WELL-BEING OF THE MUNICIPALITIES IN SLOVENIA

BLAGINJA OBČIN V SLOVENIJI

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ABSTRACT

Well-being is a complex multidimensional concept defined as a state of being happy, healthy and prosperous. Generally, well-being is geographically not evenly distributed within a country. Major differences in well-being among territorial units at subnational level impede the progress of society and may cause economic, social, urban, environmental and political problems. Acknowledging of regional differences in well-being is of key importance for efficient planning and implementation of regional and spatial policy measures. The principal objective of these policies is balanced regional development proven by diminishing differences in economic development and well-being. The paper deals with the measurement of geographical differences of well-being in Slovenia using composite indicators based on principal components. Municipalities were selected as basic units, since presently municipality is the only type of subnational government in Slovenia. They represent the level of government closest to people that provides local public services to community. Well-being was defined by 49 quantitative social, economic, demographic and environmental indicators. The indicators were selected on the basis of relevance for well-being and data availability at the municipality level. In order to verify the validity of the measurement of well being using composite indicators and to enhance the interpretability and usability of the results, several approaches based on multivariate analysis were applied. All approaches clearly show substantial differences in the level of well-being of municipalities with prevailing higher level in the Western and lower level in the Eastern part of Slovenia. Besides that, cluster analysis has revealed dual nature of the top well-being group of municipalities. On one side, there is a subgroup of a

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POVZETEK

Blaginja je kompleksen, večrazsežen pojem, ki ga opredelimo kot stanje sreče, zdravja in prosperitete. Na splošno se blaginja med območji države precej razlikuje. Večje regionalne razlike v blaginji zavirajo družbeni razvoj in lahko povzročajo ekonomske, socialne, urbanistične, okoljske in politične probleme. Poznavanje regionalnih razlik v blaginji je bistvenega pomena za učinkovito načrtovanje in izvajanje regionalnih in prostorskih politik, s pomočjo katerih želimo doseči skladnejši regionalni razvoj, ki se kaže v zmanjševanju razlik v gospodarski razvitosti in v blaginji. Prispevek obravnava merjenje geografskih razlik v blaginji v Sloveniji s pomočjo sestavljenih kazalcev, temelječih na t.i. glavnih komponentah. Kot osnovne enote so izbrane občine, ker predstavljajo edino raven regionalne uprave v Sloveniji. Občina je tista raven delovanja države, ki je ljudem najbližja in ki zagotavlja javne storitve na lokalni ravni. Blaginja je opredeljena z 49 številčnimi socialnimi, ekonomskimi, demografskimi in okoljskimi kazalci. Kazalci so bili izbrani na osnovi vsebinske ustreznosti za blaginjo in razpoložljivosti podatkov na ravni občin. Veljavnost merjenja blaginje s pomočjo sestavljenih kazalcev je bila preverjena z uporabo dodatnih metod multivariatne analize. To omogoča tudi poglobitev vsebinske razlage in uporabljivost rezultatov. Vsi pristopi jasno kažejo znatne razlike v ravni blaginje med občinami, pri čemer je blaginja v zahodnem delu Slovenije v glavnem višja, v vzhodnem pa nižja. Analiza razvrščanja v skupine je dodatno odkrila dvojno naravo blaginje v skupini visoke blaginje. Na eni strani sestavlja skupino občin visoke blaginje podskupina gospodarsko in socialno visoko razvitih urbanih središč. Na drugi strani pa se oblikuje podskupina občin, za katero so značilni ugodni življenjski in okoljski pogoji, ob tem

socially most developed urban centres. On the other side, well-being of the second subgroup of municipalities is characterized by high standards of living and pleasant environmental conditions, although being a step behind on the economic and social scale.

pa nekoliko zaostaja za ravnijo gospodarske in družbene razvitosti prve podskupine občin.

KEY WORDS

well-being, composite indicator, municipality, cluster analysis, method of principal components, regional development

KLJUČNE BESEDE

blaginja, sestavljeni kazalec, občina, analiza razvrščanja v skupine, metoda glavnih komponent, regionalni razvoj

1 INTRODUCTION

Well-being is one of the core issues of modern society. It is defined as a state of being happy, healthy and prosperous. But what is meant by well-being and having a good life is the subject of continuous debate (Boarini et al., 2006; Matthews, 2006). It is generally agreed that well-being is a complex concept that encompasses a number of components. An important segment is the standard of living being dependent for instance on disposable income and access to goods and services. These components can be objectively measured. The evaluation of some other constituents, such as freedom, happiness, security, quality of environment, is to some extent subjective.

Due to its complexity, subjectivity and intangibility, measurement of well-being is conceptually and methodologically a demanding task with no routine solutions. Nevertheless, considering that well-being is today a central social objective, citizens, politicians and policy makers need appropriate information for monitoring the state and progress of well-being. Over the past years, several initiatives and projects have been launched aiming to develop more appropriate measures of well-being compared to traditionally used GDP per capita (Beyond GDP, 2008; OECD, 2008). In order to provide an insight into geographical variability, many of these efforts are directed to the measurement of well-being of geographical units (regions, local units) of a country. Geographically disaggregated information is of key importance for efficient planning and implementation of regional and spatial policy measures aiming to achieve balanced regional development. In this framework, such information is of particular relevance for spatial planning, since space dimension affects individual and social well-being in many different ways (accessibility to public services and to work, quality of environment, quality of housing and infrastructure).

The aim of this paper is to explore well-being in municipalities in Slovenia by integrated application of different statistical techniques and to demonstrate the analytical potential of this approach for decision makers.

Municipalities were selected as basic units for two reasons. First, presently they are still the only type of subnational government in Slovenia. Second, they represent the level of government closest to people that provides local public services to community. Beside by personal initiatives, well-being is also largely determined by these services.

The functions of municipalities in Slovenia include the provision of local public services: municipal administration, municipal public services such as elementary education, social assistance, child care, health care, cultural and sports activities, subsidies and other current transfers for municipal services such as housing provision, local road maintenance, environmental protection, urban and spatial planning, fire prevention and dealing with natural disasters (Bregar et al., 2003). According to the situation in 2006, 193 municipalities are included in the analysis; presently their number is already 210. It has to be noted that municipalities are rather heterogeneous in terms of the size: in 2006 92 out of 193 municipalities had less than 5,000 inhabitants and 24 municipalities had even less than 2,000 inhabitants.

The first step of the analysis involved the research of data availability at the municipalities' level. Social, economic, demographic and environmental indicators were selected concerning their relevance for well-being and data quality. The majority of the data at the municipal level were obtained from the Statistical Office of the Republic of Slovenia. Certain specific data were acquired also from the Ministry of Finance, Institute for Public Health of the Republic of Slovenia, the Ministry of the Interior, and Employment Service of Slovenia.

The selected indicators could depict a variety of aspects of well-being. However, they are not able to provide an overall summary measure of well-being.

Composite indicators are becoming increasingly acknowledged as a tool for summarizing complex and multi-dimensional issues (Giovannini et al., 2005). As they are presented as a single variable, they enable ranking and comparison of units. They are also easier to interpret than the attempts to resume common characteristics from many separate indicators. However, when such aggregate indicator consists of a large number of indicators, it may mask certain issues that may be of interest to researchers and policy makers.

Concerning the multifaceted nature of well-being, a composite indicator of well-being has been constructed using principal component analysis. However, in order to test the validity of these results and to get a deeper insight into the structure of the composite well-being measure and thus improve the interpretability and usability of this measure, two approaches of cluster analysis were carried out.

2 INDICATORS OF WELL-BEING

The strengths and weaknesses of composite indicators largely derive from the quality of the selected indicators (Giovannini et al., 2005). Therefore the indicators were selected very carefully, following the criteria of data quality of European statistics (European Statistics Code of Practice, 2005). Particular attention was paid to the criteria of relevance, availability and accuracy of indicators.

Relevance is the degree to which statistics meets current and potential users' needs (Glossary of Quality Terms, 2003). In our research, relevance of indicators means that the selected indicators correspond to the concept of well-being defined as a state of being happy, healthy and prosperous. However, this concept is too broad and too general for statistical measurement. We transformed this conceptual definition into a measurable one in several steps.

First, we confined the concept of well being to the objective components of well-being, since no data on subjective perception of well being (happiness, satisfaction) are available in Slovenia at the municipality level. Second, we defined the components which constitute well-being. They are presented by four major segments (demographic, economic, social and environmental). Being the most influential for well-being, social segment was split further into several components. Third, we selected the most suitable indicators for each component, also coping with the problem of data availability and accounting for other requirements of data quality. Thus, we had to bind the measurement of well-being to ultimate 49 indicators.

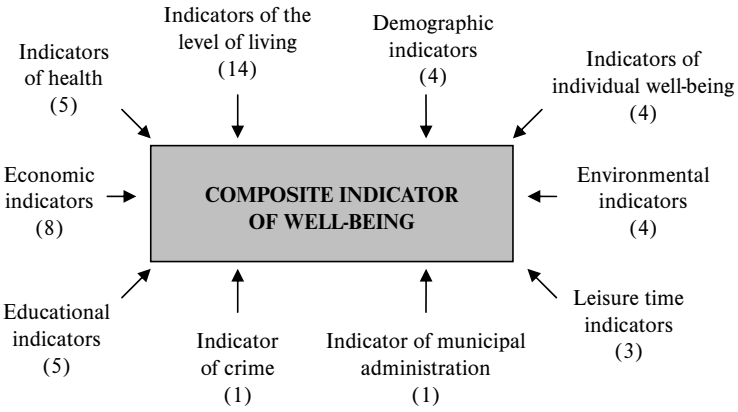

Figure 1: *Number of selected indicators for Slovenian municipalities by components of well-being*

Demographic indicators show population characteristics and population change in a selected area. We assumed that positive growth of population and its components are generally oriented toward areas of higher well-being. Demographic indicators that indicate population growth, migration and age structures were selected for the analysis.

Economic factors are presented by indicators of economic activity such as value added per employee, number of companies per 1,000 inhabitants, investment activity, export orientation, share of agricultural population. We predicted that higher economic activity had a positive impact on economy and consequently people would have a better opportunity for employment, better chance of higher income and choice of profession. On the other side, more developed municipalities may have higher air and noise pollution, which has a negative impact that was not considered in the analysis. Here, we also need to consider that a municipality is a local community and not an economic subject. Values are assigned to the municipality on the basis of the residence of a company (as legal unit), although it may have local units in many municipalities.

Social factors are the most complex, diverse and they affect well-being and the quality of life of individuals most directly. Consequently, their share is by far the largest and presented by several components. *Individual level of living* is defined by indicators of income, unemployment, dwellings and access to goods. *Education indicators* include variables of pre-school, elementary and higher education. *Health* is measured by the average age of deceased, the number of early deceased per

10,000 inhabitants and the number of consultations in primary health care per capita. *Leisure time* indicators are presented by the time needed to come to work, and the municipalities' expenses for sports and cultural activities of their inhabitants. *Crime* is observed by the number of municipality residents that were convicted for criminal offences. Efficiency of *municipality administration* is based on the assumption, that the share of expenses for municipality administration in the total expenses indicates the administration productivity. *Individual well-being* encompasses objective indicators of individual behavior that reflect individual perception of well-being. Suicide rate, abortion, total fertility rate and divorces were taken as indicators of individual well-being.

Comparisons of *environmental indicators* among countries generally encompass the comparison of air, water, soil and noise pollution and the reserves of renewable and nonrenewable resources. Most environmental indicators are not available at the level of municipalities. Besides, it is also not easy to attribute environmental characteristics to a certain municipality, since the measuring of emissions is conducted at monitoring points, which are not numerous enough to provide the values for all municipalities. On the other side, it is not easy to determine the geographical area of environmental factors' impact (for instance pollution caused by transportation and industry emissions). These are the reasons why environmental indicators are relatively less presented in the analysis.

The possibility to obtain relevant indicators of well-being was seriously hampered by the *small size of many municipalities*. Several measures were taken in order to mitigate this problem.

In cases when an event is very rare we considered the average variable values of several years (e.g. average yearly suicides per 10,000 population). In some cases the indicators were not available because of the nonexistence of an event. For example, one fourth of the municipalities do not employ a physician. Some indicators were not available at the municipality level because of methodological limitations; for instance life expectancy calculation is hardly acceptable even for statistical regions. We strived to overcome the problem of non-availability of data by proxy measures.

The complete list of indicators entering the compilation of a composite measure of well-being is given in Table 1.

All indicators were assigned either a minus or a plus sign with respect to their negative or positive impact on well-being. The reference year is 2005 or 2002 (for census data), except for the indicators where the average values for several years were calculated.

Preparation of data for the analysis could also impact the *credibility and accuracy* of the composite measure (Giovannini et al., 2005, p. 35). With normalization we excluded the difference in the size of the municipalities. All indicators are relative values per capita, per employee, territory or presented as a share. The preparation of data for the analysis included also adjusting for changes of municipalities in the time period and for exclusion of extreme outliers. Regression methods were applied for the imputation of missing values.

Label	Indicator	Impact on well-being	Reference Time
DEMOGRAPHIC INDICATORS			
DE01 - popincr	Average population increase per 1,000 inhabitants	+	1999 - 2005
DE02 - dmigr	Index of daily migration	+	31.12.2005
DE03 - ageind	Ageing index	-	31.12.2005
DE04 - deprate	Dependency rate	-	31.12.2005
ECONOMIC INDICATORS			
EC01 - valuead	Value added per employee in private sector in EUR	+	2005
EC02 - export	Net revenues from sales in foreign markets per employee in private sector in EUR	+	2005
EC03 - invest	Average yearly net investment per employee in private sector in EUR	+	2002 - 2005
EC04 - company	Number of legal entities per 1,000 inhabitants	+	31.12.2005
EC05 - enterp	Number of individual private entrepreneurs per 1,000 inhabitants	+	31.12.2005
EC06 - comnew	Average yearly number of enterprise births per 1,000 inhabitants	+	2000 - 2004
EC07 - service	Percentage of business entities in services	+	31.12.2003
EC08 - agricult	Percentage of agricultural population	-	average in 2005
SOCIAL INDICATORS			
The level of living			
SO01 - earning	Taxable earnings per capita in EUR	+	2005
SO02 - dwlown	Percentage of households that are owners/co-owners of dwellings	+	Census 2002
SO03 - dwlarea	Dwellings area per capita	+	31.12.2005
SO04 - dwlmin	Percentage of population that live on a minimum dwelling area	-	Census 2002
SO05 - phone	Percentage of dwellings with telephone	+	Census 2002
SO06 - water	Percentage of dwellings with public water supply	+	Census 2002
SO07 - car	Number of cars per 100 inhabitants	+	2006
SO08 - carlux	Number of luxury cars per 1,000 inhabitants	+	2006
SO09 - unempl	Registered unemployment rate	-	average in 2005
SO10 - unemplw	Percentage of female in unemployment	-	average in 2005
SO11 - unemply	Percentage of youth in unemployment	-	December 2005
SO12 - unemplp	Percentage of permanent redundancy in unemployment	-	December 2005
SO13 - assiscsh	Cash social assistance per capita in EUR	-	2005
SO14 - assisrec	Receivers of cash social assistance per 100 inhabitants	-	2005

Label	Indicator	Impact on well-being	Reference Time
Education			
SO15 - students	Number of students enrolled in undergraduate higher education studies per 1,000 inhabitants	+	start of school year 2005/06
SO16 -education	Percentage of population with college or university degree	+	Census 2002
SO17 - eduteach	Professional staff in elementary education per 100 children	+	end of school year 2005/06
SO18 - edupers	Professional staff in pre-school education per 100 children	+	September 2006
SO19 - educhild	Percentage of children attending pre-school education	+	September 2005
Health			
SO20 - agedec	Average age of deceased	+	1999 - 2005
SO21 - earlydec	Average yearly deceased (0-64.99 years) per 10,000 population	-	1999 - 2005
SO22 - doctor	Consultations in primary health care units per capita	+	2005
SO23 - healthw	Consultation in primary reproductive health care units for women per 10 females in fertility age	+	2005
SO24 - healthp	Ratio between preventive and curative consultations in primary reproductive health care units for women	+	2005
Leisure time			
SO25 - time	Working population, who travel 61 minutes or more to work, per 1,000 working population	-	Census 2002
SO26 - sports	Average yearly share of municipality expenses for sports and recreational activities (in percent)	+	2000 - 2005
SO27 - culture	Average yearly share of municipality expenses for cultural activities (in percent)	+	2000 - 2005
Crime			
SO28 - crime	Convicted adults and accused juveniles for criminal offences by their permanent residence per 10,000 inhabitants	-	2005
Municipality administration			
SO29 - admin	Average yearly share of expense for municipality administration (in percent)	-	2000 - 2005

Label	Indicator	Impact on well-being	Reference Time
Individual well-being			
SO30 - abortion	Average yearly abortions per 100 live births	-	2003 - 2005
SO31 - suicide	Average yearly suicides per 10,000 population	-	2000 - 2005
SO32 - divorce	Average yearly divorces per 10,000 population	-	2003 - 2005
SO33 - fertility	Average yearly total fertility rate	+	1999 - 2005
ENVIRONMENTAL INDICATORS			
EN01 - sewage	Percentage of dwellings with sewage system	+	Census 2002
EN02 - waste	Waste quantities collected by public waste removal scheme per inhabitant in kg	+	2005
EN03 - envbuild	Average number of buildings per km^2	-	2001
EN04 - envinv	Average yearly municipality investment for environmental protection per inhabitant in EUR	+	2000 - 2005

Table 1: *Indicators of well-being of Slovenian municipalities*

3 ANALYSIS

Well-being of the municipalities was examined by three approaches (Figure 2). First, principal components analysis was applied to construct a composite indicator of well-being of Slovenian municipalities (❶). On the basis of the composite indicator values municipalities were ranked according to the degree of well-being. Second, to examine the proximity of municipalities, a cluster analysis was performed on the basis of all indicators (❷). The third approach is a combination of both techniques where clustering was performed on the basis of major principal components (❸).

3.1 Composite Indicator of Well-being

The inspection of the observed data set showed substantial differences in the variability of the indicators of well-being. To avoid the effect of the unequal variances, i.e. to give the same weight to each indicator, the data set was standardized first. Next, principal component analysis was used to build a composite indicator of well-being for municipalities. The objectives of principal component analysis are to reduce the dimensionality of the data set and to identify new transformed variables (principal components) that would account for a substantial amount of total variance in the data. The Bartlett's test of sphericity (P = 0.000) and the KMO (Keiser-Meyer-Olkin) measure (0.839) of the sample adequacy were used to check whether the strength of relationship among variables is large enough for principal component analysis.

Taking into account the interpretability of the components, three principal components were retained, explaining 45.64 % of the total variance. We would prefer to have lower loss of information, but considering the large number of indicators such result is acceptable.

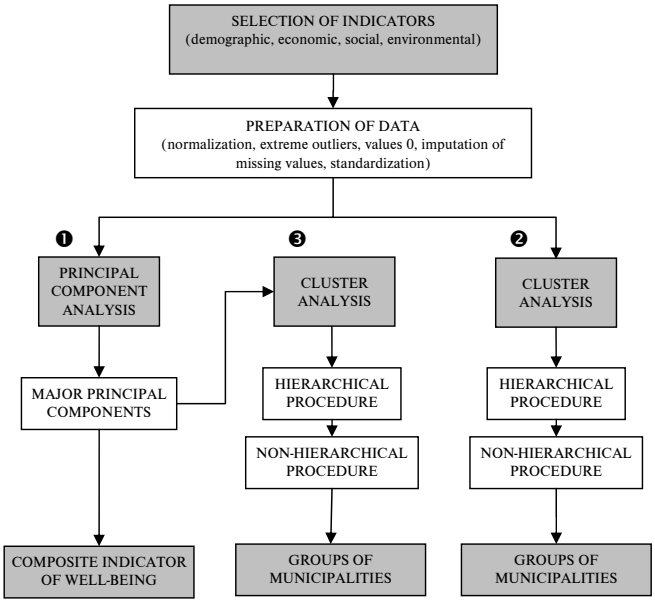

Figure 2: *Flowchart of the analysis of well-being of Slovenian municipalities*

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	13.196	26.931	26.931
2	4.756	9.706	36.637
3	4.413	9.007	45.644

Table 2: *Total variance explained by the first three principal components*

The relationships between the observed variables and principal components are given in the component matrix (Table 3). Generally, absolute value of principal component loading (correlation coefficients) of 0.5 or above is used to decide if a variable is influential in the formation of principal component. Since the variables were assigned a negative or a positive sign according to their impact on well-being, we would prefer only positive values in the component matrix, but there are some minor discrepancies. We named principal components according to the influence of the observed variables in their formation.

First principal component (= "component of economic and social advancement") accounts for 26.93 % of the variance in the data. It positively correlates with good level of living (SO01 - earning, SO07 - car, SO08 - carlux, SO05 - phone, SO06 - water), high education (SO16 - education, SO15 - students), sound economy (EC04 - company, EC06 - comnew, EC05 - enterp, EC08 - agricult, DE02 - dmigr, EC01 - valuead), low social risk (SO14 - assisrec, SO13 - assiscsh, SO09 - unempl), low number of early deceased per population (SO21 - earlydec), low values of time needed to come to work (SO25 - time), good environmental concern (EN02 - waste, EN01 - sewage) and population growth (DE01 - popincr), but also higher number of divorces per capita

(SO32 - divorce). Second principal component (= "component of family well-being and non-urban territories") is positively correlated by variables that present a favourable individual well-being and larger families (SO33 - fertility, SO30 - abortion), low social risk (SO14 - assisrec, SO13 - assiscsh, SO09 - unempl) and nonurban territories that are away from urban centres (DE02 - dmigr, EN01 - sewage, EN03 - envbuild, EC07 - service). Third principal component (="component of demographically endangered territories") is the hardest to interpret. It is represented by longevity (SO20 - agedec), older population (DE04 - deprate, DE03 - ageind), larger dwellings area per capita (SO03 - dwlarea) and a higher number of personnel per pupil in primary education (SO17 - eduteach).

Indicator	Component			Indicator	Component		
	1	2	3		1	2	3
SO01 - earning	0.944	-0.005	0.002	SO23 - healthw	0.350	0.031	0.143
SO16 - education	0.887	-0.258	0.105	SO12 - unemplp	0.309	0.299	0.025
EC04 - company	0.877	-0.179	0.056	SO26 - sports	0.242	-0.175	-0.157
EC06 - comnew	0.802	-0.238	0.077	SO22 - doctor	0.209	-0.145	-0.001
EC08 - agricult	0.791	-0.224	0.026	SO33 - fertility	0.152	0.706	-0.200
SO21 - earlydec	0.779	0.201	0.061	EC07 - service	-0.277	-0.646	0.062
SO07 - car	0.766	0.203	0.084	SO30 - abortion	0.278	0.592	0.217
SO15 - students	0.758	0.080	-0.119	EN03 - envbuild	-0.267	0.546	0.283
SO14 - assisrec	0.733	0.503	0.119	SO28 - crime	-0.153	0.441	0.214
SO13 - assiscsh	0.717	0.524	0.139	SO27 - culture	0.362	-0.366	0.031
EN02 - waste	0.692	-0.224	0.198	SO02 - dwlown	-0.220	0.278	0.151
EC05 - enterp	0.677	0.005	0.236	SO24 - healthp	-0.171	0.228	-0.034
SO08 - carlux	0.674	-0.124	-0.102	DE04 - deprate	0.204	-0.050	-0.832
SO25 - time	0.664	0.098	-0.151	DE03 - ageind	0.181	0.366	-0.815
SO05 - phone	0.659	-0.133	-0.147	SO03 - dwlarea	0.013	0.111	0.799
SO09 - unempl	0.650	0.534	0.063	SO20 - agedec	0.161	0.209	0.706
SO06 - water	0.643	-0.150	0.000	SO17 - eduteach	-0.395	-0.154	0.506
SO32 - divorce	-0.591	0.408	-0.063	SO18 - edupers	-0.136	-0.202	0.493
SO19 - educhild	0.582	-0.107	0.081	SO04 - dwlmin	0.443	0.088	0.454
DE02 - dmigr	0.547	-0.521	0.059	SO10 - unemplw	-0.002	-0.093	0.374
EC01 - valuead	0.544	-0.051	-0.211	SO11 - unemply	0.250	0.303	0.352
EN01 - sewage	0.538	-0.528	-0.022	SO29 - admin	0.179	0.162	-0.344
DE01 - popincr	0.537	0.439	-0.342	EN04 - envinv	0.033	-0.097	0.296
SO31 - suicide	0.438	0.065	0.071	EC03 - invest	0.098	-0.130	0.167
EC02 - export	0.361	-0.163	-0.130				

Table 3: *Matrix of principal component loadings of indicators of well-being in Slovenia in 200*

Composite indicator of well being (WBCI) is calculated as weighted mean of principal components with their eigenvalues (variances) as the weighting factors. In our case, the value of the composite indicator of well-being for municipality *p* equals:

$$WBCI_p = \frac{F_{p1} \cdot 13.196 + F_{p2} \cdot 4.756 + F_{p3} \cdot 4.413}{13.196 + 4.756 + 4.413} \quad (3.1.)$$

where F_{pj} is the value (score) of the *j*-th component for municipality *p*.

Rank	Municipality	WBCI	Rank	Municipality	WBCI	Rank	Municipality	WBCI
1	Trzin	1.3947	66	Kanal	0.3415	131	Podčetrtek	-0.3336
2	Šempeter - Vrtojba	1.0844	67	Novo mesto	0.3284	132	Šmarje pri Jelšah	-0.341
3	Horjul	1.0777	68	Lukovica	0.264	133	Gornja Radgona	-0.3447
4	Škofljica	1.0703	69	Trebnje	0.2513	134	Laško	-0.3481
5	Sežana	1.0534	70	Tržič	0.2467	135	Ljutomer	-0.3546
6	Komen	1.0412	71	Šentjernej	0.1952	136	Duplek	-0.3554
7	Brezovica	0.9875	72	Veržej	0.178	137	Kočevje	-0.3592
8	Nova Gorica	0.9853	73	Moravče	0.1627	138	Ruše	-0.3641
9	Komenda	0.9835	74	Hoče - Slivnica	0.1596	139	Velenje	-0.3656
10	Šenčur	0.9794	75	Miklavž na Dr. polju	0.1576	140	Selnica ob Dravi	-0.3731
11	Vipava	0.9667	76	Braslovče	0.1512	141	Kungota	-0.3826
12	Naklo	0.9635	77	Solčava	0.1485	142	Benedikt	-0.3863
13	Miren - Kostanjevica	0.9461	78	Slovenj Gradec	0.1457	143	Bistrica ob Sotli	-0.3883
14	Žirovnica	0.9256	79	Metlika	0.1422	144	Škocjan	-0.4046
15	Idrija	0.9192	80	Krško	0.1036	145	Črna na Koroškem	-0.415
16	Preddvor	0.9157	81	Gornji Grad	0.1022	146	Radlje ob Dravi	-0.4198
17	Bled	0.8749	82	Loški potok	0.095	147	Dobrna	-0.4379
18	Vodice	0.8746	83	Nazarje	0.0788	148	Pesnica	-0.4484
19	Ajdovščina	0.8652	84	Križevci	0.0709	149	Muta	-0.4574
20	Logatec	0.8518	85	Šmartno ob Paki	0.0707	150	Majšperk	-0.4589
21	Cerklje na Gorenjskem	0.8509	86	Mirna Peč	0.0486	151	Kozje	-0.4932
22	Koper/Capodistria	0.8346	87	Brežice	0.0462	152	Trbovlje	-0.4974
23	Velike Lašče	0.8277	88	Mislinja	0.029	153	Sveti Jurij	-0.5241
24	Medvode	0.8163	89	Semič	0.0183	154	Velika Polana	-0.5652
25	Mengeš	0.8089	90	Prevalje	0.0078	155	Lovrenc na Poh.	-0.5772
26	Dobrova-Polhov Grad.	0.8046	91	Celje	-0.0049	156	Osilnica	-0.5784
27	Grosuplje	0.794	92	Zreče	-0.0061	157	Tabor	-0.5816
28	Sodražica	0.7855	93	Radenci	-0.0115	158	Lendava/Lendva	-0.6006
29	Vrhnika	0.7818	94	Rače - Fram	-0.0245	159	Tišina	-0.6058
30	Ljubljana	0.7579	95	Maribor	-0.0393	160	Dornava	-0.6273
31	Tolmin	0.7578	96	Črnomelj	-0.0538	161	Ormož	-0.6274
32	Brda	0.7539	97	Kidričevo	-0.0597	162	Oplotnica	-0.631
33	Hrpelje - Kozina	0.749	98	Šoštanj	-0.0706	163	Gorišnica	-0.6669
34	Cerkno	0.7278	99	Dravograd	-0.0806	164	Črenšovci	-0.6823
35	Kranjska Gora	0.7273	100	Žalec	-0.0828	165	Odranci	-0.683
36	Piran/Pirano	0.7242	101	Markovci	-0.0831	166	Šentilj	-0.7154
37	Domžale	0.6964	102	Litija	-0.0895	167	Dobje	-0.7207
38	Radovljica	0.6823	103	Ljubno	-0.0999	168	Vitanje	-0.7323
39	Loška dolina	0.6752	104	Sevnica	-0.1008	169	Videm	-0.7592
40	Dol pri Ljubljani	0.6723	105	Vojnik	-0.1103	170	Sveta Ana	-0.7608
41	Kobarid	0.666	106	Rogaška Slatina	-0.1127	171	Hrastnik	-0.7625
42	Bloke	0.6633	107	Ptuj	-0.1367	172	Kobilje	-0.8488
43	Bovec	0.6606	108	Prebold	-0.1369	173	Destrnik	-0.8571
44	Dobrepolje	0.6563	109	Vuzenica	-0.1425	174	Rogatec	-0.8783
45	Jezersko	0.651	110	Žužemberk	-0.1438	175	Ribnica na Pohorju	-0.9493
46	Bohinj	0.6413	111	Slovenske Konjice	-0.1499	176	Gornji Petrovci	-0.9541
47	Izola/Isola	0.6388	112	Luče	-0.1511	177	Dobrovnik	-0.9577
48	Cerknica	0.635	113	Hajdina	-0.1706	178	Puconci	-0.9742
49	Škofja Loka	0.6306	114	Slovenska Bistrica	-0.1714	179	Cerkvenjak	-1.0116
50	Pivka	0.6205	115	Murska Sobota	-0.202	180	Turnišče	-1.0153

Rank	Municipality	WBCI	Rank	Municipality	WBCI	Rank	Municipality	WBCI
51	Kostel	0.6096	116	Zagorje ob Savi	-0.2136	181	Podvelka	-1.0207
52	Ig	0.6085	117	Štore	-0.2226	182	Grad	-1.0265
53	Žiri	0.6014	118	Vransko	-0.228	183	Trnovska vas	-1.08
54	Dolenjske Toplice	0.5818	119	Ravne	-0.2328	184	Žetale	-1.1189
55	Postojna	0.5809	120	Lenart	-0.2436	185	Podlehnik	-1.2129
56	Divača	0.5584	121	Mežica	-0.2449	186	Cankova	-1.233
57	Kranj	0.5046	122	Šmartno pri Litiji	-0.2453	187	Sv.Andraž v Sl..g.	-1.2436
58	Kamnik	0.4989	123	Starše	-0.2454	188	Juršinci	-1.2942
59	Gorenja vas - Poljane	0.4934	124	Polzela	-0.2632	189	Hodoš	-1.3628
60	Železniki	0.4905	125	Radeče	-0.2743	190	Šalovci	-1.3786
61	Borovnica	0.4563	126	Beltinci	-0.2944	191	Zavrč	-1.4092
62	Ribnica	0.4295	127	Šentjur pri Celju	-0.302	192	Kuzma	-1.5924
63	Ivančna Gorica	0.4072	128	Jesenice	-0.307	193	Rogašovci	-1.6414
64	Mozirje	0.3959	129	Razkrižje	-0.3112			
65	Ilirska Bistrica	0.367	130	Moravske Toplice	-0.3251			

Table 4: *Ranks of Slovenian municipalities in 2005 by well-being composite indicator*

3.2 Cluster Analysis – All Indicators

The second approach is focused on identifying and forming internally homogeneous and externally isolated groups of municipalities. First, as in the case of principal component analysis, the set of indicators was standardised. Next, Ward's hierarchical procedure was applied. On the basis of the dendrogram we identified four clusters. In order to improve the results of Ward's method, K-means non-hierarchical procedure was applied, using cluster centers (i.e. centroids) as the initial seed points. 16 municipalities or approx. 8 % of all municipalities were reassigned to different clusters by K-means method. For 47 out of 49 variables the differences between arithmetic means among four groups of municipalities (univariate ANOVA) are statistically significant.

On the basis of cluster analysis we came to the conclusion that from the viewpoint of the overall level of well-being we can identify four groups of municipalities (Figure 3). Next, reviewing the average indicator values of the clusters (centroids), we can clearly identify cluster 1 and 2 as groups of top well-being municipalities, but with substantial differences in the nature of well-being. Cluster 3 is a group of moderate and cluster 4 a group of low well-being municipalities.

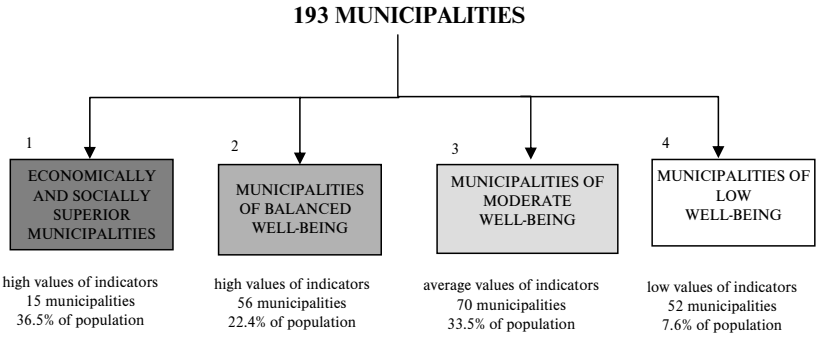

Figure 3: *Categorization of Slovenian municipalities in 2005 by type of well-being*

Well–being Characteristics by Groups of Municipalities

Economically and Socially Superior Municipalities (cluster 1)

This group of municipalities is comprised of 15 municipalities that extend on the territory of 1910 km^2 or 9.4 % of Slovenia. It is the largest group by population since 36.5 % of Slovenian inhabitants live there. It has the highest values of all economic indicators (Figure 4, group 1). These municipalities share a relatively small area and an exceptionally high urbanization level. Economically developed centres have large numbers of companies and high index of daily migration. Inhabitants of an average municipality enjoy high standard of living and good access to goods with the highest values of indicators such as taxable earnings per capita and number of cars per 100 inhabitants. They are better educated than inhabitants in other groups of municipalities and have better access to communal infrastructure. Values of some indicators such as the registered unemployment rate and the number of social assistance receivers per 100 inhabitants are about average. On the other side total fertility is the lowest, the number of divorces per 10,000 inhabitants is the highest and more criminal offences are committed by residents of these municipalities.

Municipalities of Balanced Well-being (cluster 2)

56 municipalities of balanced well-being extend over the largest part of Slovenia and cover almost 39.8 % of the country. 22.4 % of the total population reside in these municipalities. Although these areas are not densely populated, the access to communal infrastructure is above average or average.

An average municipality of balanced well-being has above average values of most economic indicators and indicators of the level of living, but falls behind the economic and socially superior municipality (Figure 4, group 2). Nevertheless, this group shows the highest values of population increase and the lowest values of registered unemployment rate and the number of social assistance receivers per 100 inhabitants. The level of education is above average, but still behind the first group. The inhabitants live on average for one year and nine months longer than those in the first group, and for two years and seven months longer than those in the third group. The highest total fertility rate and the lowest number of abortions per 100 live births contribute to a higher level of well-being.

There is no obvious difference in the level of overall well-being (composite indicator, approach 1) between the top two groups of municipalities, but they do differ in the type of well-being. The first group is economically the most developed, while the second group is more attractive concerning living and environmental conditions.

Municipalities of Moderate Well-being (cluster 3)

The third group encompasses 70 municipalities that extend over 35.9 % of the Slovenian territory and have about 33.5 % of the total population. This is a group (Figure 4, group 3) of moderate economic conditions, the standard of living is slightly below average. Most variable values are about average while the dwelling area per capita and the percentage of dwelling owners per

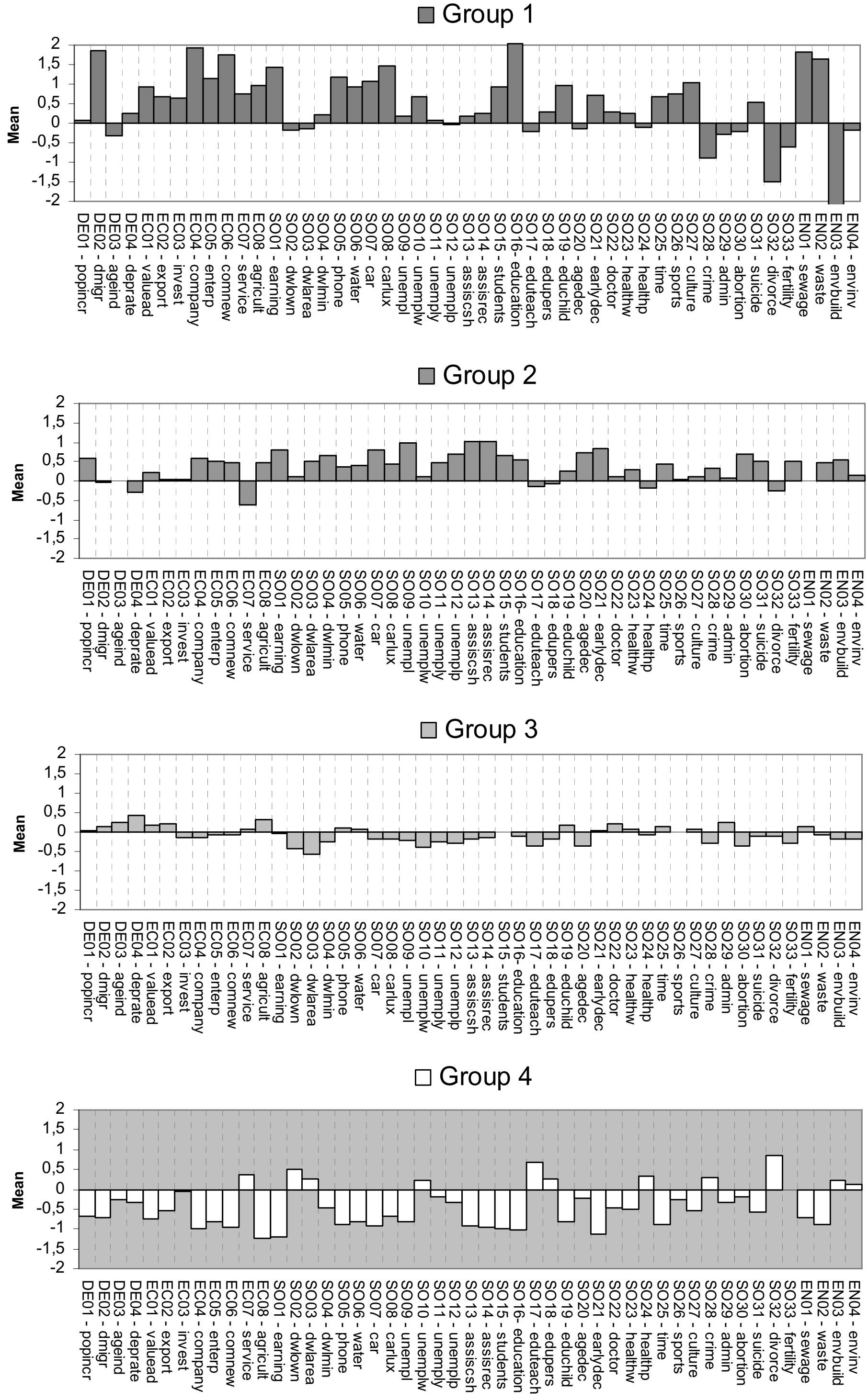

Figure 4: *Mean values of standardized indicators for four groups of Slovenian municipalities in 2005*

capita are the lowest of all groups. The average municipality also has the youngest population compared to other groups. The age at death is the lowest.

Municipalities of Low Well-being (cluster 4)

The fourth group includes 52 municipalities of low well-being, which cover 17.3 % of territory and 7.6 % of the total population of Slovenia. The average municipality in this group has only 2946 inhabitants. This implies that the average municipality of this group does not fulfil the legislative requirements for its establishment concerning the size. These are economically underdeveloped rural territories (Figure 4, group 4), taxable earnings per capita are the lowest and the access to communal infrastructure is far below average. The registered unemployment rate, the number of social assistance receivers per 100 inhabitants and the education level are the worst. The share of children in pre-school education is far below average, while on the other side the number of staff members in primary education per pupil is the highest, due to the low number of pupils per class. The number of suicides per 10,000 inhabitants and the number of abortions per 100 live births in these municipalities are the highest. However, there are the least divorces per 10,000 inhabitants and the least criminal offences committed by residents.

Presentation of municipalities by type of well-being in the cartogram (Figure 5) exposes at a glance the prevailing difference in the level of well-being between the western and the eastern part of Slovenia. A clear boundary is set east of the capital Ljubljana, demarcating rather homogenous western part containing only municipalities of top well-being and more

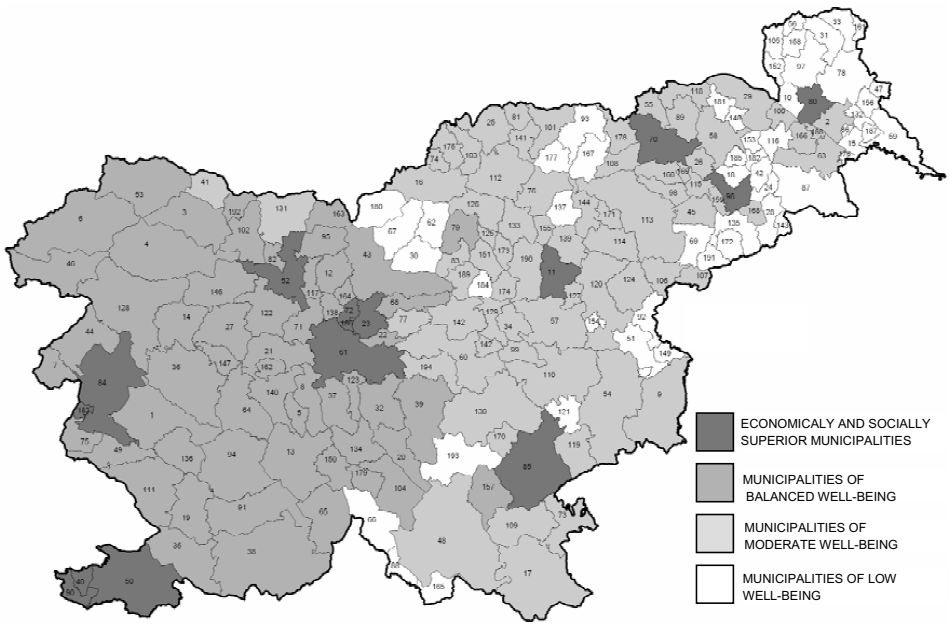

Figure 5: *Four groups of Slovenian municipalities by the overall level of well-being (codes of municipalities are explained in Table 6)*

heterogeneous eastern part of Slovenia with prevailing municipalities of lower well-being.

A more detailed inspection of the cartogram reveals territorial groupings of municipalities with similar characteristics of well-being. We can easily identify groups of municipalities with low level of well-being in the Upper Savinja valley, in the area along Kolpa river, in the north-eastern part of Slovenia, continuing along Croatian border to the regions along Sotla river and Kozjansko. On the other side, areas of well-being, characterised by social and economic advancement, are mainly urban municipalities with their closest neighbours (Ljubljana with the closest surroundings, Nova Gorica and its southern neighbours, Koper and the other coastal municipalities, Maribor, Celje, Ptuj, Murska Sobota and Novo mesto). Due to such geographic distribution of well-being among Slovenian municipalities, a selective dynamic approach of regional development policy is expected. It should not be confined to predefined territorial classification schemes like statistical regions.

3.3 Cluster Analysis – Major Principal Components

The third approach focuses on forming groups of municipalities by using unstandardised values of three principal components which were retained by the principal component analysis. We presumed this approach to be inferior to the second approach, since there is a loss of information by retaining only the first three principal components, which together account for 45.64 % of the total variance. However, we expected the interpretation of differences among groups to be easier to some extent.

Once again, we have applied Ward's hierarchical procedure and on the basis of the dendrogram we identified four clusters. The results, improved by the K-means method, are very similar to those we obtained in the clustering process on the basis of all indicators (second approach). Only 11 municipalities or 5.7 % of all municipalities were assigned to a different group. The differences among group means are statistically significant for all three principal components (univariate ANOVA).

This approach confirms the difference between the two top well-being groups of municipalities. When we look at the mean values of principal components (Figure 6) we notice that the first group of municipalities (»economically and socially superior municipalities«) shows very high value of the first principal component (»component of economic and social advancement") and

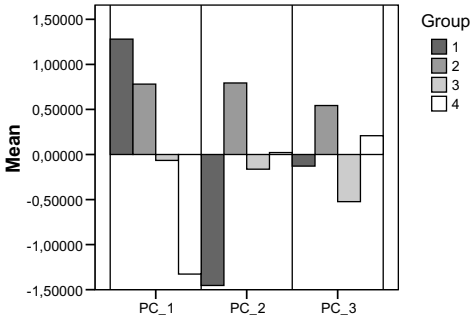

Figure 6: *Mean values of standardized major principal components*

extremely low value of the second principal component ("component of family well-being and non-urban territories"), while the second group of municipalities ("municipalities of balanced well-being") has above average means of both first two principal components. Since the results obtained are very close to those in the second approach, we shall not explain them into more details.

The results of this approach can serve as the basis for general development policy for the four groups of municipalities. Therefore, for instance for the first group of municipalities, characterised by high crime rate, numerous divorces and low fertility, there is a need for certain measures of public safety and social policy.

4 EVALUATION OF RESULTS OF THE THREE ANALYTICAL APPROACHES

In the final step we compared the results of all three approaches, taking into account their general characteristics (Table 5). On one side there is a composite indicator approach, based on principal components, which enabled rank ordering of municipalities according to well-being concept. On the other side, there are two cluster analysis approaches, resulting in very similar well-being groups, i.e. two top well-being groups (cluster 1 and 2), moderate well-being group (cluster 3) and low well-being group (cluster 4).

	First approach: COMPOSITE INDICATOR OF WELL-BEING	**Second approach: CLUSTERING ON THE BASIS OF ALL INDICATORS**	**Third approach: CLUSTERING ON THE BASIS OF PRINCIPAL COMPONENTS**
STRENGTHS	Enables ranking of units as unidimensional composite indicator Enables ranking by each principal component	Formation of groups on the basis of complete information	Transparency of results and ease of interpretation
WEAKNESSES	Partial loss of information Composite indicator enables ranking, but it does not form groups of units	Large number of indicators may blur out the differences among groups No ranking of units	Partial loss of information No ranking of units

Table 5: *Strengths and weaknesses of the three approaches*

First we compared composite indicator approach (❶) and all indicators clustering approach (❷) (Figure 7). To enable comparison, municipalities that are rank ordered by the composite indicator values were divided into groups of equal size (number of municipalities) as the ones defined by the second approach. The comparison of the municipality membership of the four groups formed by the above mentioned conditional approach revealed that the composite indicator does not acknowledge the difference in well-being between the two top groups of municipalities. For example, if we focused on the first 15 municipalities with the highest value of composite

indicator of well-being (conditional group 1), only 3 municipalities would belong to cluster 1 and the remaining 12 to cluster 2. On the other hand, 15 municipalities from cluster 1 are distributed to the following conditional composite indicator groups: 3 to the first group, 8 to the second group and 4 to the third group.

A detailed comparison showed that the three approaches mainly differ in allocating municipalities between groups 1 and 2, while there are much less differences concerning groups 3 and 4.

Therefore, we merged the two top well-being clusters into one group and made a three group conditional comparison. In this way, the number of different group memberships was reduced from 47 (in the case of four groups) to only 27 (Figure 7), a reasonable number that might be attributed to different methodology approaches. Thus, this confirmed the fact that the difference between the two top groups was in the type, but not in the level of well-being. Comparison of the two remaining pairs of approaches follows the same pattern.

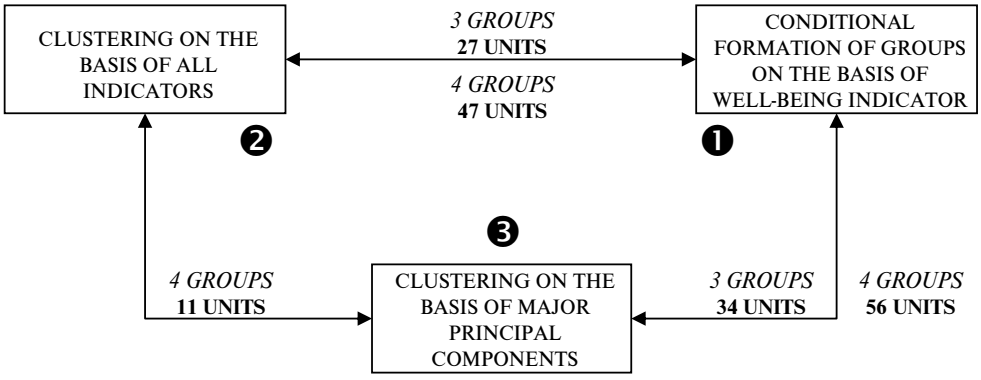

Figure 7: *Presentation of the differences between the group membership of Slovenian municipalities in 2005 by the three approaches*

Id	Municipality	❷	❸	❶	Id	Municipality	❷	❸	❶
1	Ajdovščina	2	2	1-2	160	Hoče - Slivnica	3	3	3
2	Beltinci	3	3	3	161	Hodoš	4	4	4
148	Benedikt	4	3	4	162	Horjul	2	2	1-2
149	Bistrica ob Sotli	4	4	4	34	Hrastnik	3	3	4
3	Bled	2	2	1-2	35	Hrpelje - Kozina	2	2	1-2
150	Bloke	2	2	1-2	36	Idrija	2	2	1-2
4	Bohinj	2	2	1-2	37	Ig	2	2	1-2
5	Borovnica	2	2	1-2	38	Ilirska Bistrica	2	2	1-2
6	Bovec	2	2	1-2	39	Ivančna Gorica	2	2	1-2
151	Braslovče	3	3	3	40	Izola/Isola	1	1	1-2
7	Brda	2	2	1-2	41	Jesenice	3	3	3
8	Brezovica	2	2	1-2	163	Jezersko	2	2	1-2
9	Brežice	3	3	3	42	Juršinci	4	4	4
152	Cankova	4	4	4	43	Kamnik	2	2	1-2
11	Celje	1	1	3	44	Kanal	2	2	1-2
12	Cerklje na Gorenj.	2	2	1-2	45	Kidričevo	3	3	3
13	Cerknica	2	2	1-2	46	Kobarid	2	2	1-2
14	Cerkno	2	2	1-2	47	Kobilje	4	4	4
153	Cerkvenjak	4	4	4	48	Kočevje	3	3	3
15	Črenšovci	4	4	4	49	Komen	2	2	1-2
16	Črna na Koroškem	3	3	4	164	Komenda	2	2	1-2
17	Črnomelj	3	3	3	50	Koper/Capodistria	1	1	1-2
18	Destrnik	4	4	4	165	Kostel	4	4	1-2
19	Divača	2	2	1-2	51	Kozje	4	4	4
154	Dobje	4	4	4	52	Kranj	1	1	1-2
20	Dobrepolje	2	2	1-2	53	Kranjska Gora	2	2	1-2
155	Dobrna	3	3	4	166	Križevci	3	3	3
21	Dobrova-Pol.Gradec	2	2	1-2	54	Krško	3	3	3
156	Dobrovnik/Dobronak	4	4	4	55	Kungota	3	3	3
22	Dol pri Ljubljani	2	2	1-2	56	Kuzma	4	4	4
157	Dolenjske Toplice	2	2	1-2	57	Laško	3	3	3
23	Domžale	1	1	1-2	58	Lenart	3	3	3
24	Dornava	4	4	4	59	Lendava/Lendva	4	4	4
25	Dravograd	3	3	3	60	Litija	3	3	3
26	Duplek	3	3	3	61	Ljubljana	1	1	1-2
27	Gor. vas - Poljane	2	2	1-2	62	Ljubno	4	3	3
28	Gorišnica	4	4	4	63	Ljutomer	3	3	3
29	Gornja Radgona	3	3	3	64	Logatec	2	2	1-2
30	Gornji Grad	4	4	3	65	Loška dolina	2	2	1-2
31	Gornji Petrovci	4	4	4	66	Loški potok	4	4	3
158	Grad	4	4	4	167	Lovrenc na Pohorju	4	4	4
32	Grosuplje	2	2	1-2	67	Luče	4	4	3
159	Hajdina	3	3	3	68	Lukovica	2	3	1-2
69	Majšperk	4	4	4	112	Slovenj Gradec	3	1	3
70	Maribor	1	1	3	113	Slovenska Bistrica	3	3	3
168	Markovci	3	3	3	114	Slovenske Konjice	3	3	3
71	Medvode	2	2	1-2	179	Sodražica	2	2	1-2
72	Mengeš	1	1	1-2	180	Solčava	4	4	3
73	Metlika	3	3	3	115	Starše	3	3	3

Id	Municipality	❷	❸	❶	Id	Municipality	❷	❸	❶
74	Mežica	3	3	3	181	Sveta Ana	4	4	4
169	Miklavž na Dr. polju	3	1	3	182	Sv. Andraž v Sl.gor.	4	4	4
75	Miren - Kostanjevica	2	2	1-2	116	Sveti Jurij	4	4	4
170	Mirna Peč	3	3	3	33	Šalovci	4	4	4
76	Mislinja	3	3	3	183	Šempeter - Vrtojba	1	1	1-2
77	Moravče	3	3	3	117	Šenčur	2	2	1-2
78	Moravske Toplice	4	4	3	118	Šentilj	3	3	4
79	Mozirje	2	2	1-2	119	Šentjernej	3	3	1-2
80	Murska Sobota	1	1	3	120	Šentjur pri Celju	3	3	3
81	Muta	3	3	4	121	Škocjan	4	3	4
82	Naklo	2	2	1-2	122	Škofja Loka	2	2	1-2
83	Nazarje	3	3	3	123	Škofljica	2	2	1-2
84	Nova Gorica	1	1	1-2	124	Šmarje pri Jelšah	3	3	3
85	Novo mesto	1	1	1-2	125	Šmartno ob Paki	3	3	3
86	Odranci	4	4	4	194	Šmartno pri Litiji	3	3	3
171	Oplotnica	3	3	4	126	Šoštanj	3	3	3
87	Ormož	4	4	4	127	Štore	3	3	3
88	Osilnica	4	4	4	184	Tabor	4	4	4
89	Pesnica	3	3	4	10	Tišina	4	4	4
90	Piran/Pirano	1	1	1-2	128	Tolmin	2	2	1-2
91	Pivka	2	2	1-2	129	Trbovlje	3	3	4
92	Podčetrtek	4	4	3	130	Trebnje	3	3	1-2
172	Podlehnik	4	4	4	185	Trnovska vas	4	4	4
93	Podvelka	4	4	4	186	Trzin	1	1	1-2
173	Polzela	3	3	3	131	Tržič	3	3	1-2
94	Postojna	2	1	1-2	132	Turnišče	4	4	4
174	Prebold	3	3	3	133	Velenje	3	1	3
95	Preddvor	2	2	1-2	187	Velika Polana	4	4	4
175	Prevalje	3	3	3	134	Velike Lašče	2	2	1-2
96	Ptuj	1	1	3	188	Veržej	3	3	3
97	Puconci	4	4	4	135	Videm	4	4	4
98	Rače - Fram	3	3	3	136	Vipava	2	2	1-2
99	Radeče	3	3	3	137	Vitanje	4	4	4
100	Radenci	3	3	3	138	Vodice	2	2	1-2
101	Radlje ob Dravi	3	3	4	139	Vojnik	3	3	3
102	Radovljica	2	1	1-2	189	Vransko	3	3	3
103	Ravne	3	1	3	140	Vrhnika	2	2	1-2
176	Razkrižje	4	4	3	141	Vuzenica	3	3	3
104	Ribnica	2	2	1-2	142	Zagorje ob Savi	3	3	3
177	Ribnica na Pohorju	4	4	4	143	Zavrč	4	4	4
106	Rogaška Slatina	3	3	3	144	Zreče	3	3	3
105	Rogašovci	4	4	4	190	Žalec	3	1	3
107	Rogatec	3	3	4	146	Železniki	2	2	1-2
108	Ruše	3	3	3	191	Žetale	4	4	4
178	Selnica ob Dravi	3	3	3	147	Žiri	2	2	1-2
109	Semič	3	3	3	192	Žirovnica	2	2	1-2
110	Sevnica	3	3	3	193	Žužemberk	4	4	3
111	Sežana	2	2	1-2					

Table 6: *The group membership of Slovenian municipalities in 2005 by the three approaches (❶ Conditional assignment to group on the basis of WBCI, ❷ Clustering on the basis of all indicators, ❸ Clustering on the basis of major principal components).*

5 CONCLUSIONS

The aim of this paper was to explore well-being in municipalities in Slovenia by integrated application of different statistical techniques and to demonstrate the analytical potential of this approach for decision makers. The analysis was based on 49 indicators at the municipalities' level. Because of the small size of municipalities, it was not easy to find appropriate indicators. Sample sizes of surveys are far from being adequate at municipalities' level and the indicators have to rely mainly on administrative sources. We assume that well-being is fairly represented by the selected indicators. However, it has to be noted that the impact of the indicator selection on composite measures should deserve further research.

Three approaches were applied in the analysis of well-being. Principal component analysis was implemented to construct a composite indicator of well-being. The use of the method proves to be helpful for the interpretation purposes of components in the composite indicator and for the ranking of municipalities. In order to further investigate well-being, cluster analysis was implemented on the basis of all indicators. Four groups of municipalities were formed with respect to the level of well-being: top well-being municipalities (cluster 1 and cluster 2), municipalities of moderate well-being (cluster 3) and municipalities of low well-being (cluster 4). The clustering process revealed the differences in the characteristics of well-being of the top ranked municipalities: on one side economically and socially superior municipalities (cluster 1) and on the other side the municipalities of balanced well-being (cluster 2). Third, clustering was implemented on the basis of major principal components. The results obtained are very close to those acquired in the clustering process with all indicators.

All three approaches distinctly imply significant differences among the municipalities in the level of well-being. The western part of Slovenia is characterised by a higher level of well-being, while the eastern part is defined by lower well-being. There are 52 municipalities where the level of well-being is especially low, the majority of them located in the north-east. However, by their size and population they represent a relatively small proportion of Slovenia. They amount to 7.6 % of the total population and cover approx. 17 % of the Slovenian territory.

The comparative use of several multivariate methods has identified the basic characteristics of the four groups of municipalities. These results can serve as the basis for the creation of appropriate development policies, tailored to the characteristics and level of well-being of the groups considered. Due to the fact that the municipalities with similar level of well-being frequently form territorial units, regional distribution of municipalities should be taken into account by policy makers.

It can be concluded that the analysis of well-being in Slovenian municipalities on the basis of composite indicators demonstrated the capacity of this approach: composite indicators resume multivariate information sources (a large number of observed variables) but in this process they may mask certain issues that could be of interest to researchers and policy makers. For this reason a comparative use of some other multivariate method, like cluster analysis, may be a fruitful approach to test the validity of the results and to enhance the interpretability and usability of composite measures.

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