

Ljubljana as a ‘Green’ and Sustainable city– Comparing and Contrasting Various Practices

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Abstract

Purpose and Originality: ‘Greenness’ and sustainability are moving from an abstract concept toward a measurable state, using the triple bottom line approach considering environmental, social, and economic dimensions. How the ‘greenness’ and sustainability of Ljubljana, the capital of Slovenia, are achieved and estimated, is determined by comparing two indices. European Green Capital Award represents its ‘greenness’, while its sustainability is analysed by A New Sustainability City Index Based on Intellectual Capital Approach. Originality of the research is the analysis of the potential of Ljubljana city through contrasting these two indices.

Method: Quantitative and qualitative methods were used. Two comparable indices have been chosen as a multidimensional concept which both clearly involve economic, environmental (ecological) and social aspects, with available and published results for Ljubljana. Both indices are comparable, the category scores were aggregated according to equal weighting, and the index results were expressed as percentages.

Results: The results showed that ranking of Ljubljana as a ‘green’ and sustainable city respectively is different. Total index score of 52 % for European Green Capital Award places Ljubljana 22nd among the ‘green’ cities of Europe and ranks it in the upper half of the 58 European cities in the study. A New Sustainability City Index Based on Intellectual Capital Approach x of 44.92 ranking Ljubljana on the 102nd position in a scale of 158 European cities, places it in the lower half. The results confirm that Ljubljana is more ‘green’ than sustainable, according to these studies.

Society: There are many studies, which make a concerted effort toward capturing the ‘greenness’ and the sustainability of cities. Therefore, indices include three independent dimensions and are decisive in positioning the city. These are important tools in making environmental (ecological), social-cultural, and economic decisions in cities’ policy, which directly affect companies, management and society.

Limitations / further research: The main research limitation of this proposal is unavailability of complete database for both indices. Further research is more than needed, with the most recent available data.

Keywords: ‘green’ city, sustainable city, ‘green’ indicators, indicators of sustainability, European Green City Award, A New Sustainability City Index Based on Intellectual Capital Approach, Ljubljana.

1 Introduction

Sustainability is one of the most important global challenges and the greatest challenge for the future development of the cities. According to United Nations reports 54 percent of the world’s population lives in urban areas; by 2050, two-thirds of its population are likely to be urban. This dominance of cities highlights the significant role of urban sustainable development. Although the population projection for Slovenia up to 2050 does not show substantial changes, one of the aims is to achieve sustainability. Ljubljana was awarded the title of the European Green Capital last year; in this respect it is leading the way in environmentally friendly urban living.

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In literature, there are several definitions of the terms '*green*' city and *sustainable city*. We attempt to analyse indices divided into categories and indicators to review which of the three dimensions play an important role when evaluating the degree of 'greenness' and sustainability of Ljubljana. The analysis of literature indicates that the 'green' city concept has a multidimensional meaning; it takes responsible societal and political action in order to meet the conditions of environmental quality.

Currently, the 'green' city concept is defined as an extension of sustainable development in the urban context (Lewis, 2015, p. 1) and it represents the architectural model of the future, where urban structures are compatible with the environment and life quality (ELCA, 2011, p. 4).

Sustainability is defined in the context of economic, social, environmental issues and it is in this focus a sustainable city is attempted to be defined. However, there is no completely agreed upon definition for what a sustainable city should be or completely agreed upon paradigm for what components should be included. Generally, developmental experts agree that a sustainable city should meet the needs of the present without sacrificing the ability of future generations to meet their own needs, analogous to the definition of sustainable development by World Commission on Environment and Development. One of the definitions of a sustainable city: *A city constructed or landscaped in such a way as to minimize environmental degradation, with facilities (such as transport, waste management, etc.) which are designed so as to limit their impact on the natural environment, while providing the infrastructure needed for its inhabitants* (Oxford Living Dictionaries).

How the 'greenness' and sustainability of Ljubljana, the Slovenian capital, is achieved and estimated, is determined by contrasting different practices and using various sustainable and 'green' indicators. This paper presents an overview of the relevant studies of measuring 'greenness' and sustainability of Ljubljana, where results are published and available.

Therefore, to measure and evaluate city 'greenness' and city sustainability sets of indicators, frameworks and assessment tools have been developed. In this paper it is exposed how 'green' and sustainable indicators and their appropriate selection play undoubtedly an important role in attainment of both 'greenness' and urban sustainability. This paper examines different practises in order to determine the 'greenness' and sustainability of Ljubljana. Discussions based on the comparative analysis are categorized in three dimensions: environmental (ecological), social (cultural) and economic.

'Environmental' and 'ecological' are not synonymous and has different conceptual meanings and overlaps with the concept of 'nature'. "Environment includes three very different sorts of the word environment: the physical world, the social world of human relations and the built world of human creation" (Grange in Klesse, 2001, p. 62). "By ecology we mean the whole science of the relations of the organism to the environment, including, in the broad sense, all the 'conditions of existence'" (Haeckel, translated in Stauffer, 1957, p. 140).

There are major subsets of environmental indicators, one the subset is the collection of ecological indicators. From this viewpoint environmental and ecological indicators are compatible and comparable.

The purpose of this paper is to discuss conceptual requirements for 'greenness' and sustainable indices by using the European Green City Award (EGCA) and A New Sustainable City Index Based on Intellectual Capital Approach (SCI) to analyse the differences and results. The aim of this study is to critically examine and contrast different 'greenness' and sustainable urbanization practices and analyse the position of the city of Ljubljana in the 'green' and sustainable framework of European cities.

2 Theoretical framework

There are many studies, which make an effort toward capturing the 'greenness' and sustainability of cities. A comprehensive literature review was conducted to obtain the information needed for pursuing the objectives of this research. Information was obtained from the Web of Science literature and academic journals. In this section, we outline the 'greenness' and sustainability indices for Ljubljana, regarding studies for which results are published and accessible. Two comparable studies – the SCI and the EGCA - have been chosen as a multidimensional concept which clearly involves economic, environmental (ecological) and social aspects. Results of each of these two studies are comparable, the category scores were aggregated according to equal weighting, and the index results were expressed as percentages.

Analysing the potential of Ljubljana in the 'greenness' and sustainability framework we believe that all three essential aspects of the SCI and the EGCA equally contribute to the final index result although different indicators are used to create each index.

We can assume that ranking of Ljubljana's degree of 'greenness' and sustainability is in the higher half of the European cities which are estimated in these two studies. In relative ranking, we suppose that Ljubljana is more 'green' than sustainable.

3 Method

The research required to use the analysis of scientific studies, papers and reports about the given issue. The methodological process also consists of collecting the various studies and analyses of 'greenness' and sustainability performances of Ljubljana city. The comparative method helped to indicate and recognize differences between indices as well as similarities. The mixed research method applied in this paper uses a quantitative and qualitative approach.

3.1 European Green Capital Award

The growing need for urban sustainability monitoring has resulted in elaborate overviews of the economic, environmental and social performance of EU member states and the EU as a whole. The European Green Capital Award (EGCA) is the process leading to the yearly

selected award which was launched in 2008 by European Commission DG Environment after an initiate of 15 European cities in Tallinn, Estonia in 2006 (Zoeteman, Slabbekoon, Mommaas, Dagevos, Smeets, 2014, p. 8). For selection of the cities, 19 sustainability themes, called stocks, with related sustainability requirements have been included for the 3 P's, called 3 capitals. The per cent achievement scores of individual indicators are summarized for each stock and the total of stock scores determines subsequently the capital score. The mean of the 3 capital-scores finally determines the total sustainability score of a city which varies in principle between 0 and 100% (Zoeteman, Slabbekoon, Mommaas, Dagevos, Smeets, 2014, p. 13-14).

The method applied is based on the experience of Telos since 2000 by monitoring sustainability of Dutch municipalities and provinces. Although it applies a detailed assessment of the three sustainability pillars: the ecological capital, the economic capital and the socio-cultural capital, it does not include governance aspects. Each of these three sustainability 'capitals' is composed of 5-7 sustainability themes, while each of those is based on some 4 indicators. The score for each indicator could vary between 0 and 100% reaching the sustainability goal. Indicator values were added to a theme score by giving them in principal equal weight, and the same was done for the themes to arrive at a capital score and for the three capitals to obtain the overall sustainability score of a municipality. (Zoeteman, van der Zande, Smeets, 2015, p. 68-69).

The results of the EGCA about total sustainability score and scores for each three pillars of sustainability from monitoring of 58 EU cities are in table 1.

Table 1. The European Green City Award (EGCA)

Town (Europe)	EGCA Total sustainability score (0-100 %)	Rank	Ecological pillar	Socio-cultural pillar	Economic pillar
Munich	62	1-2	54	69	63
Stockholm	62	1-2	58	70	59
Ljubljana	52	22	56	54	47
Thessaloniki	33	1	38	29	31

Adapted from: *Integrated Sustainability Monitoring of 58 EU-Cities*. A study of European Green Capital Award applicant cities (p. 25-26), In Zoeteman, van der Zande, Smeets, 2015, Tilburg: Telos.

3.2 Sustainable City Index (SCI) based on Intellectual Capital Approach

The following are components that constructed an indicator for each of the dimensions considered in the SCI. The environmental dimension (ED) reflects four components: pollution; water consumption; waste management and land uses, each measured by a set of indicators. The economic dimension (EcD) has been measured using the Gross Domestic Product (GDP) and the labour market indicators. Finally, the social dimension (SD) has been disaggregated into four components: health; safety; education; and culture conditions, each measured by a set of indicators. The cities and indicators used have been selected based on the literature review developed and the data available in the Urban Audit database from Eurostat. The different dimensions consider in their construction two kinds of scales of indicators:

absolute, normalized in per capita terms; and efficiency, on a percentage scale. To normalize, when the indicator does not have a percentage scale, variables have been rescaled assigning 100 to the highest value and 0 to the lowest. Thus, all the variables generated by the indicators have values ranging from 0 to 100 (minimum to maximum). The structure of the indicator SCI is supported in a multiplicative scheme, according to Equation, from Intellectual Capital theory and provides a robust indicator for each component. This method allows for comparison between cities; the addition of new indicators; analyses the capitals capable of obtaining future profits, and provides an interesting objective to make new political decisions. The weighting and aggregation scheme used is based on an objective method (PCA), using the percentage of variance retained by each component and the characteristic vectors, respectively (Alfaro-Navarro, López-Ruiz, Nevado Pena, 2017, p. 5-7).

Sustainable City Index for each component is shown in table 2.

Table 2. The Sustainability City Index (SCI) by Dimensions

Town (Europe)	SCI	Rank	ED	EcD	SD
Aarhus	54.31	1	61.22	46.05	55.84
Ljubljana	44.92	102	35.69	42.03	52.35
Porto	40.08	158	34.33	40.55	34.15

Adapted from: “A New Sustainability City Index Based on Intellectual Capital Approach” by Alfaro-Navarro, López-Ruiz, Nevado Pena, 2017, *Sustainability*, 9(5), p. 6.

3.3 Dimensions of ‘greenness’ and sustainability of Ljubljana

The comparison of categories and indicators of the EGCA and the SCI of Ljubljana and scores of each category are shown in table 3.

The categories presented in both the tools of ecological / environmental aspect are: air (pollution), water, waste, land use and green areas. In the EGCA the category of energy (& climate) measures GHG and CO₂ emissions, and estimates emission reduction target 2010-2010. Apparently, the SCI in the category of pollution defines ‘energy consumption of buildings’.

The social-cultural aspect in the EGCA and the SCI is focused on categories: health, education, (art) culture and safety. Moreover, the EGCA includes additional two categories – ‘economic, political and social participation’ and ‘residential (living) environment’.

The economic dimension in the EGCA and the SCI represents ‘labour’ (market) and ‘GDP’; for the SCI there are an additional indicators; ‘capital goods’, ‘infrastructure & mobility (accessibility)’ and ‘knowledge’.

Table 3. Categories (stocks) and indicators of the EGCA and the SCI of Ljubljana

The EGCA of Ljubljana		The SCI of Ljubljana	
56 %	Ecological capital	35.69	Environmental Dimension(ED)

Soil & ground water:

1. Chemical status groundwater
2. Nitrogen input on soil

Drinking water and sanitation:

3. Public water supply consumption
4. Household consumption
5. People connected to secondary or better wastewater treatment

Surface water:

6. Soil Sealing
7. Ecological status surface water
8. Chemical status surface water
9. Increasing flood risks due to heavy rain

Air:

10. Concentration NOX
11. Concentration O₃
12. Concentration PM10
13. Concentration PM 2.5
14. Annual emissions per capita of NO_x
15. Annual emissions per capita of VOC
16. Annual emissions per capita of PM 2.5
17. Perception of seriousness' of air pollution

Nuisance (annoyance) & emergencies (calamities):

18. Road noise (Lden) >55dB
19. Road noise (Lden) >65dB
20. Rail noise (Lden) >55dB
21. Rail noise (Lden) >65dB
22. Airport noise (Lden) >55dB
23. Airport noise (Lden) >65dB
24. Perception noise annoyance

Nature & landscape:

25. Urban green areas
26. Urban blue areas
27. Forest
28. Urban sprawl
29. Biodiversity

Energy & climate:

30. Annual total and traffic GHG emissions
31. CO₂ eq. emissions per capita
32. Emission reduction target 2010-2020

Resources & waste:

33. Annual municipal solid waste generated per capita
 34. Landfilling
 35. Incineration
-

Pollution:

1. Rainfall
2. Index of Summer Smog
3. Hours per year that NO₂ exceed 200 mcg/m³
4. Days particulate matter PM10 exceed 50 mg/m³
5. Accumulated ozone in excess 70 mcg/m³
6. Annual average concentration of NO₂
7. Annual average concentration of PM10
8. Energy consumption of buildings

Water consumption:

9. Total consumption of water
10. Price of a m³ of water

Wastes and recycling:

11. Annual amount of solid waste
12. Annual amount of solid waste recycled

Land uses:

13. Total land area
14. Green space area
15. Land used for agricultural purpose
16. Commercial activities
17. Land area in residential use

54 %	Social-cultural capital	52.35	Social Dimension (SD)
	Economic, political, social participation:		Health:
	36. Long term unemployment rate		18. Number of live births
	37. At-risk-of-poverty rate		19. Number of deaths per year
	38. Turnout municipal elections		20. Number of hospital beds
	39. Turnout national elections		Safety:
	40. Turnout European elections		21. Number of deaths per year due to suicide
	41. Political trust		22. Murders and violent deaths
	42. Perception foreigners are good for society		23. Car thefts
	43. Perception everyone can be trusted		24. Domestic burglary and deaths
	Health:		25. Road accidents
	44. Mortality rate		Education:
	45. Hospital beds		26. Number of residents (aged 15–64) with ISCED level as the highest level of education: A (0, 1 or 2)
	46. Availability General Practitioners		27. Number of residents (aged 15–64) with ISCED level as the highest level of education: B (3 or 4)
	47. Life expectancy		28. Number of residents (aged 15–64) with ISCED level as the highest level of education: C (5 or 6)
	48. Satisfaction with Doctors		
	49. Satisfaction with Hospitals		Culture:
	Art and culture:		29. Number of cinema seats
	50. Museum visitors		30. Number of museums
	51. Theatres		31. Number of theatre seats
	Safety:		32. Number of public libraries
	52. Homicide		
	53. Burglary		
	54. Fatalities traffic		
	55. Perception of safety		
	Residential (living) environment:		
	56. Net migration		
	57. Rental price		
	58. Satisfaction with living in this city		
	59. Satisfaction with easy of finding good house for reasonable price		
	60. Satisfaction with sport facilities		
	Education:		
	61. Youth unemployment		
	62. Early leavers from education		
	63. Secondary education		
	64. Satisfaction with schools		
47 %	Economic capital	42.03	Economic Dimension (EcD)
	Labour:		Labour market:
	65. Employment rate		33. Total economically active population
	66. Unemployment rate		34. Unemployed
	67. Employment function		35. Employment
	68. Aging labour force		36. Self-employment
	Economic structure:		37. Paid employment
	69. Disposable income		38. Full-time employment
	70. Birth of businesses		39. Part-time employment
	71. Death of businesses		GDP:
	72. GDP/capita PPS		

73. Employment growth	40. GDP per inhabitant in PPS of NUTS
74. Tourism	3 regions

Capital goods:

75. R & D intensity
76. Labour productivity

Infrastructure & mobility (accessibility):

77. Broadband access
78. Length of cycle lanes
79. Vehicle transport through fast lanes
80. Rail network
81. Congestion motorways and other roads
82. Congestion on other roads
83. Distance to airport
84. Capacity airport

Knowledge:

85. High (tertiary) education
86. Employment in science and technology
87. Creative sector employment

Adapted from *Integrated Sustainability Monitoring of 58 EU-Cities. A study of European Green Capital Award applicant cities, collaboration with DG Environment, European Commission, and European Environmental Agency – European Topic Center for Spatial Information and Analysis* (p. 21-22), In Zoeteman, van der Zande, Smeets, 2015, Tilburg: Telos.

And adapted from: *A New Sustainability City Index Based on Intellectual Capital Approach.*(p. 6), In Navarro, López-Ruiz, Nevado Pena, 2017, Sustainability 9(5). doi: 10.3390/su905086

4 Results

Table 4 presents methodological characteristic of the EGCA and the SCI. The underlined categories are present in both the indices.

Table 4. Methodological characteristic of the EGCA and the SCI

	Year of research	Data from	Number category or stock	Categories / stock	Number indicators	Total index
			8	Ecological: <u>Soil & ground water</u> , <u>Drinking water</u> and sanitation, <u>Surface water</u> , <u>Air</u> , Nuisance and emergencies, Nature and landscape (<u>land</u>), Energy and climate, Resources and <u>waste</u>	35	
			6	Social-cultural: Economic, political and social participation, <u>Health</u> , Art and <u>culture</u> , <u>Safety</u> , Residential environment, <u>Education</u>	29	
			5	Economic: <u>Labour</u> , Economic structure (<u>GDP</u>), Capital goods, Infrastructure and accessibility, Knowledge	23	
European Green Capital Award (58 European cities)	2015	2004-2014	19		87	52
			4	Environment: Pollution (<u>air</u>), <u>Water</u> consumption, <u>Waste</u> and recycling, <u>Land</u> uses	17	
			4	Social: <u>Health</u> , <u>Safety</u> , <u>Education</u> , <u>Culture</u>	15	
			2	Economic: <u>Labour</u> market, <u>GDP</u>	8	
Sustainable City Index (158 European cities)	2017	2009	10		40	44.92

Source: own study based on research

Descriptive statistics of the EGCA for 58 European cities and the SCI for 158 European cities are presented in table 5.

Table 5. Descriptive Statistic -the EGCA and the SCI

Descriptive Statistic	The EGCA	The SCI
Mean	49.1207	45.9504
Standard Error	0.8974	0.2207
Median	50	46.18
Mode	42	43.52
Standard Deviation	6.8341	2.7738
Sample Variance	46.7045	7.6941
Kurtosis	-0.6272	-0.0349
Skewness	-0.0606	0.2570
Range	29	14.23
Minimum	33	40.08
Maximum	62	54.31
Sum	2849	7260.16
Count	58	158
Largest(1)	62	54.31
Smallest(1)	33	40.08
Confidence Level (95,0 %)	1.7969	0.4359

Descriptive statistics in order to test hypothesis for Ljubljana are shown in table 6.

Table 6. Rank based - the EGCA and the SCI of Ljubljana

Ljubljana	The EGCA	The SCI
01) Index	52	44.92
02) Rank	22	102
03) Relative rank	0.61	0.36

5 Discussion

Analysis and comparison of the multidimensional indicators used in two indices (European Green Capital Award and Sustainable City Index) indicate that ecological (environmental), social (cultural) and economic dimension do not contribute equally to ranking Ljubljana city in the 'greenness' and sustainability framework.

The triple line approach considers environmental, economic and social dimensions in the EGCA58-city study based on 87 (quantitative and qualitative) indicators arranged in 19 stocks. The ecological (environmental) capital includes 35 indicators, the social-cultural capital includes 29 indicators and the economic capital 23. A total score is determined for each stock by adding the weighted scores from all the indicators. Although the indicators are not all considered to be of equal importance, in this specific study the weights of all indicators within a capital are set equal. Stock score for Ljubljana determine ecological capital in 56 %, social-cultural capital in 54 % and economic capital in 47 %. The mean of all three-capital scores determines the total sustainability score of Ljubljana to be 52 %.

The SCI is also based on the triple bottom line of sustainability (environmental, economic and social); 17 environmental indicators, 15 indicators for the social dimension and 8 economic indicators measure 10 categories. The SCI is using a geometric average and considering that averaging indicators are expressed in percentage form. The weighting and aggregation scheme used is based on an objective method principal component analysis (PCA), using the percentage of variance retained by each component and the characteristic vectors. In the composite indicator SCI of Ljubljana the environmental dimension is determined as 35.69, social 52.35, and economic 42.03. Finally, the resulting sustainability index for Ljubljana is 44.92.

Ranking Ljubljana as a 'green' and sustainable city respectively is different. Total index score of 52 % for EGCA places Ljubljana 22nd among the 'green' cities of Europe and ranks it in the upper half of the 58 European cities in the study. The SCI index of 44.92 ranking Ljubljana on the 102nd position in a scale of 158 European cities, places it in the lower half. The relative range EGCA of 0.61 and the relative range SCI of 0.36 also confirm that Ljubljana is more 'green' than sustainable.

The results generate a lot of discussion. As the databases for used indicators and calculations are not accessible, conclusions cannot be expressed with certainty. From the available calculated data for both indices, we can conclude just on the basis of results of individual three dimensions of 'greenness' and sustainability.

The score of the ecological / environmental impact in Ljubljana is much higher in the EGCA than in the SCI. Moreover, the environmental dimension has the smallest share in the SCI of Ljubljana (35.69). How and whether the result of the ecological / environmental dimension is influenced by the fact that in the EGCA this dimension is measured by 35 indicators, while in the SCI by 17 indicators, we cannot determine. But it is obvious that the SCI in category 'Water consumption' defines only two indicators, whereas in the EGCA are included 9 indicators in three categories ('Soil and ground water', 'Drinking water and sanitation', 'Surface water'). Furthermore, the highest and the lowest scoring stock in EGCA of Ljubljana are both given in ecological capital – 'Soil & groundwater' (84) and 'Drinking water & sanitation' (34). In the EGCA Ljubljana and Helsinki are the highest scoring cities for 'Air' (56).

With the purpose of investigating differences in the score of the social (cultural) dimension in the EGCA (54) and in the SCI (52.35) of Ljubljana, we ascertain that the similar four categories are included in both indices. However, in the EGCA two more meaningful categories are included; 'Economic, political and social participation' and 'Residential (living) environment' which probably influence the result. Regardless, the score of the social (cultural) impact in the EGCA of Ljubljana is not evidently different from the one in the SCI.

The score of the economic dimension contributes the least to the index EGCA (47); in the SCI index the economic dimension represents 42.03. Analysis of the indicators (excluding

‘Labour’ and ‘GDP’) shows that economic state in EGCA also concerns ‘Capital goods’, ‘Infrastructure and mobility (accessibility)’ and ‘Knowledge’.

Contrasting the EGCA with the SCI, we observe that the concept is similar and based on three-dimensional framework – ecological / environmental, social (cultural) and economic. There are differences in the disclosure pattern and the depth of ‘greenness’ and sustainability indicators. Altogether, there are 87 indicators of EGCA index, 35 of which belong to the ecological, 29 to the social-cultural, and 23 to the economic dimension. The SCI index is using only 40 indicators to disclose sustainability, 17 indicators belonging to the environmental, 15 to the social, and one fifth to the economic dimension.

The results for Ljubljana show that the majority of the indicators (35 indicators) in the EGCA are in the ecological domain and represent the highest score (56) among all the categories in both indices. In this perspective, the lowest score (35.69) in SCI represents the environmental aspect, which is difficult to explain. Due to insufficient information, we are not in a position to analyse this result and the differences in this case.

The results of the study of 58 applicant cities EGCA are presented in 2015, the data for 58 countries were collected mostly from Eurostat, years of measurement vary from 2004 to 2014. The information available in the Urban Audit database for 2009 has been used for the performance the SCI for 58 European cities in 24 European countries. Therefore, information and data are important to recognise and raise awareness of a need for adaptation in order for the cities to become more ‘green’ or sustainable. Both studies are limited in this sense and do not reflect the current state of Ljubljana. Thus, the authors of the SCI research are now investigating in two ways – through the new source of world-wide data from World Bank Group or by examining the compatibility between the Urban Audit 2013 indicators towards the previous edition of this database.

We reject the hypothesis that all three essential aspects of the EGCA and of the SCI as well contribute equally to the final index result.

Ljubljana’s degree of ‘greenness’ ranking is in the upper half of the 58 European cities, so we accept this hypothesis.

Among 158 European cities the position of Ljubljana according the SCI does not rank in the upper half, therefore we reject this hypothesis.

Relative to the rank we can confirm the hypothesis that Ljubljana is more ‘green’ than sustainable.

6 Conclusion

In this article the focus was on the identification of ‘greenness’ and sustainability indicators, which measure the capability of Ljubljana, capital town of Slovenia. Presented research work

is based on the indices, the EGCA and the SCI, the latest available and published studies where Ljubljana is included.

The results show that Ljubljana 'green' city standing is in the upper half of 58 European cities. Based on the SCI index, the outcome of sustainability emphasizes that Ljubljana does not achieve ranking in the upper half of the 158 European cities. Furthermore, the environmental dimension contributes the smallest share to SCI.

Contrasting these two practices leads to the conclusion that Ljubljana is more 'green' than sustainable. This conclusion is made within the naming of indices, originally named in both studies.

The contribution to the profession is to demonstrate and compare the 'green' and sustainable approach in recognizing city ranking. There are many studies, which make a concerted effort toward capturing the 'greenness' and the sustainability of cities. Therefore, indices include three independent dimensions and are decisive in positioning the city. This is also an important tool to support policy decision on environmental, social and cultural, and economic field. The main research limitation of this proposal is unavailability of complete databases for both indices.

Further research is more than needed, with most recent information available.

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