INTERNATIONAL JOURNAL OF ECONOMICS AND STATISTICS
DOI: 10.46300/9103.2022.10.28 Volume 10, 2022

Standards of Living Indices Modelling in European Monetary Union Members Countries

Jiří Křupka[1], Romana Provazníková[2]
[1]Institute of System Engineering and Informatics
Faculty of Economics and Administration, University of Pardubice
Studentská 84, 532 10 Pardubice, Czech Republic

Jan Langer[1], Miloslava Kašparová[1]
[2]Institute of Economic Science
Faculty of Economics and Administration, University of Pardubice
Studentská 84, 532 10 Pardubice, Czech Republic

***Abstract*—In the article a problem of modelling of standards of living is presented. The standards of living problem is described for real data set about 17 member states of European Monetary Union. It focuses on the quality of life and economic prosperity of the country. Models of Quality of life index, Prosperity index and Complete Standard of Living were proposed and analysed on the basis of cluster analysis algorithm TwoStep. Models were realised in SPSS Clementine.**

***Keywords*—quality of life; objective evaluation; prosperity index; cluster analysis**

I. Introduction

At present the European Union member states struggle with considerable economics and social problems produced with economics and financial crises. Significant impact of crisis appears mainly in some countries of European Monetary Union - Eurozone. In the article we asses standards of living (SL) in 17 member states of European Monetary Union. SL is assessed by means "Standards of living I", which is focused on evaluation of living standard, and "Standards of Living II", focused on economic prosperity of the country.

It does not exist any generally accepted definitions of standard of living. It should be considered as social- economics category. According to [1] standard of living is historically conditioned level of fulfilment peoples living conditions (material and spiritual), sum of living, existential, labour and others conditions, under which are these needs fulfilled. SL depends on existing production relations and on the level of production factors development.

The most important become those segments of SL which are connected with the general need to preserve and improve the living conditions on the Earth, to face ecological crisis, mainly air and water pollution, protect the nature and as well to avoid war catastrophes [1].

SL should be expressed by the system of quantitative and qualitative indicators, mostly aggregated into the composite indexes based on subjective SL and quality of life evaluation as well as objective indicators characterised socio-economical, ecological and political conditions [2-6]. Objective assessment of SL is mainly focused on assumed sources of living standard and quality of life [7, 8]. Subjective assessment is based on accomplishing personal targets, individual's self-realisation and satisfaction with own life (human well-being).

The objectives of the paper are:

- Selection of appropriate characteristics (indicators) for objective SL measurement based on the expert evaluation of selected indices and approaches to the SL assessment
- Comparison assessment of SL in Eurozone countries with selected approaches and models used to asses SL and well-being of individuals in a country
- Creation own assessment of objective segment of SL in Eurozone countries by means of the cluster analysis (CA) modelling

II. Problem Formulation

Among the most frequently used indicators for expressing SL belongs: Index of Sustainable Economic Welfare [9], Human Development Index [10], life fulfilment indicators - Quality of Life Index [11], Better Life Index [12], Legatum Prosperity Index [13], Happiness Indicators [14], Ecological Footprint [15], etc.

On the very similar components (ecological, economic, and social) are based indicators, which are developed for estimating of sustainable development of a country, region and an enterprise e.g. Sustainable Society Index [16].

Quality of life and SL measurement is provided by number of researches and institutions, namely e.g. United Nations [10], with its Human Development Index created in 1990, OECD [12],with quite new Better Life Index, Legatum Institute and its Prosperity index [13], Mercer Human Resource Consulting with Mercer´s quality of Living Survey Liveability [7] and the Economist Intelligence Unit's Global Liveability Report [17]. Two last mentioned (latter) create world's most liveable cities as they rank on a reputable annual survey of living conditions.

This work was supported by the project No. SGFES02 of the Ministry of Education, Youth and Sports of CR with title Research and Development Activities in the area of System Engineering and Informatics at the Faculty of Economics and Administration, University of Pardubice in 2013.

Last but not least is necessary to mention the indicator Gross National Happiness [14], which is presented by Bhutan state as guidelines on measuring subjective well-being, (measures of life satisfaction, happiness, and similar concepts).

Very interesting results and methodological approach of the sustainable development investigation in rural territories are presented by studies developed in Baltic countries [18]. A large area of rural territories, a relatively small number of populations in them, and a high percentage of senior people, influence quality of life in them. The historically development environment of rural areas in these countries (and other „new" European member states) is undoubtedly of great significance for the development of the whole country.

A. Standards of Living Models and Indicators

On account of analysis of above-citied approaches to assessment SL and quality of life, appropriate indicators what characterise economical, socio-demographical and environmental aspects in Eurozone countries were assorted. Apart from economic factors (Gross Domestic Product, industrial production, government debt, current account of balance of payments, unemployment and inflation) also socio-demographic indicators (health care expenditures, poverty and social exclusion, fertility, life expectations) and environmental indicators (greenhouse gas emissions, electricity generated from renewable resources, municipal waste generation and treatment) were inserted.

The most common, the simplest and the most frequently used indicator for the performance of the economy, is the **Gross Domestic Product** (GDP**)**. GDP is an indicator of the output of a country or a region. GDP at market prices is the final result of the production activity of resident producer units.

Harmonized indices of consumer prices (HICPs) give comparable measures of inflation for the countries and country groups they are produced. They are economic indicators that measure the change over time of the prices of consumer goods and services acquired by households. They are a set of consumer price indices (CPIs) calculated according to a harmonised approach and a single set of definitions. HICPs are produced and published using a common index reference period (2005=100). In the article growth rates with respect to the previous month (M/M-1) are used.

General government gross debt as a percentage of GDP. The indicator is defined (in the Maastricht Treaty) as consolidated general government gross debt at nominal value, outstanding at the end of the year in the following categories of government liabilities (as defined in ESA95): currency and deposits, securities other than shares excluding financial derivatives, and loans. General government sector comprises the subsectors: central government, state government, local government and social security funds.

The current account of balance of payments (BoP). The current account is the sum of the balance of trade (exports minus imports of goods and services), net factor income (such as interest and dividends) and net transfer payments (such as foreign aid). The current account is one of the three balance of payments sub-balances together with capital account and financial account. The balance of payments is the statistical statement that systematically summaries, for a specific time period, the economic transactions of an economy with the rest of the world.

The unemployment rate represents unemployed persons as a percentage of the labor force based on International Labor Office (ILO) definition. The labor force is the total number of people employed and unemployed. Unemployed persons comprise persons aged 15 to 74 who: a) are without work during the reference week; b) are available to start work within the next two weeks; c) and have been actively seeking work in the past four weeks or had already found a job to start within the next three months. Data are presented in seasonally adjusted form.

The industrial production index shows the output and activity of the industry sector. It measures changes in the volume of output on a monthly basis. Data are compiled according to the Statistical classification of economic activities in the European Community. The current base year is 2010 (Index 2010 = 100). Growth rates are presented with respect to the previous month (M/M-1) and are calculated from calendar and seasonally adjusted figures.

From the socio-environmental area following indicators were chosen:

Total fertility rate. The mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years. This indicator conforming to the fertility rates by age of a given year. This rate is therefore the completed fertility of a hypothetical generation, computed by adding the fertility rates by age for women in a given year (the number of women at each age is assumed to be the same).

Life expectancy at certain ages represents the mean number of years still to be lived by a person who has reached a certain exact age, if subjected throughout the rest of his or her life to the current mortality conditions (age-specific probabilities of dying).

Public health care expenditure (in percentage of GDP). Data provide information on expenditure in the functionally defined area of health distinct by provider category (e.g. hospitals, general practitioners), function category (e.g. services of curative care, rehabilitative care, clinical laboratory, patient transport, prescribed medicines) and financing agent (e.g. social security, private insurance company, household).

People at risk of poverty or social exclusion (percentage of total population). This indicator corresponds to the sum of persons who are: at risk of poverty or severely materially deprived or living in households with very low work intensity. Persons are only counted once even if they are present in several sub-indicators. At risk-of-poverty are persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60% of the national median equivalised disposable income (after social transfers). Material deprivation covers indicators relating to economic strain and durables. People living in households with very low work intensity are those aged 0-59 living in households where the

adults (aged 18-59) work less than 20% of their total work potential during the past year.

Total **Greenhouse gas emissions** (in CO_2 equivalent) indexed to 1990 (index =100). This indicator shows trends in total man-made emissions of the "Kyoto basket" of greenhouse gases. The "Kyoto basket" of greenhouse gases includes: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and the so-called F-gases (hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride (SF_6)). These gases are aggregated into a single unit using gas-specific global warming potential (GWP) factors. The aggregated greenhouse gas emissions are expressed in units of CO_2 equivalents. The indicator does not include emissions and removals related to land use, land-use change and forestry (LULUCF); nor does it include emissions from international aviation and international maritime transport.

Electricity generated from renewable sources (share on gross final energy consumption). This indicator is the ratio between the electricity produced from renewable energy sources and the gross national electricity consumption for a given calendar year. It measures the contribution of electricity produced from renewable energy sources to the national electricity consumption. Electricity produced from renewable energy sources comprises the electricity generation from hydro plants (excluding pumping), wind, solar, geothermal and electricity from biomass/wastes. Gross national electricity consumption comprises the total gross national electricity generation from all fuels (including autoproduction), plus electricity imports, minus exports.

Municipal waste generation and treatment (kg per capita) Municipal waste consists to a large extent of waste generated by households, but may also include similar wastes generated by small businesses and public institutions and collected by the municipality; this part of municipal waste may vary from municipality to municipality and from country to country, depending on the local waste management system. For areas not covered by a municipal waste collection scheme the amount of waste generated is estimated.

III. Data Description and Analysing

With using selected indicators [7, 8, 10-15] the SL indicator has been constructed. For its derivation were used two attribute (variables, indicators) sets from economical and socio-environmental area.

For creation of entering data set, real data from the Eurostat database between 2002-2011 [19] have been used. There are 15 attributes total, among them 2 are demographical attributes – state g_1 and year g_2 which identifies the particular country in time. For economical area was defined vector $\mathbf{a} = (a_1, \ldots, a_6)$ and for social-environmental area vector $\mathbf{b} = (b_1, \ldots, b_7)$. Variables are described in two parts of data dictionary, see the Table I and Table II.

Values for attribute g_1 and g_2 were defined by the following way: g_1 = {Finland, Netherland, Ireland, Luxembourg, Germany, Austria, Belgium, France, Spain, Slovenia, Malta, Portugal, Cyprus, Italy, Estonia, Slovakia, Greece} and g_2 = {2002, 2003, …, 2011}.

The input matrix have been formulated $\mathbf{M}(170\times15)$, which includes 17 countries in time horizon 10 years and 15 attributes. The elementary statistical analysis of input set of data has been provided. For each attribute were calculated Count, Mean, Minimum, Maximum, Median, Mode, Variance and Stand. Deviation [19, 20].

For absolute number of modelling techniques and algorithms complete input set of data is needed. Based on verifying completeness of data in some attributes (b_1 "Number of children per woman" and b_2 "Life expectancy") were fulfilled 5 missing values. There are available several methods for calculating missing values. As a simplest method the substitution of one value is considered. According to this method the missing value is replaced by median or mode of the particular set of data [22]. In our case the method of regression substitution [22, 23] have been used with using correlation in set of data [24, 25].

TABLE I. DATA DICTIONARY (PART 1)

Variable			
Name	***Type***	***Range***	***Unit***
State	Set	{Austria, ..., Spain}	-
Year	Set	{2002, ..., 2011}	year
HICPs	Range	[83.29; 132.93]	%
Government debt	Range	[3.57; 162.45]	%
Current account of BoP	Range	[-27 782; 45 377]	mil. EUR
Unemployment	Range	[2.47; 21.45]	%
Industrial production	Range	[67.39; 148.52]	%
GDP	Range	[1 225; 20 475]	EUR per inhabitant
Fertility rate	Range	[1.19; 2.07]	person
Life expectancy	Range	[70.5; 81.7]	age
Public health care expenditures	Range	[4.8; 12]	%
People at risk of poverty or social exclusion	Range	[14.9; 33.5]	%
Greenhouse gas emissions	Range	[663.66; 2 807.71]	tons per 100 thous. inhabitants
Electricity generated from renewable sources	Range	[0; 67.69]	%
Municipal waste generation and treatment	Range	[23.9; 78.49]	kg per capita

IV. The Design of Standards of Living Models

With using selected indicators [7, 8, 10-15, 26] the SL indicators have been constructed. For its derivation were used two attributes (variables, indicators) from economical and socio-environmental area. Based on data analysis and survey of available relevant resources has been appeared that it is necessary the process of modelling SL to divide into two parts

- SL index I s_1 and SL index II s_2. SL index I focuses on Quality of Life and SL index II describes economic prosperity the examined countries.

TABLE II. DATA DICTIONARY (PART 2)

Variable		Atribut
Name	***Description***	***Name***
State	Country description	g_1
Year	Year describtion	g_2
HICP	Rate of inflation (year average from monthly growth rates)	a_1
Government debt	Percentage of GDP	a_2
Current account of BoP	Balance of current account	a_3
Unemployment	Rate of unemployment	a_4
Industrial production	Increasing of industrial production (year average from monthly growth rates)	a_5
GDP	Level of Gross Dmestic Product	a_6
Fertility rate	Number of children per women	b_1
Life expectancy	Life expectancy at birth at certain age	b_2
Public health care expenditures	Percentage of GDP	b_3
People at risk of poverty or social exclusion	Percentage of total population	b_4
Greenhouse gas emissions	trends in produkce per 100 thouts. inhabitants	b_5
Electricity generated from renewable sources	Share of electricity produced from renewable energy sources and the gross national electricity consumption	b_6
Municipal waste generation and treatment	Waste generated by household	b_7

CA is used for defining clusters of standards of living based on the value of the attributes. CA [22, 27-30] is an exploratory data analysis tool for solving classification problems. The object is sorted into groups, or clusters, so that the degree of association is strong between members of the same cluster and weak between members of different clusters. The task of clustering is then to divide the set of objects into the disjunctive clusters. The decision making about the object clustering in cluster is realized on the basis of the similarity by application of metric [22, 31]. The basic division of methods is mentioned for instance in [22] and application in [27].

A. Modelling of Quality of Life

Design of the model (Fig. 1) is based on the comparison quality of live in Eurozone countries [32]. In that approach the index of quality of live has been constructed on 10 indicators (mainly from economic and social areas) with data of 2009 year. For each indicator the rank of the best and the worst country was defined in observed area. Subsequently was calculated arithmetic mean of ranking for each country. This parameter represents quality of live index.

On the basis of [26] and data analysis 4 input attributes a_4, a_6, b_2 and b_4 have been designed. Output derived variable Standards of living index I s_1 has been constructed with using CA TwoStep method with 4 and 3 values (number of clusters) for s_1. More useful results have been reached for three clusters c_1, c_2 and c_3, presented by values {low, middle, high} level of s_1 (Table III). Countries have been assigned to particular clusters as value of attribute g_1.

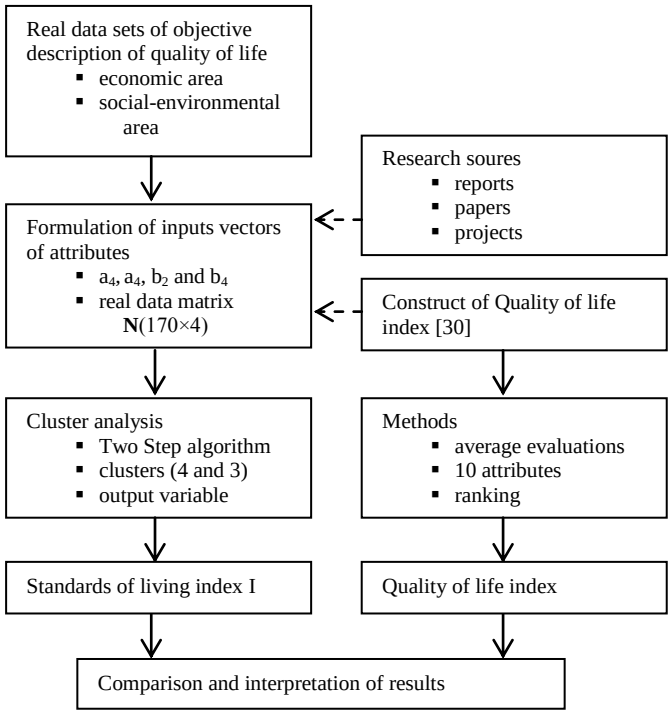

Fig. 1. Model of Quality of life indexes

TABLE III. CLUSTER DESCRIPTION FOR ATRRIBUTE s_1

Cluster	Value of attribute	
Name	***Meaning***	***Representation of attribute g_1***
c_1	low	Estonia, Slovakia
c_2	middle	Ireland, Spain, Portugal, Cyprus, Italy, Greece
c_3	high	Finland, Netherland, Luxembourg, Germany, Austria, Belgium, France, Slovenia, Malta,

It is possible to characterised identified clusters by normalised values of attributes in Fig. 2.

Cluster 1 represents countries with lowest GDP, lowest life expectancy, hig level of people at risk of poverty or social exclusion and high unemployment. Cluster 2 is characterised by higl level of GDP, high life expectancy years, very low level of people at risk of poverty or social exclusion and unemployment. Cluster 3 is characterized with highest value of life expectancy. Remaining attributes of this cluster demonstrate inferior results as cluster 2.

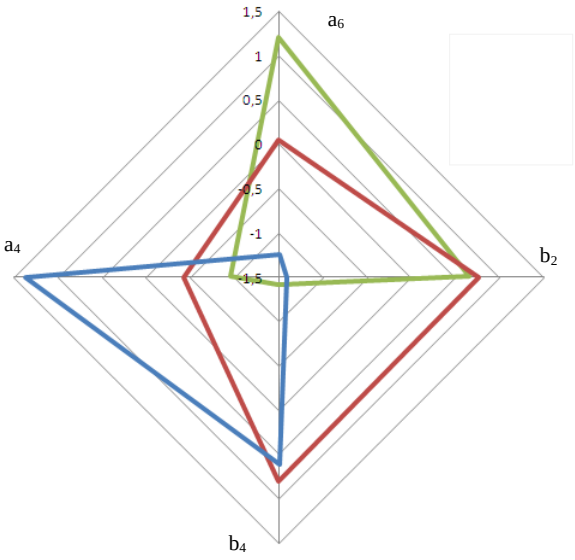

Fig. 2. Representation of normalised values of attributes a_4, a_6, b_2, b_4 for Standards of living index I s_1; where green line represents high, red line represents middle and blue line represents low value of this index

In comparison the results of evaluation with Quality of life approach [32] and our modelling of Standards of living index I some differences are obvious. Results are identical in countries with high standard of living (cluster c_3), except Ireland (in our assessment was qualified as country with average standard of living in cluster c_2) and Malta (this country was by our model evaluated better than assessed in Quality of life approach – it was on 14. place ranked only). The best evaluation in both approaches was reached by Luxembourg. Countries classified to the category of average standard of living (cluster c_2) and low level of standard of living (cluster c_1) is consistent only for Slovakia. Countries as Portugal, Greece, Spain are ranked on last places in Qality of life approach.

Incomparability of time in assessment can be indicated as the main reason of results discrepancy mentioned above. Whereas in our analysis we use data from 2002-2011, Quality of life approach worked with data from 2009 year. This is importatnt mainly in South European countries, where impact of economic crises was significant in following years. Ranking of the Ireland in our model could be explained by higher level of people at risk of poverty or social exclusion in Ireland contrary to the rest of countries with high level of living standard.

B. Modelling of Prosperity Indexes

Design of the model (Fig. 3) comes out from Legatum Prosperity index which works with objective as well as subjective variables to measure prosperity [13]. Legatum Prosperity index assesses global wealth and well-being and benchmarks 142 countries around the world. Index is based on 89 different variables grouped into 8 sub-indices which are averaged using equal weights. The 8 sub-indices are: Economy, Education, Entrepreneurship & Opportunity, Governance, Health, Personal Freedom, Safety & Security, and Social Capital.

Each sub-index is constructed using econometric analysis to determine what increases both per capita income and life satisfaction of a country's citizens. Within each sub-index is used regression analysis to identify and retain those variables that are statistically relevant to income and well-being. Regression analysis sets the weight (regression coefficient) of each variable within sub-index. Prosperity index score is determined by assigning equal weights to all 8 sub-indices for each country. The average of the 8 sub-indices yields a country´s overall prosperity score [13].

On the basis of [13] and data analyse 5 input attributes a_1, a_4, a_6, b_3 and b_4 have been constructed. Output derived variable Standards of living index II s_2 has been constructed with using CA TwoStep method with 4 and 3 values (number of clusters) for s_2. As in previous case, better results were obtained for clusters c_1, c_2 and c_3, represented by values {low, middle, high} level of s_2 (see Table IV).

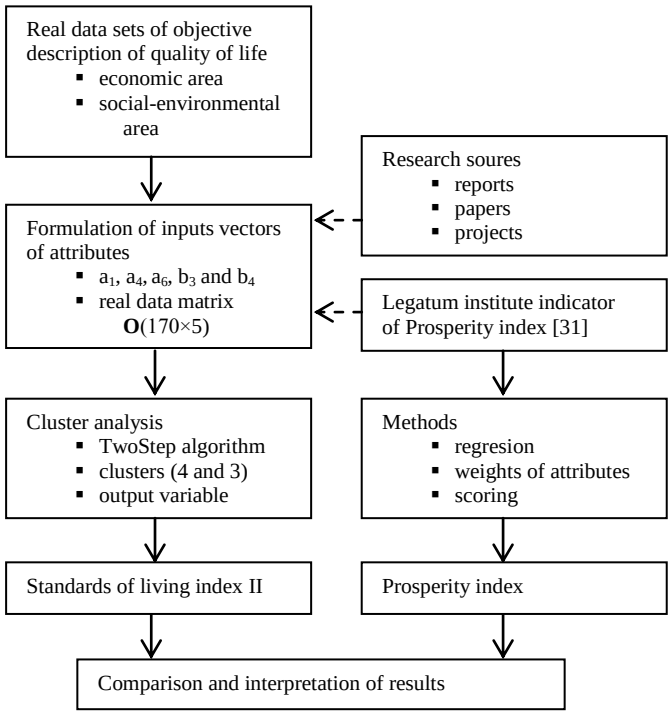

Fig. 3. Model of Prosperity indexes

TABLE IV. CLUSTER DESCRIPTION FOR ATRRIBUTE s_2

Cluster	**Value of attribute**	
Name	***Meaning***	***Representation of attribute g_1***
c_1	low	Spain, Portugal, Italy, Estonia, Slovakia, Greece
c_2	middle	Finland, Ireland, Luxembourg, Slovenia, Malta, Cyprus
c_3	high	Netherland, Germany, Austria, Belgium, France

Designed clusters could be characterised by normalised values of attributes in Fig. 4. Attribut a_1 "Harmonized indices

of consumer prices (HICPs)" the CA algorithm identified as unimportant variable and from this reason is not included in the figure.

Cluster 1 is characterised with the lowest GDP, high number of people at risk of poverty or social exclusion and unemployment. This cluster represents countries with low standard of living. Cluster 2 illustrates countries with average standard of living (higher level of GDP, quite high number of people at risk of poverty or social exclusion and low unemployment). It is characterised wit lowest health care expenditures. Cluster 3 comprises countries with the highest GDP and health care expenditures, lowest number of people at risk of poverty or social exclusion and unemployment.

Our modelling of Standards of living index II shoved that it does not correspond with results in ranking countries according to the Legatum Prosperity index. It can be explained by number of indicators (variables) entering to the calculation of index. As was already mentioned, the Prosperity index works with 89 variables, whilst for our Standards of living index II we have chosen only 6 indicators. Moreover one third of variables in Prosperity index is obtained on respondent surveys and refers to well-being measurement. Our analysis is based only on objective variables.

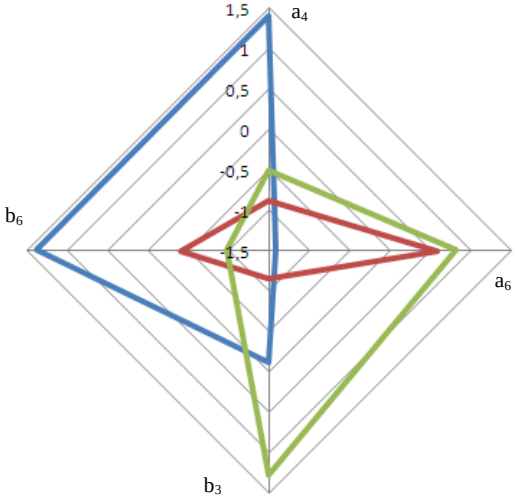

Fig. 4. Representation of normalised values of attributes a_4, a_6, b_3, b_4 for Standards of living index II s_2 ; where green line represents high, red line represents middle and blue line represents low value of this index

Legatum Prosperity index is constructed for data from period 2006-2010 years, which almost correspond with our period of time used in our model for Standards of living index II. This aspect is not the main reason of incompatibility of analysed indices.

C. Modelling of Complete Standard of Living Index

In this part of the article we designed the model of Complete Standards of Living (Fig. 5). This model includes all variables described in Table II and work with complete input matrix **M**(170×15).

Output derived variable Complete standards of living index s_3 have been designed with using CA TwoStep method with 4 and 3 values (number of clusters) for s_3. As in previous two cases again more appropriate cases have been reached for three clusters c_1, c_2 and c_3, presented by values {low, middle, high} level of s_3 (see Table V). Countries have been assigned to particular clusters as value of attribute g_1. Identified clusters could be characterised by normalised values of attributes in Fig. 6.

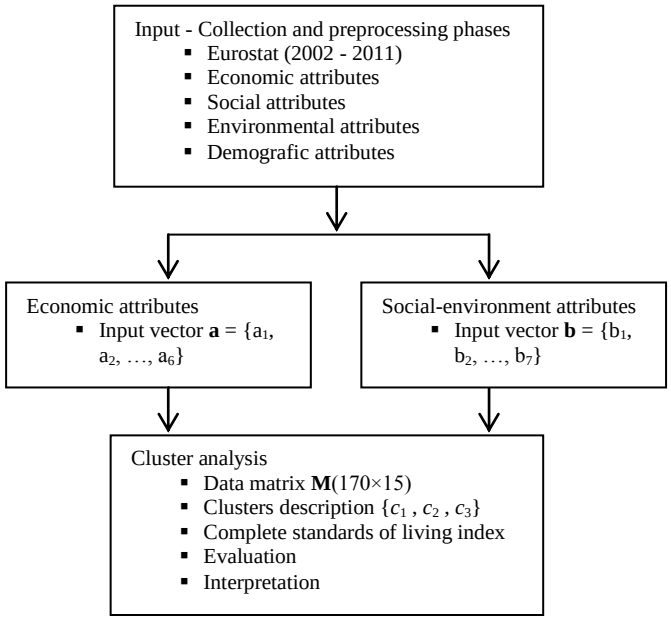

Fig. 5. Model of Complete Standard of Living

TABLE V. CLUSTER DESCRIPTION FOR INDEX s_3

Cluster	**Value of index**	
Name	***Meaning***	***Representation for attribute g_1***
c_1	low	Spain, Slovenia, Portugal, Italy, Estonia, Slovakia, Greece
c_2	middle	Ireland, Luxembourg, Malta, Cyprus,
c_3	high	Finland, Netherland, Germany, Austria, Belgium, France,

Cluster 1 illustrates lowest GDP, lowest life expectancy, and lowest fertility among three designed clusters. Current account of BoP exhibits deficit. There is also high unemployment and high number of people at risk of poverty or social exclusion. It can be considered as cluster with negative values in economic and socio-demographic indicators. Only in the area of environmental indicators it reaches sufficient values. This cluster comprises countries with low Index of standard of living.

Cluster 2 is characterised by high GDP, the highest level of life expectancy, and highest fertility rate. Includes countries with high level of health care expenditures, and low number of people at risk of poverty or social exclusion. Even the share of electricity generated from renewable sources is high. This cluster demonstrates countries with high index of Standard of living. Cluster 3 represents countries with high level of GDP,

low unemployment and level of government debt. The values of environmental indicators are unsatisfactory (high level of greenhouse emissions and household waste generation and low level of electricity generated from renewable sources. This cluster includes countries with average Index of Standard of living.

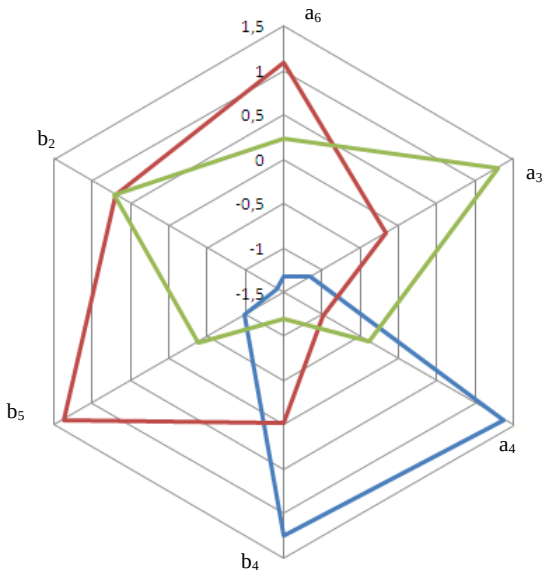

Fig. 6. Representation of normalised values of choosing attributes a_3, a_4, a_6, b_2, b_4 and b_5 for Complete Standards of living index; where green line represents high, red line represents middle and blue line represents low value of this index

V. Conclusions

In the article three models of standards of living of Eurozone countries have been designed. In two cases were used indices Quality of life Index and Prosperity Index. Our models were designed by mean of CA TwoStep method and in all three models where three clusters created. The result of our models demonstrated, that created clusters of group of countries are not fully comparable with assessment of countries according to the Quality of life index and Prosperity Index. The main reason of incomparability in the model of Quality of life can be considered different time horizon for input data. Whereas in our analysis data from 2002-2011 have been used, quality of life approach worked with data only from 2009 year. This is not the aspect of discrepancy in model of Prosperity Index where both approaches worked with very similar time period. Legatum Prosperity index is constructed for data from period 2006-2010 years. The difference in second models could be explained by number of indicators (variables) entering to the calculation of indices. Prosperity index uses much greater number of variables comparing with our Standards of living model.

The third model have been designed with variables characterised all aspects of standard of living (economic and socio-environmental). The results demonstrate that the western countries of Eurozone together with Slovenia and Finland correspond with high level of Standard of living Index. Contrary to the South and East European countries, which represent low level of Standard of living Index. These countries exhibit substantial results in environmental area however in economic and socio-demographic exhibit weak values.

Our analysis and quality of life models were designed only on the pattern of Eurozone countries. Generally are "old" EU member states considered as countries with highest level of standard of living and quality of life. Non all of them are members of Eurozone (e.g. Denmark, Sweden) and therefore was not included in our analysis. Conversely countries, which joined EU after year 2004, so called "new" member states could be considered as countries with lower level of standard of living and quality of life. In our modelling only Eurozone countries (Estonia, Slovakia, Slovenia) have been included and our models confirmed their lower quality of live level. These "new" countries are altogether net recipients (their contributions into the common European budget are less than the amounts received from this budget) – sources are dedicated for support of their further development. Majority of "old" countries are net contributors to the common EU budget. Surprising is comparison of these receipts/contributions recalculated per capita: according to this recalculation Luxembourg is the biggest recipient [33]. Relationship between standard of living, quality of life and net position of an each EU member country could be area of our further research and modelling.

References

[1] Životní úroveň [Standard of Living]. Co je co - vaše encyklopedie [What is What - Your Encyclopedia] [online]. 2000 [cit. 2013-01-30]. Available at: http://www.cojeco.cz/index.php?detail=1&id_desc=109875&s_lang=2&title=%9Eivotn%ED%20%FArove%F2 (in Czech)

[2] M. Rapley, M. Quality of Life Research: A Critical Introduction, SAGE: London, 2003, Reprint 2007.

[3] D. Phillips, D. Quality of Life: Concept, Policy and Practice, Routledge: London 2006.

[4] J. Kim, E. Hatfield, "Love Types and Subjective Well-being: A Cross-Cultural Study", Social Behavior and Personality, Vol. 32, No. 2, 2004, pp. 173–182.

[5] J. Křupka, M. Kašparová, P. Jirava, P., J. Mandys, "Quality of Life Modeling at the Regional Level", In: Olej, V., Obrsalova, I., Krupka, J. (Eds.) Environmental Modeling for Sustainable Regional Development: System Approaches and Advanced Methods, IGI Global: US, 2011, pp. 392-415.

[6] J. Křupka, M. Kašparová, J. Mandys, P. Jirava, "Quality of Life Modelling on the basis of Qualitative and Quantitative Data", In: Y. Holtzman (Eds.) Advanced Topics in Applied Operations Management, InTech, Rijeka: Croatia, 2012, pp. 133-156.

[7] Kvalita života [Quality of Life]. Vliv změn světa práce na kvalitu života [Impact of Changes in Labor World for Quality of Life] [online]. 2009 [cit. 2013-01-31]. Available at: http://www.google.cz/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDIQjBAwAQ&url=http%3A%2F%2Fkvalitazivota.vubp.cz%2Fprispevky%2Fsoudoba_sociologie_II_kvalita_zivota-svobodova.doc&ei=gCwKUa6KDujL4ASU1oCQDA&usg=AFQjCNEc-QqWcnNOo1dY2sETh6Kp3sLmAA&bvm=bv.41642243,d.Yms (in Czech)

[8] J. Poláčková, A. Jindrová. "Assessment of subjective aspects of the quality of life in the various regions of the Czech Republic". Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis Vol. 28, No. 7, 2011 [online]. 2011 [cit. 2013-02-19]. Available at: http://www.mendelu.cz/dok_server/slozka.pl?id=51329;download=88550

[9] Economics online. ISEW. [online]. 2013 [cit. 2013-03-05]. Available at: http://www.economicsonline.co.uk/Global_economics/Measure_of_economic_welfare_MEW.html

[10] UNDP. Human Development Reports. International Human Development Indicators. [online]. 2013 [cit. 2013-03-05]. Available at: http://hdr.undp.org/en/statistics/

[11] The world in 2oo5. Quality-of-life index. The Economist Intelligence Unit's quality-of-life index Quality of Life Index. [online]. 2013 [cit. 2013-03-05]. Available at: http://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf

[12] OECD Better Life Index. [online]. 2013 [cit. 2013-03-05]. Available at: http://www.oecdbetterlifeindex.org/#/11111111100

[13] The 2012 Legatum Prosperity Index. Legatum Institute [online]. 2012 [cit. 2013-03-05]. Available at: http://www.prosperity.com/Ranking.aspx

[14] Gross National Happiness. [online]. 2013 [cit. 2013-03-05]. Available at: http://www.grossnationalhappiness.com/

[15] EPA Victoria. Ecological Footprint, Measuring our impact on the environment. [online]. 2013 [cit. 2013-03-05]. Available at: http://www.epa.vic.gov.au/ecologicalfootprint/

[16] L. Abele, M. Zeltiņa, L. Simanskiene, D. Burgis. "The Evaluation of the Effectiveness of the Environmental Management Instruments of Latvia", Economics and Management, Vol. 3, No. 17, 2012, pp. 929-935.

[17] The Economist. Economist inteligence unit. Global_liveability_report - Melbourne retains the crown of most liveable city. [online]. 2013 [cit. 2013-03-05]. Available at: http://www.eiu.com/site_info.asp?info_name=The_Global_Liveability_Report

[18] L. Simanskiene, A. Kutkaitis, A. Buciene. "How to Select The Rates of Sustainable Development in Rural Territories: The Insights to Methodological Approach", Economic Science for Rural Development, No. 30, 2013, pp. 1-6.

[19] European Commission. Eurostat [online]. 2012 [cit. 2012-11-03]. Available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

[20] M. Meloun, J. Militký, Kompendium statistického zpracování dat [Compendium of Statistical Data Processing]. Praha: Academia, 2006. (in Czech)

[21] R. Nisbet, et al. Handbook of Statistical Analysis and Data MiningApplications. Academic Press, 2009.

[22] J. Han, M. Kamber, M., Data Mining: Concepts and Techniques. Morgan Kaufmann Publishers: San Francisco, 2001.

[23] O. Rud, Data Mining. 1st ed., Praha: Computer Press, 2001. (in Czech)

[24] J. Kubanová, Statistické metody pro ekonomickou a technickou praxi [Statistical Methods for Economic and Technical Practice]. Bratislava: Statis, 2003. (in Czech)

[25] SPSS. SPSS Inc. Clementine® 12.0 Desktop User´s Guide. 2007

[26] Kde se v Evropě žije nejlépe? [Where is the Best Live in Europe?]. E15 [online]. 2009 [cit. 2013-03-05]. Available at: http://finexpert.e15.cz/kde-se-v-evrope-zije-nejlepe (in Czech)

[27] P. Guidici, Applied Data Mining: Statistical Methods for Business and Industry, West Sussex: Wiley, 2003.

[28] O. Maimond, L. Rokach, The Data Mining and Knowledge Discovery Handbook, New York: Springer, 2005.

[29] O. Maimon, L. Rokach, Decomposition metodology for knowledge discovery and data mining, World Scientific Publishing: London, 2005.

[30] I.H. Witten, E. Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufman Publishers: San Francisco, 2005.

[31] SPSS (2002). Clementine® 7.0 User's Guide. SPSS Inc.

[32] Co to je životní úroveň? [What is the Living Standard?]. SOCIOweb [online]. 2005 [cit. 2013-01-30]. Dostupné z: http://www.socioweb.cz/index.php?disp=teorie&shw=113&lst=108 (in Czech)

[33] J. Kovárník. "The Analysis of Net Position Development and the Comparison with GDP Development for Selected Countries of European Union", in Panian Z. (Ed.) Resent Researches in Business and Economics : Proc. of the 4th WSEAS World Multiconference on Applied Economics, Business and Development (AEBD´12), Porto, Portugal, July 1-3, 2012. Athens: WSEAS Press, 2012. pp. 223-228.