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# Disparities regarding life quality in Central and Eastern European Countries

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# DISPARITIES REGARDING LIFE QUALITY IN CENTRAL AND EASTERN EUROPEAN COUNTRIES

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*The analysis of social indicators and the analysis of life quality are very important in order to know, in time, the changes of the main social and economic phenomena that characterize a society. To monitor the social system is a priority of modern societies because it helps to identify in time the changes of unemployment main aspects, health of population, person's level of security, educational level, life satisfaction, and even the subjective part of life quality.*

*The increase of life quality has to be a purpose of social and economic politics. Taking into consideration the progress and especially the life standard attained by the developed countries of the world, each country that presents deficiencies in social politics has to identify the best measures as an answer to the existing social needs.*

*This research aims to study the disparities regarding life quality in the following Central and Eastern European Countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Austria, Latvia, Lithuania, FYR Macedonia, Poland, Romania, Moldavia, Slovakia, Slovenia, Serbia and Montenegro, Turkey, Ukraine, Russia, Belarus.*

*The paper is structured as it follows: (1) introduction, (2) description of variables, (3) analysis of life quality in the Central and Eastern European Countries and (4) conclusion.*

*The methodological approach is based on cluster analysis and the variables were selected taking into account theoretical, conceptual and practical reasons, trying to be relevant for the investigated problems and in straight connection with the analysis objectives.*

*We try also to balance the number of the socio-economic demographic variables with the variables of the living level. From the analysis, in both cases, (with four or two groups), the revealed image is the same. There is a class of countries with a high level of life quality, characterized by a high socio-economic standard, and consequently good life conditions, and a class made of low socio-economic standard countries with low GDP, due to the inefficiency of economical politics or to the hell of civil wars and with big problems regarding corruption, civil and political liberties, life satisfaction, infant mortality and unemployment.*

*This research offers a better understanding of macroeconomics politics effects that are promoted at the level of this region as well as their improvement.*

## 1. Introduction

The life quality is one of the most important links of the statistic system from each country. The life quality analyze means first a clear definition of this concept. The concept of "life quality" was launched in the 60s by the developed societies that had as objective the fast growth of welfare. It began from the fact that every economical development must be a mean to create better living standard in order to satisfy the needs of a certain community. The special interest that American society had for this new category of social indicators is the creation at the beginning of 70s of the Coordination Centre of the social indicators research, which researched and developed the first methodology of measure of the subjective welfare (Cambell, Converse and Rodgers, 1976).

There is often confusion between the living standard and the life quality, the two concepts seem to be mixed up, but yet they are different. We understand through the living standard all the material, cultural, and social condition which the society places at the entire community's disposal. The limits of the living standard depend on the economical development level of each country, on participation degree in the process of work, on the capacities, abilities and qualitative level of the activities, and on the attitude of each person towards the income supplies.

The characterization of the living standard of a society means the analysis of the level and evolution of incomes, the level and evolution and the structure of the expenditure of the labor, of the living conditions, of the population's state of health, of the educational level of the population.

Beginning with the 60's, the concept of life quality was often associated with the concept of living standard. Thus concept was defined for the first time by sociologist Arthur Schlesinger and by the economist J.K.Galbraith, being developed later by the futurology Bertrand de Jouvenel. The opinion of different economists upon this matter are various, however the common idea is that mainly, the life quality has an organizational component of the material and cultural living standard of population. An ample definition of life quality was given by the Romanian economists M. Băcescu, A. Băcescu-Cărbunaru (1997): the life quality involves the totality of human life conditions, which assure the biological life integrity, the achievement of economical-social needs, the material and cultural living standard, the spiritual life which can allow the permanent equilibrium of the human being and the accomplishment of human personality. The life quality involves comparative to living standards also the quality of the environment, the demographic state, the quality of labor conditions and of spare time, the quality of living conditions, the state of health, the educational and cultural level, the structure and level of income, the level land structure of the expenditure, problems concerning civil and religious rights, etc.

In many cases the life quality is considered as a dependent variable, although there are cases where it is considered as an independent variable. According to the aggregation level the life quality can be considered an exogenous variable in some macro economical models. We must take into consideration analyzing the life quality the following reasons:
- the life quality must not be analyzed only through the point of view of incomes values, of expends of a human within the society, from the dimensioning of the capital goods, but it must also involves aspects that can not be measured in money;
- in order to obtain a general view on the life quality we must compare the living conditions of different social group;
- the life quality must be presented as a complex whole, but we must specify its different components which characterize specific fields from concrete domains of life quality.

The aim of this research is to study the life quality in the following Central and Eastern European countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Austria, Latvia, Slovakia, Slovenia, Serbia and Montenegro, Turkey, Ukraine, Russia, Belarus. The used methodology is multivariate statistical method cluster analysis.

The term "cluster analysis", which was used for the first time by Tyron (1939), includes a number of classifing algorithms of elements into relatively homogenous groups. The method makes a global analysis of statistical units using a high number of characteristics. The required hipotheses are minimal. A set of groups that minimizes and maximizes variation within the groups, can be identified using cluster analysis.

The paper is organized as follows: (1) Introduction, (2) Description of variables, (3) Analysis of life quality in the Central and Eastern European Countries and (4) Conclusion.

## 2. The variables

The variables which will constitute the basis of the groups setting up were selected having in view theoretical, conceptual and practical reasons, trying to be relevant for the investigate problems and in straight connection with the analysis objectives.

We tried also to balance the number of the social-economical demographic variables with the variables of the living level.

### 2.1. Demographic variables

We used the following indicators: **life expectancy at birth** (years), **fertility rate** (birth per women) and **infant mortality rate** (per 1000 life births). The data were gathered from the corresponding structure of each country given by World Bank for 2003.

### 2.2. Socio-economical variables

The used socio-economical indicators are: **gross domestic product/capita** USD $, **public expenditure on education** (% of GDP), **public expenditure on health** (% of GDP), and **unemployment rate** (% of total labor force), indicators in straight connection with the evaluation of life quality. Data were gathered from the corresponding structure of each country given by UNDP and CIA World Fact book, the reference year being 2003.

### 2.3. Variables of the level of living

The following subjective indicators of the level of living were used: **civil and political liberties** – measured as mean in between the two indicators: **civil liberties and political liberties,** measured on a scale from 1 (low level of liberties) to 7 (high level of liberties), with data provided by Freedom House for 2003; **corruption** measured with values from 0 (highly clean) to 10 (highly corrupt) and which include police corruption, business corruption and political corruption with data for 2003**, life satisfaction** - most scores are based on responses to the following question "All things considered how satisfied or dissatisfied with your life-as-a hole now? 1 dissatisfied to 10 satisfied", World Database of Happiness, Happiness in Nations, Rank Report 2003 **and objective indicators – literacy** (% of total population) with data provided by CIA World Fact book for 2003.

### 3. Analysis

The methodology used in this work includes multivariate statistical method – cluster analysis. It is the standard approach for analyzing socio-economic disparities between countries and territories.

The corresponding data for the indicators chosen for this study are presented in Table 1.

Table1. Set of 11 indicators for the evaluation of life quality in Central and Eastern European states.

| Nr. crt. | Country | Life Expectancy (years) | Fertility rate (birth per women) | Infant mortality rate (per 1000 live births) | PIB/ capita US $ | Public expenditure on education (% from PIB) | Public expenditure on health (% from PIB) | Literacy (% of total population) | Unemployment (% of total labour force) | Civil liberties (1-7) | Corruption (0-10) | Life satisfaction (1-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Albania | 74.30 | 2,20 | 18.00 | 4900 | 5.80 | 2.4 | 86,5 | 14.80 | 2.50 | 7.50 | 4.60 |
| 2 | Bosnia& Hertzegovina | 74 | 1,30 | 4.00 | 6511 | 4.0 | 2.8 | 93,0 | 44.00 | 2.50 | 6.70 | 5.10 |
| 3 | Latvia | 70.70 | 1,30 | 10.00 | 11584 | 5.9 | 3.4 | 99,8 | 8.80 | 5.50 | 6.20 | 4.80 |
| 4 | Lithuania | 71.90 | 1,30 | 8.00 | 12676 | 5.2 | 4.2 | 99,6 | 8.00 | 5.50 | 5.30 | 4.90 |
| 5 | Macedonia | 73.60 | 1,80 | 10.00 | 7041 | 4.1 | 5.8 | 96,0 | 37.70 | 3.50 | 7.70 | 4.90 |
| 6 | Poland | 74.60 | 1,20 | 6.00 | 11984 | 5.4 | 4.6 | 99,8 | 19.50 | 5.50 | 6.40 | 5.90 |
| **7** | **Romania** | **70.10** | **1,30** | **18.00** | **7680** | **3.5** | **5.2** | **98,4** | **6.30** | **5.00** | **7.30** | **4.70** |
| 8 | Moldova | 67.00 | 1,40 | 26.00 | 1926 | 4.0 | 2.8 | 99,1 | 8.00 | 4.00 | 7.60 | 3.50 |
| 9 | Slovakia | 73.40 | 1,20 | 7.00 | 14525 | 4.1 | 5.1 | 99,7 | 13.10 | 5.50 | 6.30 | 5.60 |
| 10 | Slovenia | 76.10 | 1,20 | 4.00 | 19597 | 5.4 | 6.3 | 99,7 | 6.40 | 5.50 | 4.10 | 6.30 |
| 11 | Serbia &Montenegro | 72.80 | 1,70 | 12.00 | 2426 | 5.4 | 6.5 | 93,0 | 30.00 | 2.50 | 6.70 | 5.10 |
| 12 | Turkey | 68.60 | 2,40 | 33.00 | 7303 | 3.7 | 3.3 | 86,5 | 9.30 | 2.50 | 6.90 | 5.60 |
| 13 | Ukraine | 68.30 | 1,20 | 15.00 | 6307 | 4.2 | 2.9 | 99,7 | 3.50 | 3.00 | 7.70 | 3.60 |
| 14 | Russia | 66.70 | 1,10 | 18.00 | 9817 | 3.1 | 3.7 | 99,6 | 8.30 | 2.00 | 7.30 | 4.40 |
| 15 | Bulgaria | 72.10 | 1,20 | 12.30 | 6255 | 3 | 3.9 | 98,6 | 12.70 | 4.50 | 6.10 | 4.50 |
| 16 | Croatia | 74.00 | 1,40 | 6.00 | 11195 | 4.2 | 7.3 | 98,5 | 13.80 | 4.50 | 6.30 | 5.90 |
| 17 | Czech Republic | 75.20 | 1,20 | 3.90 | 16915 | 4.4 | 6.7 | 99,8 | 10.60 | 5.50 | 6.10 | 6.70 |
| 18 | Estonia | 71.60 | 1,20 | 10.00 | 14427 | 7.4 | 4.3 | 99,8 | 9.60 | 5.50 | 4.50 | 5.20 |
| 19 | Hungary | 71.70 | 1,20 | 8.00 | 14920 | 5.1 | 5.1 | 99,4 | 5.90 | 5.50 | 5.20 | 5.50 |
| 20 | Austria | 79,10 | 1,4 | 4,50 | 31265 | 5.9. | 5.5 | 98,0 | 4.40 | 6.00 | 2.00 | 7.00 |
| 21 | Belarus | 68.20 | 1,3 | 13,00 | 6844 | 6.0 | 4.8 | 99,6 | 2.00 | 1.00 | 5.80 | 4.30 |

In order to eliminate the influence of the unit of measure in determining the distances between countries, we changed the initial data into standardized data using the transformation $a'_{ij} = (a_{ij} - \bar{a}_{ij}) / \sigma$ , where $a_{ij}$ - represents the data for each indicator, $\bar{a}_{ij}$ represents their mean and $\sigma$ standard deviation.

The mean and the standard deviation for each variable calculated with SPSS 8.0 are presented in Table 2.
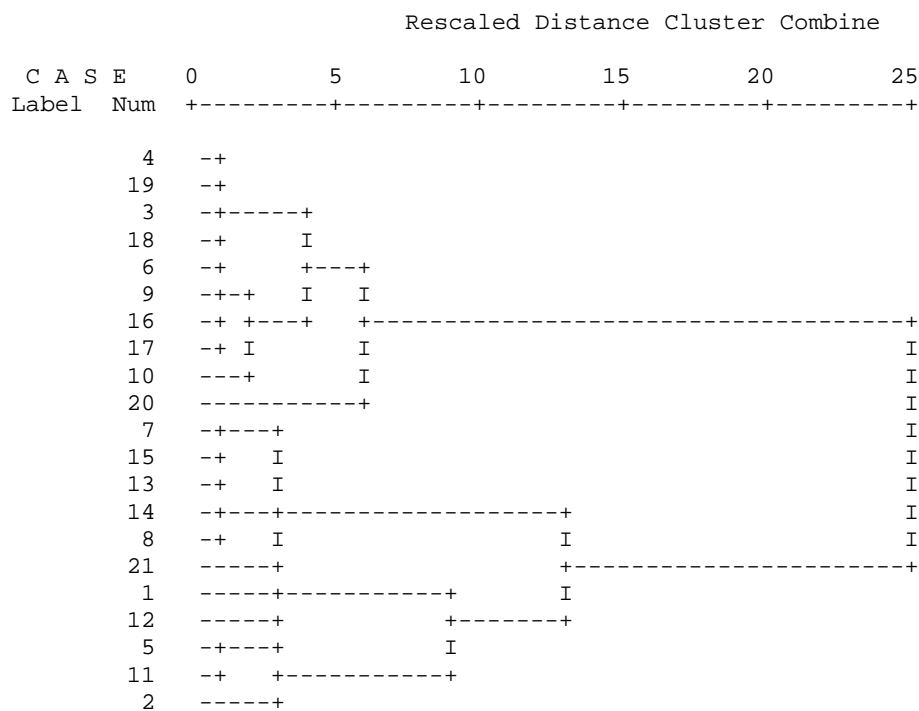
Table 2. Mean and standard deviation

| | Life expectancy | Fertility rate | Infant mortality | PIB/capita | Expenses for education | Expenses for health | Literacy | Unemployment | Civil liberties | Corruption | Life satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 72.0952 | 1.4048 | 11.7476 | 10757.048 | 4.75 | 4.6 | 97.3381 | 13.1762 | 4.1667 | 6.1762 | 5.1476 |
| Standard deviation | 3.1688 | 0.3427 | 7.5651 | 6623.0954 | 1.1197 | 1.4184 | 4.1385 | 11.0691 | 1.5193 | 1.3881 | 0.9053 |

The next step consists in introducing the standardized data in the PC for being processed with the SPSS 8.0.

Using as measure of distance the Squared Euclidian Distance and for classification the Ward algorithm, we obtain the proper dendrogram presented in Figure 1. The main difference between Ward's method and the linkage methods is in the unification procedure. This results in clusters that are as homogenous as possible (Mucha and Sofyan, 2003).

Figure 1. Dendrogram using Ward Method

```
                        Rescaled Distance Cluster Combine

    C A S E    0         5         10        15        20        25
   Label  Num  +---------+---------+---------+---------+---------+

         4    -+
        19    -+
         3    -+-----+
        18    -+     I
         6    -+     +---+
         9    -+-+   I   I
        16    -+ +---+   +------------------------------------+
        17    -+ I       I                                    I
        10    ---+       I                                    I
        20    -----------+                                    I
         7    -+---+                                          I
        15    -+   I                                          I
        13    -+   I                                          I
        14    -+---+------------------+                       I
         8    -+   I                  I                       I
        21    -----+                  +-----------------------+
         1    -----+-----------+      I
        12    -----+           +-------+
         5    -+---+           I
        11    -+   +-----------+
         2    -----+
```

Analyzing agglomeration schedule and dendrogram using Ward Method we notice that countries aggregate at low levels in between 0 and 5, but the clusters aggregation is realized at high levels (25). Differences are explained by using the Ward method meaning the variation of each class must be as small as possible while the intercluster variation must as high as possible. On the basis of dendrogram, we can classify the 21 studied countries as following:

**Class 1** is formed of: Lithuania, Hungary, Latvia, Estonia, Slovakia, Poland, Croatia, Czech Republic, and Slovenia. The distances between these countries are small and

relatively closed (the smallest distance Latvia-Lithuania, generated by the similitude between these two former USSR countries). The countries of this class have a high GDP/capita USD $ (Czech Republic has the maximum value 16 915 and Croatia the minimum value 11 995) and give high percents of GDP for education (Estonia gives the maximum value 7.4 and Slovakia the minimum value 4.1) and for health (Czech Republic gives the maximum value 6.7 and Latvia the minimum one 3.4). These countries present low unemployment rates (Croatia the maximum value 13.80 and Hungary the minimum one 5.90), a high life expectancy at birth, with values in between 70.70 and 74.00 years, an approximately equal fertility rates, the most reduced infant mortality rate among the Central and Eastern European countries (Czech Republic 3.90 - the most reduced rate of geographical zone), a high level of civil and politic liberties (5.50 excepting Croatia with 4.50) and high levels of life satisfaction (Czech Republic with the maximum value 6.70 and Latvia with the minimum value 4.80). Instead they have problems with corruption, recording high levels in between 4.10 (Slovenia) and 6.30 (Croatia). In conformity with World Bank standards 2004, Croatia, Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary are upper middle-income countries and Slovenia is high income country.
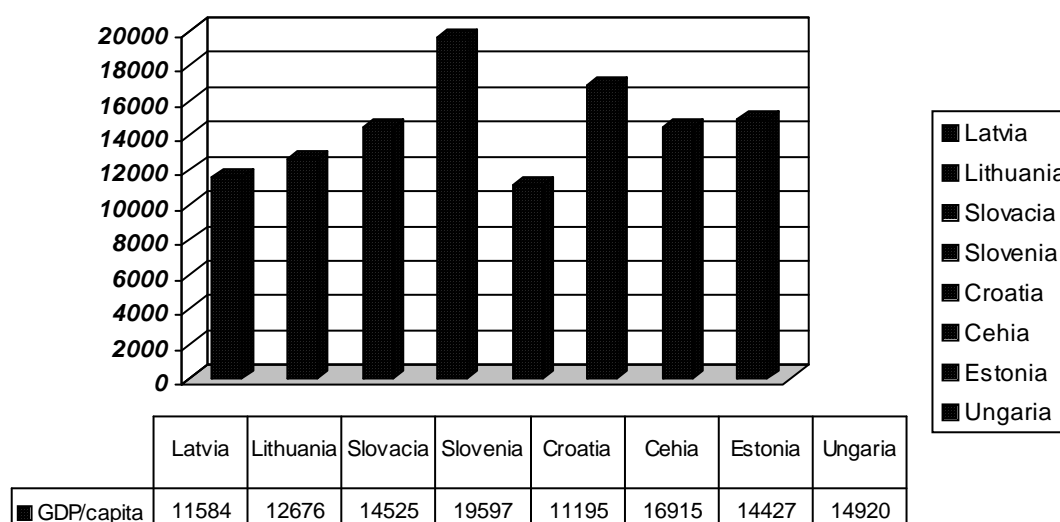
### Figure 2 - Cluster 1 GDP/capita US $



| | Latvia | Lithuania | Slovacia | Slovenia | Croatia | Cehia | Estonia | Ungaria |
|---|---|---|---|---|---|---|---|---|
| ■ GDP/capita | 11584 | 12676 | 14525 | 19597 | 11195 | 16915 | 14427 | 14920 |

**Figure 3 - Cluster 1 - Civil and political liberties, corruption, life satisfaction**

Legend: civil liberties, corruption, life satisfaction

Countries on x-axis: Latv, Lith, Slov, Slovenia, Croatia, Czech Republik, Estonia, Hungary
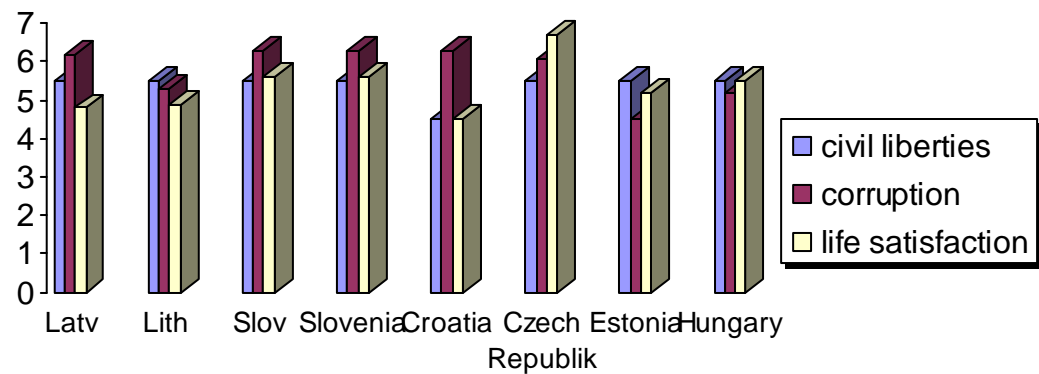
**Class 2** is formed of Austria. The isolation of Austria compared to other countries is emphasized by the big distances in comparison with the rest of the countries, being closed only by Slovenia. Austria has a GDP of 31 265 USD/capita, low rate unemployment, 4.40 % of total labor force, the greatest life expectancy at birth of the analysis countries, 79.10 years, one of the lowest rates of infant mortality, 4.50, the highest level of civil and political liberties, 6 (maximum is 7), the highest level of life satisfaction and the lowest rate of corruption, 2.

According to the World Bank Standards 2004, Austria was considered as a high income country.

**Class 3** is formed by Moldavia, Ukraine, Russia, Belarus (former USSR countries) and Romania and Bulgaria that passed through a prolonged transition process with negative results. They are countries with a modest GDP/capita, Russia having the maximum value – 9 817 and Moldavia the minimum one, 1 680 USD/inhabitant. They present low GDP provided for health and education, medium rates of unemployment but low life expectancy at birth in between 72.10 (Bulgaria) and 66.70 (Russia). They also have a reduced rate of fertility (Russia 1.10 the lowest level in the studied countries), the highest rate of infant mortality (26 in Moldavia, 18 Russia, 15 Ukraine), the lowest levels of civil and political liberties (Belarus 1.00, Russia 2.00, Ukraine 3.00, maximum Romania 5.00), a low life satisfaction and a very high level of corruption (Ukraine 7.70, Moldavia 7.60, Russia 7.30, Romania 7.30).

According to World Bank standards these countries are considered as follows: Romania, Ukraine, Russia, and Belarus - lower middle income, Moldavia - low income.
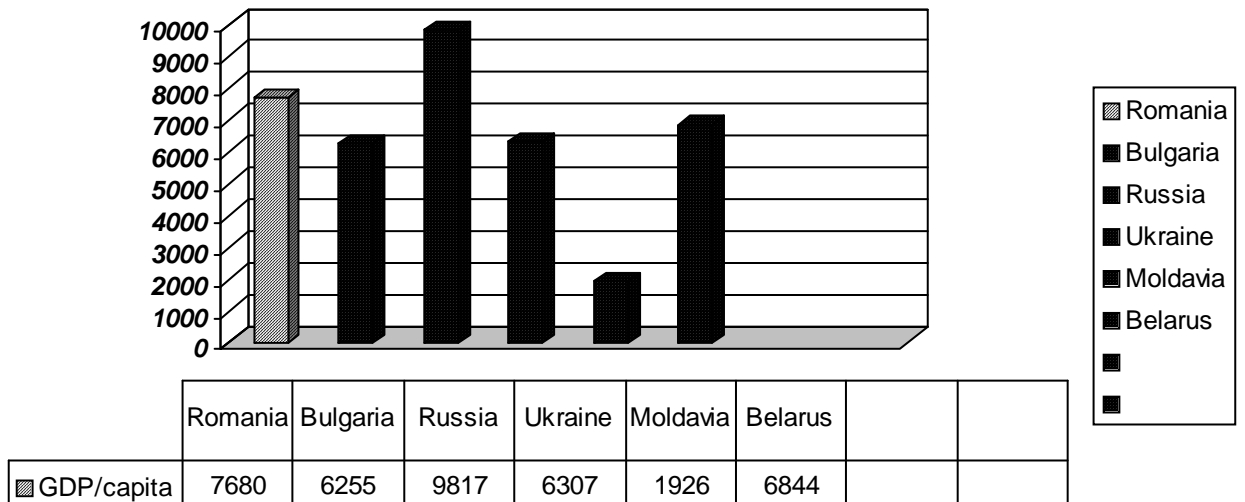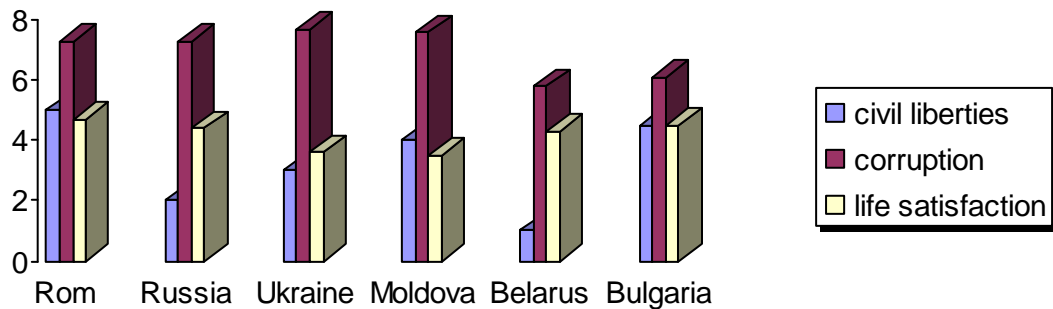
**Figure 4 -Cluster 3 - GDP/capita US $**



| | Romania | Bulgaria | Russia | Ukraine | Moldavia | Belarus | | |
|---|---|---|---|---|---|---|---|---|
| GDP/capita | 7680 | 6255 | 9817 | 6307 | 1926 | 6844 | | |

**Figure 5 - Cluster 3 - Civil and political liberties, corruption, life satisfaction**



**Class 4** contains Albania, Turkey, Macedonia, Serbia and Montenegro, Bosnia and Herzegovina. They are countries with a very low GDP/capita: Albania, 4 900, Turkey 7 303, Macedonia 7 041, Serbia 2 426, Bosnia 6 511, low percents of GDP earmarked for education and health, high rates of unemployment (Bosnia 44% of total labor force, the highest value of the studied countries, Macedonia 37.70, Serbia 30.00, Albania 14), the highest rate of fertility in the region, due to the prevailing Muslim religion, but the highest infant mortality rates (Turkey 33, the first place among the studied countries, Albania 18, Serbia 12), the lowest level of liberty in the region, 2.50 Turkey, Albania, Bosnia and Herzegovina, Serbia, and 3.50 Macedonia, a low life satisfaction, big problems with corruption, Albania 7.50, Turkey 6.90, Macedonia 7.70, Serbia and Bosnia 6.70. Macedonia, Serbia and Montenegro, Bosnia and Herzegovina are former countries of Yugoslavia that encountered the hell of civil wars. According to World Bank standards 2004 these countries are lower middle income countries.
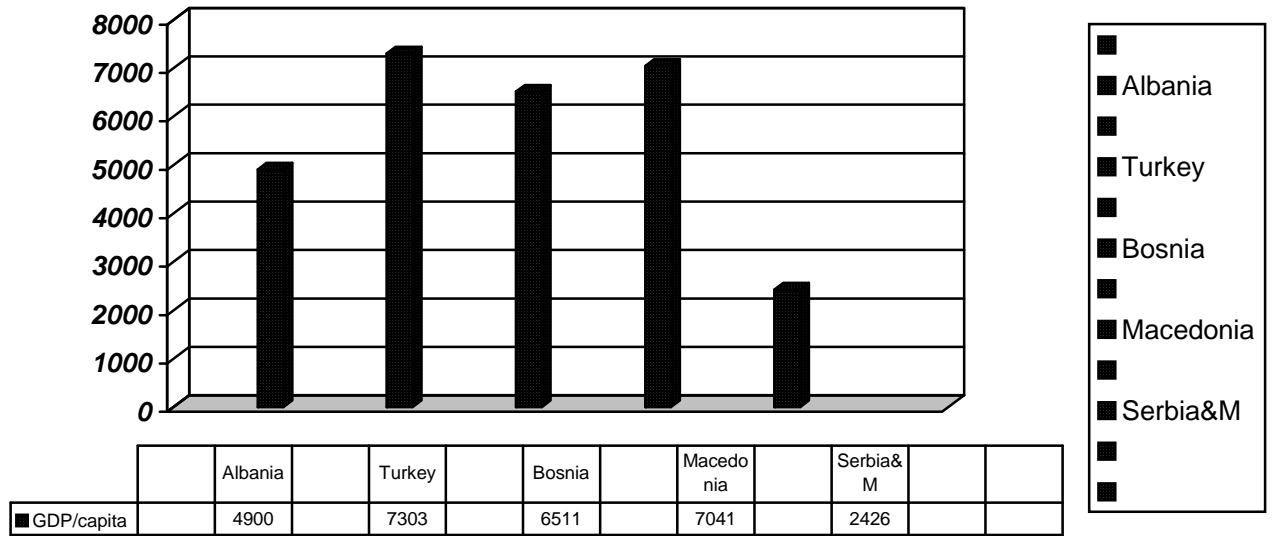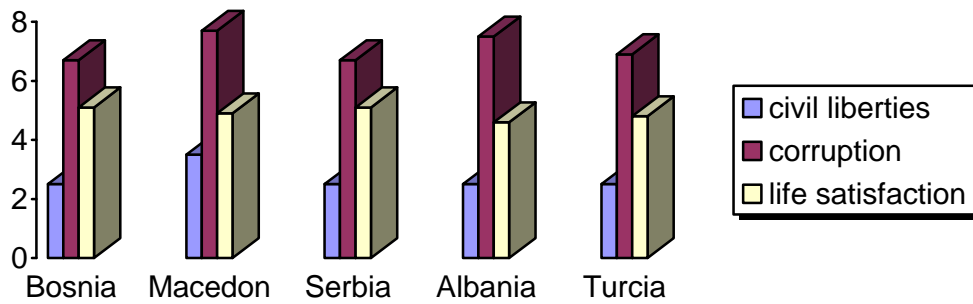
**Figure 6 - Cluster 4 - GDP/capita US $**

| | Albania | Turkey | Bosnia | Macedonia | Serbia&M |
|---|---|---|---|---|---|
| ■ GDP/capita | 4900 | 7303 | 6511 | 7041 | 2426 |

Legend: Albania, Turkey, Bosnia, Macedonia, Serbia&M

**Figure 7 - Cluster 4 - Civil and political liberties, corruption, life satisfaction**

Categories: Bosnia, Macedon, Serbia, Albania, Turcia

Legend: civil liberties, corruption, life satisfaction

The map after using Ward algorithm shows as follows:

Figure 8 The resulted groups map



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For the next step we improved the presented solution of Ward algorithm, using this time K-means of iterative partition method and the centroids of the above-presented groups as cluster initial centers. We chose the two-cluster solution classifying the analyzed countries as following:

**Class 1 - good level of life quality** - Lithuania, Latvia, Estonia, Hungary, Czech Republic, Croatia, Slovakia, Poland, Slovenia, Austria.

**Class 2– low level of life quality** – Romania, Moldavia, Ukraine, Russia, Bulgaria, Belarus, Albania, Bosnia and Herzegovina, Turkey, Serbia and Montenegro, Macedonia.

The medium values of the indicators used in this analysis for each cluster are presented in Table 6

Table 6    Summary statistics

| Mean | Cluster 1 10 countries *Good quality of life* | Cluster 2 11 countries *Low quality of life* | Mean difference | t | Sig (2-tailed) |
|---|---|---|---|---|---|
| Literacy | 99.41 | 95.45 | 3.9555 | 2.444 | 0.024 |
| Civil liberties | 5.54 | 3 | 2.4500 | 6.369 | 0.027 |
| Unemployment | 10.01 | 16.05 | -6.0445 | -1.269 | 0.000 |
| Life satisfaction | 5.78 | 4.57 | 1.2073 | 4.070 | 0.000 |
| Corruption | 5.24 | 7.02 | -1.7873 | -3.818 | 0.220 |

| Life expectancy | 73.83 | 70.51 | 3.3118 | 2.759 | 0.211 |
|---|---|---|---|---|---|
| Fertility rate | 1.26 | 1.53 | -0.2764 | -1.975 | 0.001 |
| Infant Mortality | 6.74 | 16.30 | -9.5600 | -3.696 | 0.003 |
| PIB | 15 888.800 | 6091.81 | 9796.9818 | 5.050 | 0.012 |
| Educational expenses | 5.30 | 4.25 | 1.0455 | 2.371 | 0.063 |
| Health expenses | 5.25 | 4.00 | 1.2409 | 2.182 | 0.002 |

The differences between the two clusters are obvious. Comparing the two clusters we observe that: literacy is higher with 3.95 percent, civil and political liberties with 2.45, life expectancy at birth with 3.31 years, life satisfaction with 1.20, GDP with 9 796, 98, the percent from GDP for education with 1.05 and for health with 1.24 and the unemployment rate is lower with 6.04, corruption with 1.78, fertility rate with 0.27 and infant mortality with 9.56. Using the T-test we notice that the differences between the averages of the indicators are statistical significant.

**4. Conclusion**

We used in this paper the cluster analysis for classifying the Central and Eastern European countries depending on the life quality. The procedure suggests four groups of countries using Ward method and two groups of countries after the improvement of Ward method. The most used variables from the study are also indicators of social and economic development and their values increase or decrease if the indicator is positively or negatively correlated with the economic development.

In both cases, with four or two groups, the revealed image is the same. There is a class of countries with a high level of life quality, characterized by a high socio-economic standard, and consequently good life conditions, and a class made of low socio-economic standard countries with low GDP due to the inefficiency of economical politics or to the hell of civil, with big problems regarding corruption, civil and political liberties, life satisfaction, infant mortality and unemployment. As we can see on the European map, the countries with high life quality and implicitly a high social economic life standard are those placed in the middle of the continent that present favorable straight connection with the developed western part of the Europe, while the countries with a low life standard are countries that were under the former USSR influence or with civil and politic problems, having an impact on the social-economic development.

The two final classes resulted from the life quality study are presented in Table 9.

Table 9 Life quality in Central and Eastern European Countries

| Nr. Crt. | Good life quality | Low life qualit |
|---|---|---|
| 1 | | Albania |
| 2 | | Bosnia&Hertzegovina |
| 3 | Latvia | |
| 4 | Lithuania | |
| 5 | | Macedonia |
| 6 | Poland | |
| 7 | | Romania |
| 8 | | Moldova |
| 9 | Slovakia | |
| 10 | Slovenia | |

| | | |
|---|---|---|
| 11 | | Serbia&Montenegro |
| 12 | | Turkey |
| 13 | | Ukraine |
| 14 | | Russia |
| 15 | | Bulgaria |
| 16 | Croatia | |
| 17 | Czech Republic | |
| 18 | Estonia | |
| 19 | Hungary | |
| 20 | Austria | |
| 21 | | Belarus |

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