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Development of quality of life economic indicators with regard to the environment

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Abstract

Quality of life is a very complex concept and is influenced by several factors, one of which is the quality of environment. Increase in quality of environment calls for greening of social development, awareness of all segments of society, legal and economic instruments, planning processes, but especially industrial and other economic sectors, as well as the local economy. At first glance it may seem that if the overall economic development of the country, in which the individual lives, is good it also ensures growing trend in quality of life. Unfortunately global experience does not confirm this argument. Countries with above average economic growth may have limited respect for human rights, increased greenhouse gas emissions, etc. The aim of this paper is to highlight the link between quality of life and environmental quality in 10 selected countries. We use the results of our own analysis; we base our research on the evaluation of selected indicators, which support our efforts. The aim is to highlight the development of human development index, environmental performance index and corruption perception index in selected countries

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Keywords: quality of life; human development index; environmental performance index; environment.

1. Introduction

The term “quality of life” is extremely complex; it is affected by a number of factors, and in the literature is interpreted in different ways. It should be noted that the history of the term itself depends on the work of

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economists and sociologists including John Kenneth Galbraith, Denisa Riesman and Ronald Freedman, who were associated with the criticism of the consumer lifestyle in the USA. They criticized the orientation of American society on consumption and its emphasis on the quantity of produced and consumed goods negatively affects quality of life. Moreover, in such a lifestyle they saw wasted resources and a danger to humanity.

This term captures a specific condition, quality, which is derived from survival instinct as a basic human instinct in situations in which people occur, to protect themselves from threats and keep their own life and health, as well as the lives of their descendants. The Compendium of OECD well-being indicators of economic and social progress clearly differentiates material conditions from quality of life. By material conditions of life it means economic welfare (economic well-being). Quality of life is defined as the set of non-financial, non-monetary attributes of individuals, which co-determines their life chances and opportunities in life and have value in different cultures and contexts (Compendium of Key Well-Being Indicators, OECD, 2011). There are authors who emphasize the intangible quality of life, for example English researcher and writer Amy Fontinelle (Fontinelle, 2011) who believes that "quality of life is subjective and intangible." In her opinion the Declaration of Human Rights, adopted by the UN in 1948, provides an excellent list of factors to assess the quality of life (Fontinelle, 2011). A synthetic indicator of the subjective quality of life is happiness. One comparative study conducted in the early 1990s placed the average level of happiness in Czechoslovakia at 5.57 on a scale of 0 to 10. Compared with Austria (index 7.33), Poland (index 6.57) and Hungary (index 5.73) Czechoslovakia in the early 1990s had far fewer happy people than neighbouring countries (World Database of Happiness, update 1996). The highest values of happiness among the countries surveyed were in Scandinavia, for example Iceland (index 7.93), and Sweden and Denmark (both index 7.87).

Quality of life is not only linked with the environment. Respect for the shared values of the population. Surveys show that the most important values for the residents of the 27 EU countries (Eurobarometer 72, 2009) are respect for human life (44%), peace (42%) and human rights (40%). These are also the most highly ranked values in Slovakia although the order differs from the larger EU- human rights (42%), peace (39%) and respect for human life (35%).

With the development of civilization and the constant technological progress there is an increase in a number of factors that affect quality of life. At the same time the overall issue could be accessed from multiple points of view. With the rapid development of information technology, transportation, manufacturing and services increasing trend of complexity of the concept of quality of life is even more intensified. Quality of life in the age of globalization is affected mainly by the state of environment and economy. The subjective needs of people come to the forefront of their hierarchy of needs. Besides all the different definitions Epley & Menon (2008) opined that “quality of life has become a potential marketing tool for cities around the countries.”

In economic science, society-wide perception It is commonly accepted that the size of the gross domestic product does not automatically translate into people's everyday lives, and that there is not a linear relationship between growth of gross domestic product and increases in the standard of living and better lives for the inhabitants of a country. The application of GDP and GDP per capita, as instruments to evaluate the success of economic growth, calls for wider debate and rigorous respect for the content of these indicators. This issue highlights a wide response in the professional and scientific literature. Specifically this issue is highlighted in the report of Stiglitz, Sena and Fittoussi (Stiglitz, Sena & Fittoussi, 2009).

2. Selected dimensions and indicators of quality of life

According to some authors, there are three main philosophical approaches to determining quality of life (Brock, 1993). The first approach describes the characteristics of the good life dictated by normative ideals based on religion, philosophy or other systems. The second approach is based on the satisfaction of preferences. Under this approach, quality of life is based on whether citizens can obtain things they crave. The third definition of quality of life is comes from the perspective of individuals. (Diener & Suh, 1997). Brock points out that while the first concept of quality of life is related to social indicators in the social sciences, the third is connected with the tradition of subjective wellbeing in the behavioural sciences (Brock, 1993). Lately, research has proven that use of a multi-dimensional structure has advantages when measuring and predicting quality of life (Bramston, Chipuer & Pretty, 2005; Matarrita-Cascante, 2010). Bramston *et al.* (2005) used a multidimensional approach to evaluate quality of

life. They used measures of both satisfaction and importance in material wellbeing, health, productivity, intimacy, safety, community, and emotional wellbeing. There are almost always used aggregated indicators for measurement. These indicators (indices) allow comparisons on different levels, mainly international but also national or regional. They are also used to identify trends in many areas according to the indicators used, and the calculation of an aggregate indicator. The advantages of aggregation are comparability of results, the possibility of substitution, and opportunity of prioritization by assigning weights. Statistical measurement of quality of life for the European Statistical System is based on a set of 37 indicators, some of which are considered major and some as secondary. A suggested list of indicators is included in the final report of the sponsoring group to measure development and sustainability. It is a set of objective and subjective indicators derived from current or prospective surveys in the European Union implemented both within and outside of the European Statistical System. Some of the proposed indicators are simple indicators and some are synthetic indicators, a methodology for which will be developed later.

According to the authors the most fundamental dimensions of quality of life can be classified as (Stiglitz *et al.*, 2009):

- material living conditions (income, consumption and property security),
- health and conditions of its maintenance,
- education and access to education,
- opportunities for personal self-realization, including jobs,
- the possibility of participation in public affairs,
- space for the realization of social contacts,
- current and future environment,
- uncertainty and risks (economic instability, natural disasters ...).

The most readily available information exists to evaluate the first dimension – material conditions. Stiglitz *et al.* (2009), however, highlights the need for much more thorough tracking of assets of households and individuals. Particularly problematic in terms of methodology is calculation and tracking of the value of non-market household activities and leisure time activities. Statistically covered areas – health, education and work, are quite well documented.

Every year "The International Living Magazine" ranks countries from all around the world according to the level of quality of life. In their assessment they consider nine categories: cost of living, culture, economy, environment, freedom, health, infrastructure, safety, and climate. There are also other indices of quality of life in current usage. Economist Intelligence Unit – EIU (The Economist Intelligence Unit's Quality-of-Life Index, 2005) developed a quality of life index for 111 countries in 2005. It was based on specific methodology and it considered nine indicators (EIU, 2006):

- material well-being,
- health – measured by life expectancy at birth,
- political stability and security,
- family life – divorce rate, converted into index,
- community life – church attendance or trade-union membership considered,
- climate and geography,
- job security,
- political freedom,
- gender equality.

Also very well known are the European Quality of Life Survey, OECD Better life index, Happy Planet index and Satisfaction with Life index. Consideration was given to all of the indices but, for the purposes of our analysis, we chose the Human Development Index. As we already mentioned, when assessing quality of life it is important to consider not only wealth and employment but also the environment, physical and mental health, education and other factors. We compare HDI with the selected index, which evaluates environment. The selection of environ-

ment was supported by the fact that it is currently one of the most important issues, and one which is discussed both in practise and academic discourse. The most commonly used are the Environmental Sustainability Index, the Environmental Vulnerability Index and the Green GDP. For the purpose of our comparison we selected the Environmental Performance Index. Finally, we include the results of a corruption perception index, as corruption is one of the factors affecting social and economic development. The aim is to evaluate development of selected indices for the set of specific European countries to see whether there is a relationship between those indices.

3. Indices and data

In this section we present the indices that we use for our analysis and the data set created for the purpose of this research. Overall we selected 3 main indices that we already mentioned in the previous section and 10 countries. First of all we provide short description of selected indices.

3.1. HDI – Human development index

One of the best known indications of economic growth and social progress is also relatively simple composite indicator of human development – Human Development Index – HDI (UNDP, 2010), which has long been applied in programs of the UN and its agencies. The index was first published in 1975. Since 1990, the index values are published annually in the Human Development Report of UNDP. According to the index of human development the basis of human development is the opportunity for a long and healthy life, knowledge acquisition, access to resources essential to the normal way of life and being a part of the community. Based on that, the HDI was developed and is used globally to measure human development. Behind the creation of this index is Pakistani economist Mahbub ul Haq. The Index consists of several indicators by which a country's achievements in three main areas of human development are measured (UNDP, 2010):

- economic growth (economic standard of living) – expressed through indicators of GDP per capita, it represents average standard of living,
- level of education – expressed through indicators of literacy of the adult population,
- health (longevity / life-span) – expressed through indicators of life expectancy, reflecting the possibility of people for a long and healthy life.

The following secondary indices are calculated from those above:

- GDP-I-pc, which reflects standardized value of the GDP per capita compared with the highest value of GDP in the whole group of countries studied,
- EDU-I, which shows the normalized value of the variable literacy of the adult population compared with the highest value of this indicator in the study group,
- LE-I, which reflects analogically life expectancy at birth in a particular country in comparison to the other countries studied.

The resulting HDI, which final value is between 0 and 1, is the simple arithmetic mean of partial indices; therefore, each dimension has the same weight. This presents a problem. The HDI does not consider distributions but averages. Anand and Sen (1994) consider this criticism but they also argue that “a distribution-sensitive scalar measure would continue to involve some loss of information, since there is no way of capturing the entire wealth of knowledge embedded in a set of numbers in one real number.” A detailed methodology of the calculations is included in the Annexes of Human Development Report, published annually by the United Nations through its Agency for Development (UNDP.)

The overall concept of HDI is complicated but provides a wide range assessment of human development in countries around the world since it is not based only on traditional economic and financial indicators.

3.2. EPI – Environmental performance index

For the environment there is the Environmental Performance Index (EPI). It represents 149 countries on 25 indicators across six categories: health effects, air pollution, water resources, biodiversity and habitat, productivity

of natural resources and climate change. Developed at Yale University, it has been used since 2006 and is the successor to the earlier Environmental Sustainability Index (ESI). The EPI is composed of criteria that assess environmental problems. It consists of 26 indicators to which concrete weight and score is assigned. Maximum rating is 100 points. Subsequently states are ranked starting with the greatest number of points (Yale Center for Environmental Law and policy).

3.3. CPI – Corruption Perception Index

This Index measures the perception of corruption in the public sector and reflects the quality of the business environment. Transparency International has published it annually since 1995. Based on a combination of surveys from research institutions and expert opinion from countries around the world, it includes both objective and subjective data. All the components of the index are standardized in a range from 0 to 10. Higher numbers represent less corruption. Despite the limitations of this index the CPI is considered as an effective tool promoting transparency of the economic environment. Transparency International encourages discussions of corruption (Transparency International).

3.4. Object of research

To meet the main objective it is necessary to define the object of our research. We chose a set of countries that we compare based on the values of their indices and indicators. For our paper we have selected countries grouped in V4, namely Slovakia, Czech Republic, Hungary and Poland, due to their relative similarities in structural changes after 1989. Other selected countries are Norway, Sweden, and Switzerland, all countries highly ranked by the EPI, HDI, CPI and GDPpc (GDP per capita) and their quality of life achieves values significantly higher than average. For comparison we have included in our set of the countries analysed the three Baltic republics, namely Lithuania, Latvia and Estonia. Like the V4 countries they joined the European Union in 2004. In early 2000s they experienced rapid growth and improvement in their market economies but subsequently have been hit hard by the financial crisis. According to the International Monetary Fund (IMF), the total GDP based on purchasing power parity decreased by approximately 13–17% between years 2008 and 2009. The recession in the Baltic countries Estonia, Latvia and Lithuania was the worst in the entire 27-nation European Union.

The total sample includes 10 countries and from the selected countries we have created 3 clusters:

Table 1. Created clusters

Cluster	Group	Countries
A	Baltic countries	Lithuania, Latvia, Estonia
B	Top ranked countries	Switzerland, Sweden, Norway
C	V4	Slovakia, Czech Republic, Hungary, Poland

The period covered is 2005–2012. The research also identifies and assesses the data for 2000 because of the long-term comparability and development of monitored indicators. Data are collected from reports and statistics published on external and international websites including the World Bank and Transparency International.

4. Results and research prospects

In this section we analyse the interrelationship between indices and indicators of quality of life. We examine whether there is a dependency between them. To do this, we use an econometric model to determine the dependence of two variables. The analysis is based on comparison of the values of indices and indicators in the context of time. Table 3 EPI index values for each country in selected years shows the actual scores given for a period of time from 2000 until 2012. We conclude that EPI Slovakia is constantly improving signalling progress in meeting its objectives in the field of environmental policy. When we consider V4 group, Slovakia is currently in the

best position in terms of environmental performance. Since 2005, in the selected countries reviewed by the study, we can observe an increase in their rating points. It terms of order of the countries monitored, in global assessment Slovakia reached 12th place. For comparison, Czech Republic (18), Poland (22), Hungary (45). Among all selected countries globally, the best score was achieved by Switzerland, which is worldwide in 2012 on first place. One of the reasons may be that the Swiss have a sophisticated system of waste management. The the level of recycling is highly weighted and Switzerland recycles up to 90% of all waste. Waste management in Switzerland is on the highest level of all. Conversely, the weakest score from our selection of 10 countries is Estonia, currently ranked 54th place globally. The most significant improvement since 2000 was recorded in Slovakia, which in 2000 was ranked 21st but currently is placed on 12th in the world ranking. Conversely, the biggest deterioration among the countries is observed in Estonia. Ranking 37th place in 2000 it fell to 54th in 2012.

Table 2. EPI index values for each country in selected years

Country	2000	2005	2006	2007	2008	2009	2010	2012
Slovakia	60.1	64.0	64.8	66.1	66.3	66.6	66.6	66.62
Czech Republic	60.5	63.0	63.6	64.2	64.5	64.8	64.8	64.79
Poland	62.0	62.5	62.9	63.2	63.2	63.5	63.5	63.47
Hungary	52.4	56.5	56.5	56.8	57.0	57.1	57.1	57.12
Norway	68.1	70.2	70.1	70.2	70.3	69.9	69.9	69.92
Sweden	66.4	67.3	67.6	68.2	68.5	68.8	68.8	68.82
Switzerland	76.2	77.3	77.3	78.0	77.8	77.4	76.7	76.69
Latvia	63.8	69.8	69.6	70.0	70.2	70.4	70.4	70.37
Estonia	55.6	56.0	57.2	56.4	56.4	56.5	56.1	56.09
Lithuania	61.9	64.8	65.1	65.2	65.2	65.5	65.5	64.8

In Table 3 HDI for countries in the selected period we can see the values of HDI. The rating ranges from 0 to 1. We can conclude that in selected countries since 2000, there is a continued increase in the value of HDI. When we consider only V4, the best country is Hungary which in 2012 reached assessment of 0.905. Slovakia is in third positionamong the V4 countries. The best rating among the countries observed in 2012 wasNorway, a global leader in the HDI. Very positive assessment is also given to Sweden and Switzerland. The worst position among the countries was reached by Latvia, with the score of 0.814, and in terms of overall ranking is currently in 44th place globally.

Table 3. HDI for countries in the selected period

Country	2000	2005	2006	2007	2008	2009	2010	2012
Slovakia	0.785	0.814	0.821	0.83	0.833	0.833	0.836	0.84
Czech Republic	0.824	0.862	0.866	0.869	0.873	0.87	0.871	0.873
Poland	0.778	0.798	0.802	0.806	0.811	0.813	0.817	0.821
Hungary	0.867	0.889	0.892	0.896	0.898	0.898	0.902	0.905
Norway	0.922	0.948	0.951	0.952	0.95	0.95	0.952	0.995
Sweden	0.903	0.905	0.907	0.909	0.91	0.907	0.913	0.916
Switzerland	0.882	0.898	0.901	0.901	0.900	0.906	0.912	0.913
Latvia	0.738	0.792	0.800	0.808	0.812	0.806	0.805	0.814
Estonia	0.786	0.830	0.836	0.841	0.842	0.837	0.839	0.846
Lithuania	0.756	0.802	0.806	0.810	0.813	0.809	0.810	0.818

Table 4 shows the evaluation of the countries by the CPI indicator. In the V4 countries we can see the growth in the variable only in the case of Poland from the value of 4.1, which was reached in 2000 to 5.5 obtained in 2011. Among the V4 group corruption decreased only in Poland. Hungary, Czech Republic and Slovakia recorded decreases in the value of the CPI, i.e. an increased in perceived corruption. The greatest drop was observed in Hungary. The position of the V4 countries in the overall ranking of countries varies with the most significant decrease in Slovakia, which fell from 49the position to 66th. The greatest progress in the rankings is observed in Poland which showed improvement for each reference years. Overall, V4 oscillated at around 50th position. In the Baltic countries, Estonia achieved the best rating, but the biggest improvements were seen in Latvia. Sweden is the CPI leader among selected countries.

Table 4. CPI for countries in the selected period

Country	2000	2005	2006	2007	2008	2009	2010	2011	2012
Slovakia	3.5	4.3	4.7	4.9	5	4.5	4.3	4	46
Czech Republic	4.3	4.3	4.8	5.2	5.2	4.9	4.6	4.4	49
Poland	4.1	3.4	3.7	4.2	4.6	5	5.3	5.5	58
Hungary	5.2	5	5.2	5.3	5.1	5.1	4.7	4.6	55
Norway	9.1	8.9	8.8	8.7	7.9	8.6	8.6	9	85
Sweden	9.4	9.2	9.2	9.3	9.3	9.2	9.2	9.3	88
Switzerland	8.6	9.1	9.1	9	9	9	8.7	8.8	86
Latvia	3.4	4.2	4.7	4.8	5	4.5	4.3	4.2	49
Estonia	5.7	6.4	6.7	6.5	6.6	6.6	6.5	6.4	64
Lithuania	4.1	4.8	4.8	4.8	4.6	4.9	5	4.8	54

In 2012 the method of calculating CPI was modified; the rating interval changed from 0-1 to 1-100.

After the general evaluation of development of selected indices in countries of specified set, we decided to proceed with the research and measure the dependence among selected variables. That is why the goal of the proceeding study is to measure the dependence of selected indicators in a sample of countries where in the calculation we use the model introduce by Samimi *et al.* (2011), which we subsequently modified for the needs of our future research:

$$EPI_{it} = \beta_0 + \beta_1 HDI_{it} + \beta_2 CPI_{it} + \beta_3 lnGDP_{it} + \beta_4 lnGDP^2_{it+it} \quad (1)$$

In which EPI_{it} is environmental performance index, HDI_{it} is human development index, CPI_{it} is corruption perception index and $lnGDP_{it}$ is logarithm of GDP per Capita (at purchasing power parity) and $LnGDP^2_{it}$ is Standard error of the index, i shows country and t shows time.

5. Conclusion

Quality of life is a very complex concept. The quality of life for residents of any country is influenced by a number of factors such as economic, social, cultural, and environmental. In their classification, we record different approaches, perspectives and theories. Over the time, since we encounter with the concept of quality of life, we could register several types of classification of factors connected to quality of life; from different authors and international organizations such as OECD, UN, World Bank. In 2009 scientists led by Stiglitz, Sen and Fitoussi at the request of the then Prime Minister Sarkozy developed a report titled *The Measurement of economic performance and social progress*. This paper deals with three main topics such as GDP, quality of life, and sustainable growth and environment. The report makes recommendations on how to proceed with the measurement and evaluation of these three concepts. In the literature, and also in national economic practice, there have been several other attempts to develop and apply new tools for measuring and assessing economic and social progress and quality of life. Although the methodology of such an assessment is not clearly formulated, it can be concluded that

the newly proposed schemes of real gross domestic product include (in various fashion and with various weights) components reflecting the parameters of economic growth, social development and environmental impacts.

For parameters of economic growth there are attempts to review and incorporate characteristics such as economic diversity, international trade, real income of the population, the level of tax burden, the volume of savings, and economic infrastructure. In the group of indicators of social development we can find social indicators that reflect income conditions of the population and levels of poverty, income differentiation, employment and unemployment, minimum wage, the extent of housework and volunteer activities, life expectancy, infant mortality, health status of the population, the incidence of obesity, the extent of crime, abuse and more. A system of proposed environmental indicators contains information about available fossil energy sources, the level of energy consumption, sustainability of agricultural production and timber processing, the state of protected natural areas, the state of water resources and conservation of water, greenhouse gases, ecological pressure on the environment and more. Report of the Commission on the Measurement of Economic Performance and Social Progress of Professors J. E. Stiglitz, A. Sena and J. P. Fitoussi (Stiglitz *et al.*, 2009) speaks about the urgency of better, more correct interpretation of statistical data and indicators. According to the authors, right at the start of recession in 2008, the need arose to transform the system that fosters measurement of economic performance measurement to one measuring human wellbeing. They recommend spending more time on finding adequate indicators measuring various kinds of consumption and the measurement of non-market activities, as well as the measurement of income distribution and overall functioning of private households.

This article deals with the evaluation of the EPI, HDI, and CPI in the 10 European Union countries, which we divided into 3 clusters. Development of the indicators was observed in the period of 2000–2012.

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