

# The Position of the CR Among the EU States Based on Selected Measures of the Lisbon Strategy

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## Abstract

The Lisbon Strategy is a key document of the EU, which deals with the priorities and measures for the stimulation of economic, social and ecological renewal of member states in the period 2000-2010. There are more than 130 structural measures from the fields of national development, employment, research and innovations, economic reforms, social coherence and living environment, which can be used for the evaluation and quantification as well as the modernization of European economics and the improvement of its global competitiveness. The structural measures for international comparisons have been developed by Eurostat and they are used by the European Council as the basic data for the evaluation of the level of attainments of the goals of the Lisbon Strategy. In the last few years, a list of 15 key indicators has been developed. They are: GDP per head in parity of purchasing capacity, labour productivity in parity of purchasing capacity, employment rate, employment rate of women, employment rate of elderly people, number of persons with secondary school certificate from the ages between 20 and 24, science and research expenditures as a share of GDP, investments as a share of GDP, price level, exposure to poverty, level of long term unemployment, emission of glasshouse effect, energy consumption as a share of GDP, goods traffic as a share of GDP and regional dispersion of the unemployment rate. The goal of this paper is to propose some methodological approaches that are suitable for analyzing these indicators. The proposal for a correct methodology is highly complicated due to the miscellanea of the variables involved. The multiple dimensional statistical methods seem to be useful especially because of its ability to evaluate complex sets of variables.

*Key words: European Union, Lisbon Strategy, structural indicators, multiple dimensional statistical methods, method of average distance from a fictive goal.*

## 1. INTRODUCTION

High unemployment in the 1990s developed responses at supranational as well as national levels. The result was the European Employment Strategy. (Bernard, 2004)

The European Council has approved the Lisbon Strategy for the ten years period 2000-2010. The “Strategy” represents a new approach to solution of the problems with the labour market and social and economic policies of the European Union member states. A crucial attention is given to the education and professional training corresponding with the real demand of the labour markets in member states.

It consists of a complete set of reforms of the European economy and society which supports total economic, social and ecological status of EU (Baldwin & Cave, 1999). The main intention is modernization of the European economy and raising its global competitiveness. The

member states should become “the most competitive and most dynamical economics based on knowledge, that are able to maintain a sustainable economic growth with more and better working places and with higher social coherency.”

Now the evaluation of the past ten years is in process and the strategy for following ten years period – Europe 2020 - will be proposed. The predominant part of the evaluation is based on the elemental characteristics of the commented measures – see below (Pelkmans, 2006).

The goal of this contribution is the proposal of the methodological approaches suitable for the analysis of the structural indicators. The partial goal is to assess the position of Czech Republic in comparison with other EU states in the main objectives set by the Lisbon Strategy.

The main objectives if the Lisbon Strategy are 1) transformation to the economic based on knowledge, on information society, research and technological development, 2) modernization of European social model through investments into the labour capital, 3) keeping of “healthy” economic perspective and growth. We can say that the set of measures and tasks is a dynamical system with continually extended and adjusted (Pelkmans, 2006).

The different member states have both different levels of economy and different conditions, geographical, political, social, etc. These factors influence the monitoring indicators in many ways (Urban, 2002).

The document has traced out 9 main directions of the development of the economy and employment: informational society for everybody, creation of the European research space, removing difficulties in entrepreneurship, economic reform connected with finalization of internal market, creation of integrated financial market, better co-ordination of macro economic politics, sustainable development of countryside and quality of life (Es-Agraa, 2007).

The European Council is becoming strategic, coordinating, evaluating and assessing body. Its annual meeting is always concerned with evaluation of results of the strategy and to possible adjustments to actual conditions.

## 1.1 Evaluated Indicators

The regular evaluation of completing the Lisbon Strategy goals is realized on the basis of structural indicators (now there are more then 130 of them). The 2004 report proposed 14 resp. 15 indicators with the purpose to simplify evaluation and analysis of the Lisbon process (Es-Agraa, 2007).

The data can be obtained from the Eurostat database (Eurostat). The published data is possible to compare thanks to the unique methods of taking them.

GDP per inhabitant in parity of purchasing capacity – The data are available since 1995 (for some countries since 1991).

Labour productivity per inhabitant in parity of purchasing capacity – It is a price ratio in local currencies for the same products and services in different countries recounted to number of employed persons.

Employment rate total – It is expressed in percents for persons of the age 15-64. It means the ratio between the number of employed and the total population in a given age group.

Employment rate of women – It is expressed in percents for women of the age 15-64. It means the ratio between the number of employed women and the total population in a given age group.

Employment rate of elders – It is expressed in percents for persons of the age 55-64. It means the ratio between the number of employed and the total population in a given age group.

Secondary school degree for the age group 20-24 – The number of person of 20-24 with the secondary education. The data are published since 1992.

Science and research expenditures as a share of GDP – It is the percentage of private investments to the research and development, university expenditures to science and research, governmental expenditures and expenditures of private non-profit organization of the GDP.

Investments as a share of GDP – It is a percentage of investments in GDP.

Price level – It is a comparison of the price level with the level of EU – 15, resp. EU 27. Eurostat is responsible for coordination and numeration of the final parities based on data obtained from national statistic offices of member EU states.

Exposure to poverty – It is the percentage of people whose income is under the poverty level. The poverty level has been set as a 60% of median of national income after subtraction of social allowances.

Level of long-term unemployment – It is the share of long term unemployed people. Long-term unemployment means longer than 12 month.

Emission of glasshouse effect – These indicators is calculated on an amount of 6 glasshouse gases and their impact to the global warming.

Energy consumption as a share of GDP – It is the share of electric energy consumption of GDP.

Goods traffic as a share of GDP – It is the share of domestic goods transport of GDP, expressed in ton-kilometres.

Regional dispersion of an unemployment rate – It is a variation coefficient of the degree of unemployment in regions. To find it out is very difficult and that's why many member states do not calculate it.

For the overall evaluation of member states a complex analysis based on above described indicators (or if need be on some more of following 130) is necessary. This complex analysis is provided by multiple dimensional statistical methods; the most frequently used are the analysis of main components and the factor analysis. These methods belong to the group of explorative methods, which do not have hypotheses defined in advance that can be either accepted or rejected as a result of the analysis. These methods are tightly dependent on the experience of users, their knowledge and familiarity with the investigated problems.

## **2. MATERIALS AND METHODS**

### **2.1 Single dimension data analysis**

Both classical and modern statistical methods can be used for the analysis of the structural indicators. The methods can be used for the choice of indicators as well as for their proceeding. The classical techniques of data processing are based on a presumption of independency of randomly chosen variables with unique probability distribution (normality of data). It means that the data selection should be homogenous, the elements are mutually independent and the parent population has normal distribution. The extreme and non-typical values call for special



attention. The evaluation of such value means investigation whether it is not false. In the real data files there are values which are remarkably different from others. These values are often results of mistakes in measuring, recording, etc. These remote values can to a high extent influence the quality of the analysis. It is important to identify these values with extreme deviations tests. Very effective tool for this purpose is a data search analysis (Meloun & Militký, 2004).

## 2.2 Multiple dimensional data analysis

The character of investigated measures is important for the suitable methods selection. The starting point for multiple dimensional methods is a data matrix, which has variables in columns and cases in lines.

One of the multiple dimensional methods is the analysis of main components, which is based on an identification of a lower number of variables. This method enables us to find an optimal dimension of the task and helps to the more effective exploitation of subsequent methods of multiple dimensional statistics. The application of the method of the analysis of main components is based on a sample covariance matrix of original data. The goal of this analysis is creation of new variables (components), which are mutually independent with total variability equal to the variability of the original variables. The significance of these components is given by the level of the variability explanation. The prevailing part of the total variability is usually explained by a several first main components. "It is satisfying in the analysis of field data when a low number of main components are able to explain at least 70% of the variability of the original data" (Pecáková, 2008). Certain pitfalls of this method can be found in the pragmatic interpretation of the artificially created variables but this is not the goal of this analysis.

The factor analysis, as well as the above-mentioned method, belongs to the group of methods based on a reduction of the original number of variables. The fundamentals and interpretation of results is different. The principle of the factor analysis is explanation of existing correlations (structure of correlations). Each variable is understood as a result of interrelations of factors and random events. In contrary to the analysis of main components, the factor analysis tries to explain the dependency of variables. The disadvantages are that the results are not unambiguous and the qualified application needs a user with a good knowledge of the investigated issue.

A group of methods called cluster analysis represents other analytical tools, which are designed for the assignment of the classification structure. The goal of these methods is to aggregate the original data files into several relatively unique subsets (clusters). The element of the same cluster should be similar and the elements of different clusters should show remarkable differences. The most frequently used methods are the methods of fragmentation (k-averages, k-modes, k-histograms), which are based on creation of beforehand given number of clusters, and methods of hierarchical clustering (agglomeration, divisional). The results of the cluster analysis are influenced by the numbers of chosen variables, chosen measure of similarity and on the applied way of creating clusters. The distance between the clusters is highly dependent on the scales of particular variables (Meloun & Militký, 2004).

A discriminate analysis is often used for classing the object into groups. The goal is to find variables with the highest ability to distinguish to which class the objects belong. The discriminative analysis is able to evaluate the differences between two or more groups of objects, which

are described by more signs – discriminators. The techniques are usually divided into a group of methods interpreting the differences between groups and the methods aiming to classification of the object into groups.

The method of a mean distance from a fictive object can be used for the set up target. The fictive objects are the goals defined by the Lisbon Strategy for chosen indicators. The distances  $x_{oj}$  of real values  $x_{ij}$  from the fictive values (the goal value of the indicator) can be calculated. The average distance  $d_{ij}$  is then calculated using the formula:

$$d_{ij} = \frac{1}{p} \sum_{j=1}^p (x_{ij} - x_{oj}) \quad (1)$$

$i = 1, 2, \dots, n; j = 1, 2, \dots, p$ , where  $i$  is the number of units and  $j$  is the number of variables.

Another possibility is to use the index analysis with a choice of suitable indicators. Citation (Meloun & Militký, 2004) underlines the importance of aggregate indicators, which contains important and characteristic measures of development. It can be coefficient or index.

The authors used multiple dimensional statistical methods for the structural indicators reviews. (Alves & Meves & Comes, 2010), (Biagi, 2000).

### 3. RESULTS

The best method for evaluation of fulfilment of the goals of the Lisbon Strategy was chosen the method of the average distance from the fictive goal. The method is able to determine the difference between the real situation in the market and the planned goal. By the differences it is possible to construct the order of nations. The goals for the member states have been set as follows:

The employment rate for age 15 – 64: 70%

The employment rate for women 15 – 64: 60%

The unemployment rate for age 55 – 64: 50%

We have used 13 EU states for demonstration of the chosen method. These states are a representative sample of all EU states.

We are able to evaluate the fulfilment of the Lisbon Strategy goals for the indicators of the labour market using the distance from above mentioned values. If the chosen value of the indicator is positive, it means that the member state has reached the defined goal. The negative values mean not fulfilling the goal. The results are in the Fig. 1.

| Territory             | A     | B     | C     | D     |
|-----------------------|-------|-------|-------|-------|
| <b>EU 27</b>          | -4.0  | -5.4  | -1.4  | -3.6  |
| <b>Czech Republic</b> | -3.2  | -4.6  | -3.3  | -3.7  |
| Austria               | -8.9  | 1.6   | 6.4   | -0.3  |
| Finland               | 5.5   | -1.3  | 7.9   | 4.0   |
| France                | -11.1 | -5.8  | 0.1   | -5.6  |
| Germany               | 6.2   | 0.9   | 6.2   | 4.4   |
| Hungary               | -17.2 | -14.6 | -10.1 | -14.0 |
| Italy                 | -14.3 | -12.5 | -13.6 | -13.5 |
| Netherlands           | 5.1   | 7.0   | 11.5  | 7.9   |
| Poland                | -17.7 | -10.7 | -7.2  | -11.9 |
| Portugal              | -0.3  | -3.7  | 1.6   | -0.8  |
| Romania               | -7.4  | -11.4 | -8.0  | -8.9  |
| Slovenia              | -10.5 | -9.8  | -7.2  | -9.2  |
| UK                    | 7.5   | -0.1  | 5.0   | 4.1   |

*Fig. 1 - The difference and average difference for chosen EU states. Source: own work*

A – difference between the goal and the real value of the employment rate for age 15 – 64,  
 B - difference between the goal and the real value the employment rate for women 15 – 64,  
 C - difference between the goal and the real value of the employment rate for age 55 – 64,  
 D – average difference for chosen EU states.

## 4. DISCUSSION AND CONCLUSION

The importance of the Lisbon Strategy lies in coordination of economic policies of EU member states. It was necessary to set up indicators, which can be used for evaluation and comparing of economies of member states. That's why a set of 15 indicators was defined as a basis for assessment and quantification of modernization of the European economy. The quantification can be made not only using the simple analytical methods (index analysis, absolute increases or decreases) but also using the multiple dimensional statistical methods, which help us to find mutual relations among groups of variables as well as inside groups.

According to Baldwin (1999), Bernard (2004), and Urban (2002), the malfunctioning labour market and other factors with influence on the economic development have led to the creation of the Lisbon strategy and setting the goal for the year 2010.

The multiple dimensional statistical methods have been proved as suitable for a complex evaluation of the EU states. The most appropriate method is the method of the average distance from a fictive object – cluster analysis, principal component analysis act (Pelkmans, 2006). The method makes possible to construct the order of states according to the detected difference. The difference is between the real situation on the labour market and the Lisbon strategy goal. The applied method brought results (see tab. 1), which divided the member states into two groups: the states that reached the goals (positive values) and the states that did not (negative values). The states fulfilling the labour market goals are Finland, Germany, Netherlands and UK; Austria and Portugal are quite close. Austria has the biggest problems in the employment

rate of persons 55 – 64 (difference -3.7). The Czech Republic is approximately on the average of EU 27 – it means it did not reach the goals. The worst situation is in Hungary, Italy and Poland. The results were influenced not only by the economy of certain countries but also by the global economic crisis, which has influenced the whole EU. The similar results were published also by Eurostat (Eurostat, 2010).

The results of the analysis proved the different economic standard of the member states with respect to the labour market and the values of disparities. These values of disparities can be used for construction of the order of states. The similar results have been proved also in this contribution. The list of the member states was different, resp. the member states till 2004 were investigated (Bernard, 2004). The differences in the regional disparities are solved by multiple dimensional methods also in Svatošová, Boháčková, Hrabánková (2005).

The “Europe 2020” is a proposal of a ten-year plan, which was published by European Commission in March, 2010, and it was intended as a substitution of the Lisbon Strategy. The goals mentioned here should ensure the modernization of the economy and the sustainable development. The two main goals are connected with the increasing of the employment rate. The first deals with the increasing of the employment in the age group 20 – 64 to 75% in the whole EU in 2020. The member states are now working on their national plans for the increasing of the employment rate in this age group. The age group is different from the Lisbon strategy (15 - 64 years). The newly proposed age groups would be able to capture the economically active inhabitants better. The reason lies in the shift of the completion of education and consequently in latter entering the economical life by young people.

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