economic and social cohesion. Strengthening regional competitiveness can encourage economic growth, not only for these regions and nations, but also the growth of the European Union as a whole.

Regional competitiveness is often regarded as an aggregate of microeconomic competitiveness and the derivative of national competitiveness. Microeconomic aggregate has a major influence on the definition of regional competitiveness according to Porter (2003). Since regional competitiveness is based on the firm's output, and because competitiveness is represented by productivity, the concept of competitiveness can substitute these terms. In particular, the productivity of a region (or any location) is given by the productivity of firms, which are based on two reciprocal variables. The first group is concerned with the value of goods and services and their competitive advantages (efficiency with which they are produced by the company). In addition, Porter argues that productivity is also influenced by the quality of business environment; the critical elements are: demand conditions, conditions of input factors, context for corporate strategy and competition, etc. Porter believes that competitiveness of regions is influenced by the presence and dynamism of geographically clustering activities. Within these activities we can speak about intensive rivalry and competition, favourable production factors of competition, demand of local customers, and the presence of capable local suppliers and supply-oriented activities.

[1] According to Macmillanův slovník moderní ekonomie (1993).

Martin (2003) defines the region's competitiveness as the region's ability to produce goods and services that will stand up in international markets, while ensuring the maintenance of high and stable income for its inhabitants.

Viturka (2007) states one of many other possible definitions of regional competitiveness. He says that competitiveness is a result of joint effort in a way of most productive usage of internal and external sources and development opportunities, aimed at sustainable increasing production potential of regions.

Paul Krugman appears sceptical about the notion of "competitiveness" in terms of countries and regions. He says that the concept of competitiveness is not only wrong but also dangerous, skewing domestic policies and threatening the international economic system. Thinking in terms of competitiveness can lead directly, or indirectly, to poor economic policies on a wide range of issues, both domestic and foreign, such as health care or business.

The idea that a country's economic fortunes are largely determined by its success on world markets is a hypothesis, it is not necessarily a truth; and as a practical, empirical matter, that hypothesis is flatly wrong. That is, it is simply not the case that the world's leading nations are, to any important degree, in economic competition with each other, or that any of their major economic problems are attributed to the failure to compete in the world market.

Yet presently the concept of regional competitiveness, in the economic policies environment, is widely accepted. Many policies (EU and CR) are directly focused on the promotion of the competitiveness of regions; increasing the competitiveness of regions is considered to be a major component of regional development.

3 The Factors of Competitiveness

Porter (1990) states that the sources of competitiveness are three types of competitive advantages (stages of competitive development) classifying countries as follows:

- economics-driven factors,
- investment-driven economy,
- innovation-driven economy.

Economic-driven regions compete in low cost, thus low-cost production factors. Investment-driven economies compete in the advantages obtain from an increase in economies of scale and improvements in production. The advantage lies in increased efficiency. In innovative-driven economies, new technologies are produced solely for the purpose of producing innovative products and services. Their success depends on innovation.

The research company ECORYS-NEI has develop a benchmarking methodology that measures the quality of the regional investment environment. Based on our study, we have observed eight basic factors affecting competitiveness: clusters, demography, migration and place, business environment and network, government and institutional performance, industrial structure, innovation/regional innovation systems, and property.

The determinants of regional competitiveness can be illustrated by means of so called competitiveness hat. These determinants can all be found at the bottom of the hat, in various rings around the production cycle. These determinants are national, regional, or local in nature, depending on their characteristics. The first level consists of the production factors (land, labour, and capital). Labour and land are less mobile than other production factors, and therefore more determined by regional factors. The second level includes the basic factors associated with the regional innovation climate. This group includes the basic infrastructure and its accessibility, human resources, and the productive environment. The third level factors

also specify the previous factors. The factors are: institutions, technology, innovation, entrepreneurship, internationalization, social capital, knowledge infrastructure, culture, demography and migration, and the quality of space and environment.

Regional economic competitiveness is, according BermanGroup (2006), multi-conditional. Great importance is placed on mutual combination of factors that together create "a favourable local environment." It is primarily understood as a positive endogenous development that is focused on the internal resources of the region, climate, work ethics, mutual trust, cooperation, and effective relationships in a region. The company identifies five main factors: human resources, research and development, innovation, economic structure, foreign direct investment, transport and telecommunications infrastructure.

From the above mentioned approaches, the group of factors that are considered to be most important are: the industrial structure, innovation, education and universities, clusters, demographics, location factors, local politics and quality of government, business environment and inter-firm networks, and foreign direct investment.

Some of these factors are known as being "soft" factors that have a more indirect competitive impact. Due to this fact, it makes it difficult to measure regional competitiveness.

4 The Evaluation of Competitiveness

The evaluation of the competitiveness issue is an issue of international institutions and world-renown authors are faced with. The difficulty in assessing the level of competitiveness of regions is determined by the nature of its factors, in particular the nature of the soft factors.

E.g., the EU has regularly engaged in the evaluation of regional competitiveness. It is seen as being the basic indicator of success or failure, in regards to policy. In the publication on Growth, Competitiveness, and Employment: The Challenges and Ways Forward into the 21st Century (White Paper), is discussed the objective not only of reaching the global firm's competitiveness but also of reaching the competitiveness of whole the EU. Emphasis is laid on the competitiveness of the industry. International competitiveness plays a key role in increasing productivity and in improving living standards. Factors that affect productivity growth are: technological development, investment, capacity utilization rate, size and qualification skills of labour, management skills, organization of production, and use of energy resources and raw materials.

In the Sixth Periodic Report on the Social and Economic Situation and Development of Regions in the EU, in the year 1999 (EC 1999), competitiveness (of regions) is characterized by two factors, productivity and employment. The main factors that contribute to competitiveness are considered to be: research and technological development, small and medium-sized enterprises, foreign direct investment, infrastructure and human capital, and institutions and so-called social capital. (Skokan, 2004)

Productivity which compares the available human and capital resources is expressed in terms of value of goods and services produced per unit of labour and capital. According to Skokan (2004), it is evident during the past 10 to 15 years, that competitiveness is derived from productivity and it is defined as the level of productivity. At the same time there is a change in the underlying principles on which competitiveness stands.

The original principles were based on low cost and effectiveness; new principles are based on new innovation and dynamism. Porter (1998) argues that productivity is a function of the following incidences:

- political, legal, and macroeconomic framework,

- quality of the microeconomic business environment,
- performance of companies and the sophistication of their strategies.

These three factors together determine the capacity of the state to create internationally competitive firms and support rising prosperity. They represent the so-called paradigm of competitiveness, or the determinants of productivity and its growth.

Indirect effects, in particular soft factors, cause uncertainty. The result may overestimate or underestimate the importance of certain factors. Therefore, in this work system approach was chosen, which would remedy the inadequacies.

5 Applied Methods

Complex phenomenon, which undoubtedly is the regional competitiveness, will be examined in individual sections. The analysis can be used for this purpose. The description is applied, in particularly, in the context of defining the concept of competitiveness, and in the context of the factors that affect competitiveness.

5.1 System Dynamics and Dynamic Models

The discipline of system dynamics was developed during the late 1950's by J.W. Forrester of the Sloan School of Management at the Massachusetts Institute of Technology. At this time, it is a method that deals with the construction of a mathematical model of dynamic system. The design of this model consists of three steps:

- construction of causal diagrams describing the system,
- construction of stock and flow diagrams,
- creation of differential equations.

The dynamic system can be understood (according to Burianová, 2007) as a set of interrelated elements, whose values evolve over time and influence each other.

The first step to creating dynamic models is an awareness of the interactions between elements of the system. Forrester (1961) notes that an examination of linkages and interactions among system components is more important than examining individual components of the system.

Models have become acceptable means of exploring complex phenomena. Forrester defines a model as a substitute for any real equipment or system. The importance of a model is that it allows a more efficient understanding of the processes that are, in reality, unclear. Through the use of a model, we can obtain the necessary information at a lower cost than if we tried to obtain the same information through real systems. Necessary skills can also be obtained at a faster pace.

Models are systems composed of several elements that are linked together. The linkages represent the interdependent among the components. The rising interdependence of the components means that the possibility to understand the behaviour of the system only on the basis of understanding of behaviour of particular system components decreases.

Bonds can be linear (the first activity followed by a second activity followed by the third operation, etc.), where individual elements are connected in series, or can be characterized as valves (e.g., returning to the second activity after the third one). Overall, all social systems contain a feedback processes. We can describe this situation as follows: the effect A evokes the subsequent effect B; the effect A is influenced with effect B, retroactively. We can say that the result of some process creates other processes.

The feedback loop creates a closed interdependence loops, which are essentially typical of complex systems. These loops, however, mean that the outcome of a process in itself becomes a source of additional events. For ease of analysis can then use the graphical representation of stocks and flows diagrams, causal loop diagrams, dynamic maps, etc.

A major impact on the status and development of system processes is delay. The problem with delay is that it can hide causal relationships. This refers to the human tendency to link things which are closed in time and space. This can lead to a very limited analysis of the problem. Delays can affect behaviour outside the system as a whole, in situations where mutual adaptations begins to activate oscillations.

Creating a dynamic model starts with thinking of what components are contained in the system and over what processes are realized in the system. The model is based on mental models, which consist of summaries of all sensations mediated by human senses, and are placed into the context of information stored in the memory of man.

The most important fundamental step is the identification of the components and processes that are under consideration for the system. They may arise from the results of an experiment, from observation and measurement data, or they may reflect an assumption about the system, which are created by humans and the results are derived by man from these presumptions. System components can be divided into:

- variables in the system (endogenous) which may change over time,
- variables outside the system (exogenous) which influence the system and are constantly changing,
- variables which do not change during the evolution period of the research system.

The next step is to express these components, and links between them, in graphical form. The result is a scheme which is the level of abstraction between the system and dynamic model. It is not possible to accurately analyze and draw conclusions from it (the structure of the system still does not generate or determine its behaviour). The used method of graphical presentation of the above-mentioned system is causal loop diagrams or stocks and flow diagrams.

The next stage is to create its own dynamic model. It is important to capture the components and links in equations which enable the simulation of the behaviour of the system.

5.2 The capital and production model

The model of capital is introduced in this article for touching off the above mentioned approach based on dynamic modelling. Essentially, this model displays one of partial components of regional competitiveness. According to above referenced definitions just a capital is one of the factors which increase the level of the production of region. The model of capital is displayed in the following figure 1.

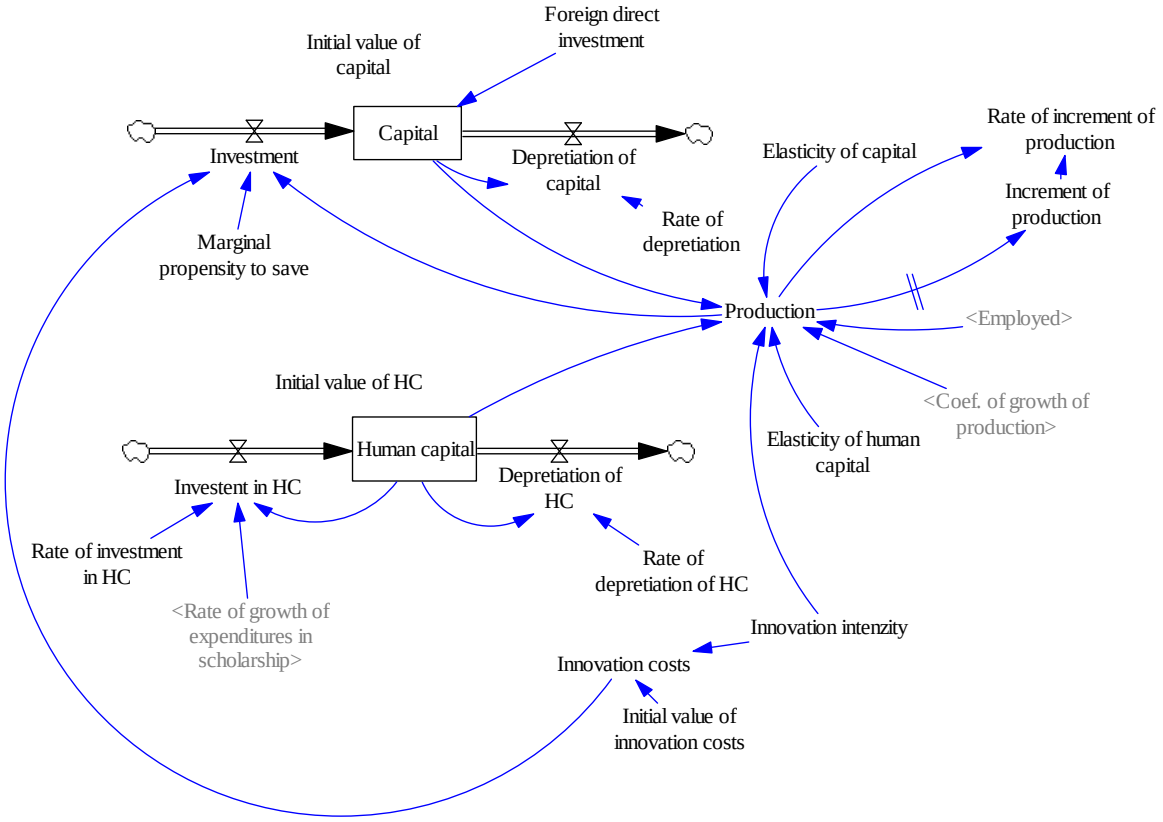

Figure 1: The capital and production model of competitiveness of region

Source: own construction

The capital model results from the Solow model of stable growth. A prerequisite of this model is to identify the region with the Cobb-Douglas production function, which considers a constant returns to scale, and includes technical improvements (given exogenously). This technical improvement in the model is represented by the growth rate of production that is influenced by changes in infrastructure.

Other components of this model are foreign direct investment (FDI) and the intensity of innovation. The amount of foreign direct investment is determined by the influences outside the regional economic system. In the model, their amount is not dependent on the production size of the economy.

The intensity of innovation is a share of the cost of innovation and a firm's income. Such innovation costs affect both production growth and they also have an affect on the level of investment in the economy. The relationship between innovation and product is expressed by multifactor productivity which is represented by product growth by constant amount of capital and labour.

Another component of the model is human capital. An increase in the size of human capital is education and level of investment. The measure of investment is furthermore increased by measure of annual growth in education expenditures.

The other factors which are focused on production creation of a region are the units of involved labour (represented by number of employed) and coefficient of rate of growth of production. The stage of these factors is dependent on other variables. However, their description would require the construction of particular models. That already overreaches the possibilities of this article.

The real values (of statistical character) describing the situation of concrete region can be completed for proposed variables in the model of capital. After that, this model can be simulated and it can help to evaluate the impact of the capital factor on the regional competitiveness.

6 Conclusion

Recently the concept of competitiveness is more and more discussed. Competitiveness can be considered as a basic measure of success of regions. The European Union marked out competitiveness as one of its main objectives. Prerequisite for achieving this objective is the successful application of tools for promoting competitiveness, in particular at regional and national levels. The question remains how to define the competitiveness of a region, how to identify the various factors, and how to determine their effects on the economies of regions. The creation of a regional dynamic model can be the starting point in answering these questions. On the basis of this model it is necessary to search for the possible impacts competitiveness factors have. The main focus of this article is paid to dynamic modelling that can help to search the mutual relations among the components of system of a region. The relations within the model of capital and production are represented by causal loop diagram. The advantage of this way of analysis lies in the possibility to simulate the behaviour of the model situation. After completing real values describing main characteristic of a region it is possible to observe the probable impact.

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