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ANALYSIS OF WELL-BEING INDICATORS IN SATELLITE TOWNS, CASE OF LATVIA

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Abstract. A satellite town or satellite city is a concept in urban planning that refers essentially to smaller metropolitan areas which are located somewhat near to but are mostly independent of larger metropolitan areas (Evans & Evans, 2007). Taking into account the rapid social economic development of satellite towns, which leads to the population growth in these municipalities, it is important to ensure the well-being for their citizens. As the well-being concept is holistic and includes different dimensions, the methodology on evaluation of the well-being on local level should be developed taking into account the peculiarities of the satellite towns. The aim of the paper is to analyse the well-being indicators in satellite towns of Latvia. Main results and conclusions of the paper: based on designed methodology on identification of satellite towns, 14 satellite towns around Riga were determined. The expert survey on selection of well-being indicators proved that indicators of different areas were needed to evaluate the well-being at satellite towns. The indicators related to remuneration, employment, demography, social safety and safety were selected. On the bases of selected well-being indicators, the Well-being index for satellite towns was designed and satellite towns of Riga accordingly evaluated.

Key words: satellite towns, municipality, well-being, well-being index.
JEL code: I31, I38, O21, R58.

Introduction

Satellite town development has attracted much attention in the research field worldwide. The history of Satellite Towns has been extensively studied (Merlin, 2013; Osborn, 2003; Thomas, 1997); however, the experiences of Satellite Towns in Central and Eastern Europe have only recently been brought into focus (Cole, 1990; Prasca & Olau, 2013; Kissfazekas, 2015).

Satellite towns in many cases have complicated history, as they have been built for different purposes (especially in post-socialist countries) and during the time change the initial motivation for constructing them is not topical anymore. Regarding the questions on how a satellite town can deal with this kind of historic heritage today and whether it can replace its lost identity with new elements in a very different social political situation, it highlights the challenges of municipality of satellite towns in promoting well-being for its citizens.

Indeed, satellite towns as all municipalities are playing crucial role in promoting well-being for its citizens as local governments are instrumental in the judicious use of natural resources, providing public services and creating local jobs - through land use and transit planning, building and infrastructure construction and rehabilitation, investments in energy, water and waste management, and economic development strategies.

In order to promote well-being in satellite towns, the relevant background information should be provided on current situation on well-being in the municipality. For this purpose researchers use different well-being indicators. Among social researchers there is confidence that well-being could be evaluated using measurable indicators (Rinne et al., 2013; Hezri, 2004; Bauler, 2012; Rydin et al., 2003). Traditional indicators of well-being are variety of socio-economic indicators - population health, salary and allowances, distribution of income between different groups of households, their use (Bikse et al., 2009) etc. These factors are typically rated, and regions and cities are ranked on this basis (e.g. Savageau, 2007; Mercer, 2015; Jordison and Kieran, 2003). Another approach for measuring well-being is developing indexes that allow to include different indicators in one index (Briec et al., 2013; Smith et al., 2013; Osberg & Sharpe, 2009).

In case of Latvia, usually the municipalities in Pieriga region are being considered as the satellite towns of the capital city of Latvia - Riga. Different criteria like distance, migration etc. have been used to determine the possible satellite towns – in many cases, the number of satellite towns differs (State Regional Development Agency, 2009). However, there is no common understanding on concept of satellite towns in Latvia.

Taking into account above mentioned, the aim of the paper is to analyse the well-being indicators in the satellite towns of Latvia. The research object is satellite towns of Latvia.

In order to achieve the aim, following tasks are formulated: (1) to determine the satellite towns of Latvia; (2) to select the well-being indicators

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representing the well-being in the satellite towns of Latvia; (3) to design the Well-being index for the satellite towns of Latvia.

The hypothesis of the paper: the well-being indicators describe different dimensions of the well-being in the satellite towns.

During the preparation of the paper, the following methodology was used: a survey of experts, standardization of empirical statistical data, analysis and comparisons of empirical statistical data. The theoretical and methodological basis of paper: special literature of economics, published scientific researches, statistical database.

Research results and discussion

In this section, the description of concept of satellite towns would be provided as well as methodology of determination of the satellite towns in Latvia and selection of the well-being indicators for them.

The concept of satellite towns

The concept of "Satellite Cities" was introduced by Graham Romeyn Taylor in 1915. At that time, factories were proposing to move to satellite cities which should be built in suburbs of big cities to relieve excessive concentration of metropolis downtown (Taylor, 1915).

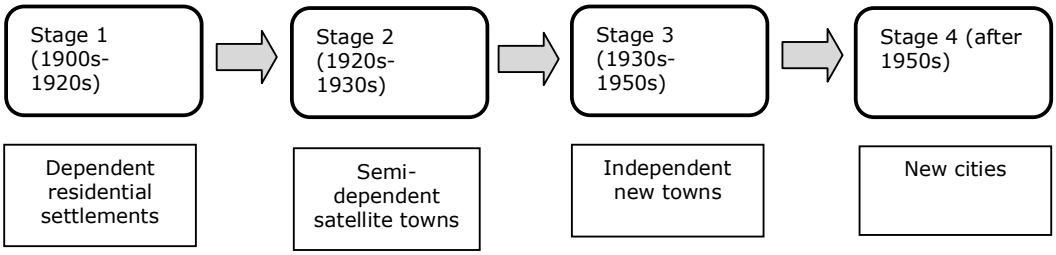
Some elements of satellite towns have been identified by many scholars as follows:

firstly, the distance of a satellite town from a major urban area differs due to availability of land, accessibility, transportation network etc. but the distance should be close enough to justify both a rapid commuting distance and the open space needed to separate the town settlements (Golany, 1976);

secondly, satellite towns should be totally economic dependent on the neighbouring urban center where the majority of satellite town residents find their jobs (Fisher-Cassie, 1943);

thirdly, an independent local government should present and run the town to give it identity so that it is different from normal urban suburb (Golany, 1976).

The development of process of satellite towns is revealed in Figure 1.



Source: adopted from Mengui, 2011

Fig.1. Evolvement process of satellite towns

The earliest satellite towns (first stage) were basically dependent residential settlements attached to metropolises. People only lived there with basic service facilities and needed to go to urban centre for work and entertainment. So these towns then were called "dormitory towns". The second stage was semi-dependent satellites towns. These towns were equipped with some industries and service facilities. At the same time, they were linked to urban downtown through subways. This concept was attempting to realise "organic decentralization" of urban functions. The third stage was to build fully independent satellite towns after World War II. They were located 30-50 kilometres from urban downtown, provided reasonable portion of living place and employment opportunities, together with culture and entertainment facilities. The fourth stage of satellite towns appeared in the context that single cantered cities were developing into polycentric cities. All the towns were linked together with city centre by rapid transit and became important part of urban spatial structure (Mengui, 2011).

Further would be analysed the concept of satellite towns in Latvia.
1. The determination of satellite towns of Latvia

As it was mentioned above, the number of satellite towns of Latvia differs in different sources. Usually, the cities of Pieriga region like Salaspils, Ikskile, Olaine are mentioned as typical satellite towns of Riga. Taking into account that by definition only towns in agglomeration of Riga city could be called as satellite towns, in further research the interaction between Riga and potential satellite towns would be examined and described in following sections. In addition, only cities (*republikas pilsetas*) and municipality towns (*novada pilsetas*)

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according to the Law on Administrative Territories and Populated Areas would be considered as the satellite towns of Riga.

In order to determine the satellite towns of Riga, it is assumed that satellite towns of Riga are towns in agglomeration of Riga that have strong tendency to the centre of agglomeration (Riga), taking into account following indicators:

1) the intensity of commuting of working population to Riga from towns (based on data from personal income tax) in 2014;

2) the evaluation of provision of public transport and attainability of city to Riga.

Each indicator is characterized by a certain strives process that shows a different intensity of the agglomeration territory. Quantitative indicator values allow distinguishing five centripetal power levels characterized by the coefficient aij described in Table 1.

Table 1

The description of centripetal power aij for indicators

Indicators	Levels				
	Very high (1)	**High (0.75)**	**Medium (0.5)**	**Medium low (0.25)**	**low (0)**
The intensity of commuting of working population to Riga from towns in 2014	The commuters proportion of the working age population is greater than 40 %	The commuters proportion of the working age population is 30- 40%	The commuters proportion of the working age population is 25- 30%	The commuters proportion of the working age population is 20-25%	The commuters proportion of the working age population is less than 20%
The evaluation of provision of public transport and attainability of city to Riga	Great public transport diversity, attainability of Riga is less than 30 min	Relatively large variety of public transport, attainability of Riga is 30–45 min	There is considerable variety of public transport, attainability of Riga is 45–60 min	There is considerable variety of public transport, attainability of Riga is 60–90 min	The city is accessible by public transport, but the cruising intensity is insufficient for easy and quick accessibility of Riga (more than 90 min)

Source: authors' construction

The cumulative strives intensity for cities is calculated using the following formula:

$$Tp_i = \sum_{j=1}^{2} Ka_{ij} \quad (1)$$

where **j** – number of indicators;

Tp_i – cumulative strives intensity for the i-th city;

a_{ij} = 1, if there is very strong tendency in the i-th city for the j-th indicator;

0,75, if there is strong tendency in the i-th city for the j-th indicator;

0,5, if there is medium tendency in the i-th city for the j-th indicator;

0,25, if there is weak tendency in the i-th city for the j-th indicator;

0, if there is no tendency in the i-th city for the j-th indicator.

K – significance coefficient:

K = 2, if indicator is very significant;

K = 1 for other indicators.

It was decided that coefficient K is equal to two for the intensity of commuting of working population to Riga from towns (first indicator).

According to the cumulative strives intensity **Tp_i**, all towns would be grouped:

1) town that is included in the agglomeration of Riga and would be considered as a satellite town, if Tpi ≥1.5;

2) town that is included in the agglomeration of Riga, however the tendency is not strong enough to call the town as a satellite town, if 0.75 ≤Tpi P<1.5;

3) town out of the agglomeration areal, if Tpi <0.75.

According to the current Law on Administrative Territories and Populated Areas in Latvia are 76 towns, of which 9 are cities. In order to reduce the number of towns, which further would be used for the data analysis, the information was compiled on how long does it take for the particular town to get to Riga. It was assumed that those towns that are further away than 2 hours away from Riga have the weak link with Riga. Consequently, the further analysis was conducted

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for 40 towns. After calculation, 14 satellite towns of Riga were determined and summarised in Table 2.

Table 2

The calculation of satellite towns of Riga

No	Town	Time (min)	Coefficient aij [0; 1]	The commuters proportion (%)of the working age population, 2014 (%)	Coefficient aij [0; 1]	Cumulative strives intensity Tpi [0; 3]
1	Balozi	23	1	48.8	1	3
2	Salaspils	27	1	48.0	1	3
3	Olaine	26	1	42.7	1	3
4	Ikskile	36	0.75	43.9	1	2.75
5	Baldone	43	0.75	40.8	1	2.75
6	Saulkrasti	50	0.5	42.9	1	2.5
7	Jurmala	26	0.75	37.1	0.75	2.25
8	Vangazi	40	0.75	35.3	0.75	2.25
9	Ogre	43	0.75	33.5	0.75	2.25
10	Jelgava	47	0.5	30.4	0.75	2
11	Kegums	52	0.5	32.8	0.75	2
12	Sigulda	54	0.5	32.5	0.75	2
13	Aizkraukle	76	0.25	30.0	0.75	1.75
14	Lielvarde	57	0.5	30.0	0.5	1.5

Based on the calculations provided above, further analysis would be conducted in context of these 14 towns.

Source: authors' calculations based on the State Revenue Service and public transport traffic data

The selection of well-being indicators for satellite towns

In order to select the indicators that could describe the well-being in the satellite towns, the authors conducted an expert survey. The list of all available indicators (overall 111 indicators) that are measured at the local level were provided for experts for evaluation. The experts were selected at local level (development specialists in municipalities), at regional level (representatives from Riga planning region) and at national level (Ministry of Environmental Protection and Regional Development of Latvia, State Regional Development Agency, Latvian Association of Local and Regional Governments). The experts were invited personally and later a questionnaire via e-mail was sent to 10 experts, the answers were received from 6 experts. All provided data were processed using SPSS, calculating different statistical indicators.

Table 3

The analysis of the results of the expert survey: selection of key indicators

Dimension	Area	Indicator	Mean	Standard deviation
Economic	Salary	Municipal budget personal income tax revenue per 1 inhabitant	9.40	0.548
		Average monthly gross wages and salaries	9.00	1.225
	Employment	Unemployment rate	8.20	1.924
		Long-term unemployed in the total number of unemployed	6.80	1.095
Social	Demography	Population change per year as a result of migration,%	8.80	1.095
		Birth rate	7.80	2.168
	Social safety	The proportion of persons who were found to meet the poor family status, % of the total population	7.60	1.949
Environment	Safety	Registered criminal offenses per 1000 inhabitants	6.60	2.881

Source: authors' calculations based on the results of expert survey conducted in November–December 2015

Analysing the results of the expert survey, eight well-being indicators were selected on the basis of average evaluation on them and dispersion of the evaluations. Indicators characterise different well-being dimensions from salary and employment to social safety and safety. As the indicators represent different

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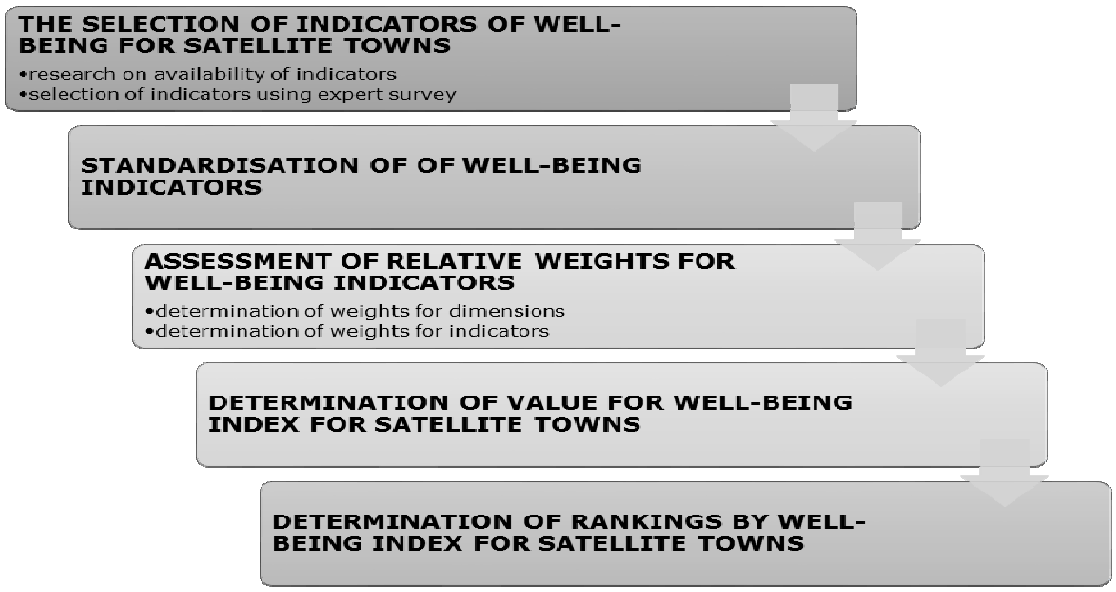
edges of the well-being concept, it was decided to develop the index where all indicators would be included.

The development of well-being index for satellite towns

The methodology of development of the well-being index for the satellite towns is presented in Figure 1



Source: authors' construction

Fig.1. **The methodology of development of well-being index for satellite towns**

The selection of indicators was discussed in the previous sub-part.

To combine the well-being indicators, expressed in different units and to create well-being index for satellite towns, there have been done statistical standardization:

$$t = \frac{x - \bar{x}}{s}, \tag{2}$$

Where:

t – standardized value of the well-being indicator in a given satellite town;

x – well-being indicator in their specific unit of measurement in a given satellite town that has to be standardized;

$\bar{x}$ – the annual weighted arithmetic average of the well-being indicator;

s – standard deviation, which is calculated for a given year, according to the formula:

$$s = \sqrt{\frac{\sum (x - \bar{x})^2 f}{\sum f}}, \tag{3}$$

where

f – statistical weight (Vanags et al., 2005).

Analyzing different studies on usage of significance weights in different well-being studies (especially in the development of indexes), it was concluded that there is no reliable basis to determine the significance weights for well-being indicators. In the scientific literature it is mentioned that the most common method to characterize the well-being indices are choosing arbitrarily or similar scales (Mayer and Jencks, 1989). In the most of the studies significance weights are determined arbitrarily without a quantitative analysis and in this case "it is impossible to determine, which of elements of common index are more important, it is based only on the researchers' psychological beliefs" (Fleurbaey, 2009). A lot of the researchers believe that "despite the popularity of the use of significance weights, more appropriate is to use the similar weights as in any case, their use is controversial but in this case, at least simple" (Chowdhury and Squire, 2006).

Taking in to account the above mentioned as well as the analysis of scientific literature (Legatum Institute 2012; Redefining Progress and Earth Day Network, 2002), in addition conducted studies of well-being indicators in Salaspils municipality (Jekabsone & Sloka, 2014a, Jekabsone & Sloka, 2014b), the authors decided to grant the following importance weights of well-being of three dimensions:

economic - 60% (each indicator – 15%),

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social – 30% (each indicator – 10%),
and environmental - 10%.

The next step after the assessment of significance weights is the determination of the value for well-being index for satellite towns. These values were calculated for defined satellite towns of Latvia. Next, the ranking of each satellite town was determined by well-being index for satellite towns. The results are revealed in Table 4.

As it is presented in Table 4, all determined satellite towns were ranked according to the values of the well-being index. According to the well-being index, the level of well-being is the highest in Kekava, Ikskile and Salaspils municipalities. The lowest values of the well-being index are in Sigulda, Kegums, Jelgava and Aizkraukle municipalities.

Table 4

The rankings of satellite towns of Latvia by well-being index in 2015

Satellite town	Value	Rank
Kekava	0.129	1
Ikskile	0.116	2
Salaspils	0.082	3
Saulkrasti	0.042	4
Olaine	0.028	5
Baldone	0.024	6
Jūrmala	0.006	7
Ogre	-0.013	8
Lielvarde	-0.028	9
Incukalns	-0.059	10
Sigulda	-0.064	11
Kegums	-0.064	12
Jelgava	-0.071	13
Aizkraukle	-0.127	14

Source: authors' calculations based on statistics from module for regional development indicators

Conclusions, proposals, recommendations

1) Nowadays, the local government is becoming more and more important regarding ensuring the well-being of the society, as they have different administrative, financial and political instruments, that's why it is important to research well-being at local level.

2) Satellite towns are municipalities that have great challenges regarding providing the well-being for its citizens due to historical, demographical and political reasons.

3) Though developing the methodology for defining the satellite towns of Latvia on the basis on availability of core city and intensity of commuting population, 14 satellite towns of Rīga were determined: Balozi, Salaspils, Olaine, Ikskile, Baldone, Saulkrasti, Jurmala, Vangazi, Ogre, Jelgava, Kegums, Sigulda, Aizkraukle, Lielvarde.

4) Well-being is a complex concept – in order to represent its many-sided nature, different indicators should be used. During the expert survey, eight indicators were defined that could characterise the well-being in the satellite towns. All selected indicators represent different dimensions of well-being – employment, safety, social safety etc. Thereby, the proposed hypothesis could be approved - the well-being indicators describe different dimensions of well-being in satellite towns.

5) In order to describe the well-being in the satellite towns in more complex way, the authors developed the methodology for determination of the well-being index for satellite towns. According to the developed index, the level of well-being is the highest in Kekava, Ikskile and Salaspils municipalities. The lowest values of well-being index are in Sigulda, Kegums, Jelgava and Aizkraukle municipality.

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