

# Possibilities of Analysis of Selected Sustainable Development Regional Indicators

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**Abstract**—The aim of the paper is to analyse the defined group of indicators from the selected priority axis of the Strategy of the sustainable development of the Czech Republic. The methods of regression analysis and also Saaty's matrix are used for this analysis. Interpretation of trend by means of linear and quadratic regression is discussed for the selected region and also for the region's individual parts. The results of the analysis could be used in the process of planning in the local politics on the regional level.

**Keywords**—Sustainable development, safe society, indicators, regression analysis, Saaty's matrix.

## I. INTRODUCTION

THE area of the sustainable development has been recently mentioned very often especially in many levels and in different subject fields. One of the first important international actions where it was discussed was the United Nations Organization (UNO) Conference about the environment in Rio de Janeiro in 1992. The latest material within the Czech Republic (CR) is a Strategic Framework (SF) of the sustainable development in the CR from 2010. It is a strategic framework which is used as a long lasting guideline for a political decision making in the context of international obligations. They were accepted by the CR or are going to be accepted according to the membership in the UNO, the OECD and the European Union (EU) [1]. The SF introduces four so called global aims according to the re nascent Strategy of the sustainable development of the EU from 2006. They are these:

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Protection of the Environment, Social Cohesion, Economic Prosperity and International Responsibility.

Within these documents the sustainable development is defined as a development, which will carry out the needs of the present generation without threatening the needs of the future generations. There are priority axis and aims defined because of reaching a desirable situation of the sustainable development. They are these (according to [1]):

- Priority axis 1 – Society, Human, Health
- Priority axis 2 – Economics and Innovation
- Priority axis 3 – Area Development
- Priority axis 4 – Countryside, Ecosystems and Biodiversity
- Priority axis 5 – Stable and Safe Society

This paper deals with analysis of selected, open accessible regional quantitative indicators from the priority axis 1 “Society, Human, Health” and 5 “Stable and Safe Society”.

The stated analyses can be used for strategic planning on the regional level in public administration (PA).

## II. PROBLEM FORMULATION

Let us assume that activities of PA management are, on the regional level, in accord with the goal that is stated for instance in v [2]: “... the objectives of regional management are wellbeing and development of the region, satisfaction of inhabitants needs and interests, satisfaction of individual groups of inhabitants and public interest ...”. This objective is in accord with Act no. 128/2000 Sb., On Municipalities (municipal administration) and with Act no. 129/2000 Sb., On Regions (Region Administration).

The Ministry of Interior of the CR guarantees quality control and review in the area of PA. The Ministry promotes the introduction of quality management tools in PA. This effort is reflected in the document “Strategy for National Quality Policy in the CR for the period 2008 to 2013”. The proposed Strategy is based on the analysis of how existing National Quality Policy objectives have been so far fulfilled. Based on the analysis of the existing situation the mission, vision, framework and long term strategic objectives for the following time period are defined. This objective is to jointly develop such an environment in the Czech Republic in which the strive for permanent high quality is present in all walks of life of the society and inhabitants including quality of life improvement that is achieved by sustainable development measures [3]. The Strategy should be beneficial for business

community, for public administration and for non-governmental organization (NGOs). In the public sector area the Strategy should promote the PA quality development.

The most commonly used tools, methods and models for the PA management quality assessment are stated for instance in [4]-[7]. An inseparable part of this process is the collection, pre-processing, analysis and evaluation of the data.

#### A. Data sources

When analyzing various PA areas we work with notions as: quantitative and qualitative data, methods, research, evaluation and similar. Quantitative data (we can also use the terms “hard” data) are numeric characteristics (variables) of the observed phenomenon. Quantitative data (“soft” data) are non-numeric characteristics of the observed phenomenon. The various views on the sorting of quantitative and qualitative methods are dependent on the application areas, e.g. marketing research [8], sociological research [9], [10] and similar. In case of the quantitative methods [9], [10] the distinctive features in the observed phenomenon point to the entire population characteristics, number of individuals are observed so that their selection has the statistical significance. Here reduction of data is essential – the reality is simplified to a couple of variables and to a couple of relations between the variables. The observed reality must be boxed up into predefined schemes. Using Quantitative methods we get limited information on a large number of individuals – however representative for the entire population. Qualitative methods allow us to understand the problem and to deal with the issue more in depth, to understand the essence of a problem we do not yet know well, acquire information about already a little bit known phenomenon or a completely new way of looking at this phenomenon. Qualitative methods help us to understand regular life of people in natural conditions – from their perspective, in their interpretation and in their language. However such findings cannot be generalized to the entire society.

In quantitative research [9] multidimensional social and human reality is reduced to a limited number of a couple of variables and to a small number of analyzed relations between such variable. Qualitative research is a non-numerical examination and interpretation of social reality the objective of which is to uncover the meaning of the interpreted information.

The above mentioned issues in the social area can be summarized into Table 1. In the stated table methods are not included since both method types use the same techniques, but their execution differs. For instance in an interview in case of qualitative method it is assumed that the set of respondents understand notions in the same way, has the same life experience, has the same language skills and so on and we also assume that respondents respond in accord with their true opinions or behaviours. In an interview that is the most common qualitative technique we can have two alternatives – partially structured or open interview. With the partially structured interview topics are defined, however questions are

adapted to previous responses; some questions are added, explanatory questions. With the open interview it is more an open narration.

Table 1 Definition of notion quantitative and qualitative in social area

Notion	Data	Research
Quantitative	Numeric characteristics of the observed phenomenon	Reduction of real data to limited number of variables and analyzed relations between those variables. Importance of generalization of achieved results, conclusions.
Qualitative	Non-numeric characteristics of the observed phenomenon	Non-numeric survey and interpretation of reality with the objective to clear and interpret provided information

Knowledge from data analyses can be used as a background for setting priorities in further decision making process and for region management. When talking about management we must assume that it is a dynamic system and we accept the validity of the system theory. Cybernetic management principles for managing a dynamic system are generally expressed in Fig. 1. There are two elements in the process (managing – represented by the regional management and managed – it can be understood as the region) and there is a relation between these two elements that represent the managing intervention. Inputs are planned requirements into the managing element and external intervention on managing and managed elements. The output is also the change in PA quality [11], [12]. In the feedback there are for instance sustainability by selected priority axes evaluation models, inhabitants satisfaction evaluation models, quality of life evaluation models, quality of environment evaluation models, and so on, in more detail see [5], [13].

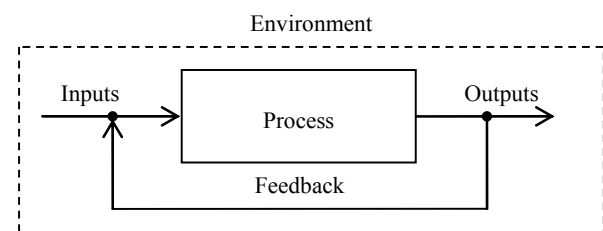


Fig. 1 Management System Model by Norbert Wiener

One of the approaches how to evaluate the PA quality is to utilize inhabitants' satisfaction questionnaire survey. This way of acquiring information by utilizing direct inhabitants' satisfaction measuring provides management feedback on inhabitants' views and opinions directly provided by the inhabitants themselves. Direct measuring has its clear advantages, but it has also its problems. One such issue is whether the respondent shall fill in the questionnaire by himself/herself without any assistance from inquirer (lower costs, lower rate of return of the questionnaires, risk of misunderstanding questions) or whether managed interview shall be used and executed by inquirers (higher costs, higher

questionnaire return, risk of inquirer influencing the responses) The unquestionable advantage of questionnaire survey is that in a relatively short period of time we can get a lot of data. Enquiry can be, without any problems, repeated in various locations on various groups of people. The disadvantage is that e.g. compared to an interview it brings information that do not allow us to see the problem in depth. Any questionnaire must be created with regard to the motivation of the respondent to respond to the questionnaire's questions.

There is no single complex tool for defining the set of indicators (that is variables, characteristics) that can be used for planning on the regional level [14]-[18]. For instance European Common Indicators - ECI [19] were consulted across European cities. In another case [20] this was based on problem areas on the national level and their thorough analysis.

Profound region analysis is the essential base for selection of suitable indicators [21] (recognizing strong and weak sides, analysis of threats and opportunities) for which we create the observed indicators. Next comes the selection of suitable indicators. Here it is essential to realize to which extent we shall use data that are generally observed (e.g. by the Statistical office) and to what extent we shall indicate those indicators for which we must first collect data sets. This is also the base for their usefulness for regional management.

Contrary to these "qualitative" data in the regional management process it is possible to work with "quantitative" from publicly available sources, e.g. with data from the Czech Statistical Office, and similar.

### B. Quantitative data

In our case we have done a certain compromise. Most indicators (their values) can be found in regular databases. For more precise planning we then define "super" indicators. The use these super indicators means that regional management must provide more in-depth view into the solved problem. The set of indicators that we presented – basic indicators and super-structural indicators for the area "Stable, safe society, health and a human being" went through a simple consultation process. We believe that the set of indicators can cover at the same time both priority axes 1 and 5. Professionals representing PA, NGO representatives (mainly their managers) and also researchers shared in the creation of the set.

Priority axis 1 aims to develop and improve conditions for healthy lifestyle, improve the lifestyle and health of the population and adapt the state and the regional policy of the demographic development. The other topic of the axis is a family and an inter-generation cohesion. Priority axis 5 is aimed on the strengthening of a social stability in the society, on the development of an effective public administration and the state, the development of a civic sector and on handling the global, terrorist and other threats.

According to the data which is accessible on the public web sites, it is possible to define the following indicators – basic  $b_i$

and super-structural  $ss_j$ . They are e.g. indicators mentioned in Table 2. Indicators of the sustainable development, e.g.:  $b_1$ ,  $b_3$  (indicator substitutes  $b_2$ ),  $b_5$ ,  $b_6$ ,  $ss_1$  and  $ss_2$  (it means migration itself), we can consider as methodically, formally and objectively clearly appointed, lucidly recorded, connected mainly to the demographic survey of the population of the specific area, which they do not consist of any contradiction.

However, we can find two important indicators in the set of basic  $b_i$  and super-structural indicators  $ss_j$ , which will be analysed more consistently.

Table 2 Basic and Super-structural indicators

Indicator	Name of the indicator
$b_1$	Average life expectancy
$b_2$	Average age
$b_3$	Age median
$b_4$	Death rate (according to the cause)
$b_5$	Birth rate
$b_6$	Number of inhabitants
$b_7$	Number of beds
$b_8$	Accessibility of health care
$b_9$	Number of places in the social care facilities
$b_{10}$	Number of pre-school facilities
$b_{11}$	Number of offences in the region, from them disclosed cases
$b_{12}$	Number of households connected to the Internet
$ss_1$	Migration
$ss_2$	Migration rate
$ss_3$	Population density
$ss_4$	Number of accidents, injuries and death
$ss_5$	Number of completely built flats
$ss_6$	Number of cultural, sport and other facilities
$ss_7$	Number of active non-governmental and non-profitable organizations
$ss_8$	Number of municipalities connected to activity Local agenda 21
$ss_9$	Unemployment rate according to age
$ss_{10}$	Unemployment rage according to gender
$ss_{11}$	Unemployment rage according to education

They are the indicators  $b_9$  "Number of places in the facilities of the social care", which could not be easily interpreted and it is necessary to take many factors when applicable and  $b_{11}$  „Number of offences in the region and then disclosed cases from them”.

In case of indicator  $b_9$ , accessible data represent a sum of daily places in the facilities of social care facilities, municipalities, religion and others. There are shown the beds prepared for acceptance, even if they were not used. The beds' changes are not counted, also there are not counted beds for emergency cases and beds temporarily laid off because of the room settings (e.g. adaptation, disinfection etc.). That is done only when the wards are not registered as inhabitants of the facility [22].

Information resulted from  $b_9$  are helpful for public, social care (SC) providers and for submitters. The last, but not least they are base for community and medium-term planning SC. Data is accessible from several sources. It can be Statistical Authority, Register of SC Providers or data found in Ministry of Labour and Social Affairs of the CR.

We can discover a fundamental problem here. There is a

definition of SC according to [23]. Between two, which are connected to our problem there are definitions of the SC facilities and kinds of SC (in Table 3).

Table 3 Summary of facilities and kinds of SC [23]

SC facilities	Kinds of SC
Centre of daily services	Basic social consultant ship
Daily hospital	Special social consultant ship
Weekly hospital	Personal assistance
Homes for disabled	Social services
Homes for elderly	Emergency services
Homes with special regime	Guide and reading services
Protected habitation	Support of self-reliant habitation
Asylum houses	Relieve services
Half-way house	Centres of daily services
Facilities for help in critical stage	Daily hospital
Centre for homeless people	Weekly hospital
Centre for children and youth	Homes for disabled
Hostels	Houses for elderly
Therapeutic community	Homes with special regime
Social consultant ship	Protected habitation
Social therapeutic workshop	Social services provided in medical facilities with institutional care
Centre of social rehabilitation services	Mutational care
Workplace of mutational care	*

where \* means: Telephonic emergency help, Translating services, Asylum houses, Half-way houses, Contacting centres, Emergency help, Centre for homeless people, Centre for children and youth, Hostels, Services of following care, Activation social services for families and children, Activation social services for elderly and disabled people, Social therapeutic workshops, Therapeutic communities, Field work programmes and Social rehabilitation.

Up-dated information about places (better say capacity) could be found in [24]. Obligation of registration is given by the law. Data from the providers are put by officers in Regional Authorities. In this case it is very important to update capacity data (number of places) by the provider. The other problem appears when there is not the same number of facilities providing SC and number of each SC. It means that one facility can provide more different kinds of services with different capacity and it is necessary to add the places through different services. In real life each service is valued separately from the type of the facility. Also when regional planning processes the capacity and usefulness of SC is solved not the facility of SC itself. As a result of it is that we have to work with more data for each service than for data of the facility (in case of the differences between SC facilities and SC kinds) while recording the regional development connected to social care.

In this context the tool for the sustainable development seems  $b_{9_{new}}$  "Number of places in the social services" or "Capacity in the social services" rather than  $b_9$  "Number of the places in the facilities of the social care".

Indicator  $b_{11}$  shows the crime rate of the area. We have to realize that it brings the risk. This indicator works only with identified offences. None of the institution is not able to estimate, how much of real criminal (pathological) behaviour

is in the society. However, we can consider this indicator as important indicator of the state of the society. In order to that we have to take all evidence with reserve and use other corroborative materials e.g. local documents about the crime prevention or use counsels of interested institutions (workers in the prevention, mainly in the authorities, social curators, non-governmental and non-profitable organizations, parts of the City Police or State Police etc.).

Number of the disclosed offences as an indicator shows the number of the offences according to number of the inhabitants. In other words it means the probability of an average person from the selected area would commit an offence. It is expressed as an absolute number of the disclosed offences per 1000 inhabitants of the region. The disclosed offences are meant the offences where the criminal trial proceeding started or preliminary procedure was shortened or that the case was put into cold cases because of inadmissibility or uselessness of the criminal trial. It is the crime shown in statistics of the Police of the CR – i.e. number of acts which are taken as offences due to the applicable law. To mark the act as an offence, it has to carry out two conditions. One of them is a danger for society, it is called "material condition". Also there have to be carried out indications mentioned in the Criminal Law, which are called formal indications. The Police of the CR have to note down each offence into the united evidence, where the basic information is mentioned which of course helps to find an offender. This evidence is accessible for each policeman/policewoman including traffic ones. The abstract must be made from the evidence where we can see how many of them were disclosed or not, if the offender was caught or not and what punishment was applied etc. [25]-[29].

Indicator  $b_{11}$  is possible to discuss only from the view of really pathological (deviant) behaviour compared to statistics of the registered offences. From the safety point of view, we can say that many deviations from the norms may cause some problems to people in their private or public life, but also they do not relate to criminal activity and therefore we cannot find any evidence. In many cases it is not possible to disclose them despite the fact that the crime happens. It is necessary to take into account this statistic evidence with the knowledge that there is not any other statistic evidence without factual findings.

### III. PROBLEM SOLUTION

When model making, it is always very important to have a phase of analysis and understand the data. These phases could be identified with first two phases of methodology CRISP-DM [30]. In the phase of analysis it is always useful to start with graphic display of the data file. Then it is usually tested the normal data distribution and calculation of the correlation (Pearson's, Spearman's linear correlation coefficients) etc.

#### A. Indicators Prediction

From the set of indicators we will choose an indicator  $b_{11}$  "Number of offences (from them disclosed cases)". Data is accessible from the public database Czech Statistical Office

for the years 2000-2009. The indicator is a basic indicator of disclosed offences in the years 2005-2009 for each municipality. For the years 1994-2004 the data is not possible to find for each municipality, but only for the separate regions. This is the crime introduced in the statistics of the Police of the CR – i.e. number of acts which are taken as offences – see the Act No. 140/1961Sb (the Criminal Law) and Act No. 141/1961Sb about prosecution (Criminal Rules).

For the following analysis it is possible to use linear regression analysis. We suppose that there is an equation between the dependent  $y$  and independent  $x$  variables [31]. The data is necessary to transfer to the relative values. Otherwise there will appear the trend of gradual decrease of the criminal activity.

We work with real absolute data of district (PCE is Pardubice, CHR is Chrudim, SVIT is Svitavy and UO is Ústí nad Orlicí) in Pardubice region 2001-2009 (Table 4). We express these absolute values per 1000 inhabitants.

Table 4 Real data set

Year	Number of offences in district of Pardubice region				Number of inhabitants in the region
	PCE	CHR	SVIT	UO	
2001	4511	2080	1698	2320	50 7176
2002	5116	2010	1842	2317	50 6534
2003	4656	1769	1848	2266	50 5486
2004	4584	1882	1748	2305	50 5285
2005	4503	1796	1764	2225	50 6024
2006	3880	1678	1706	2323	50 7751
2007	4206	1819	2027	2431	51 1400
2008	4088	1801	1859	2314	51 5185
2009	3537	1712	1775	2202	51 6329

The equation of the linear regression (linear trend) of the Pardubice region [32] for the real data (Fig. 2) is:

$$y = 22.143 - 0.385x, \tag{1}$$

where  $y$  is expected value of offences in the region and  $x$  is observed value of offences in the region per 1000 inhabitants. The *multiple R* [33, pages 522-525] is 0.8149 and coefficient of determination *Rsquare*  $R^2$  is 0.6642 [32] for nine observed values.

We defined linear trends of district  $y_k$  :  $y_{PCE}$  for PCE

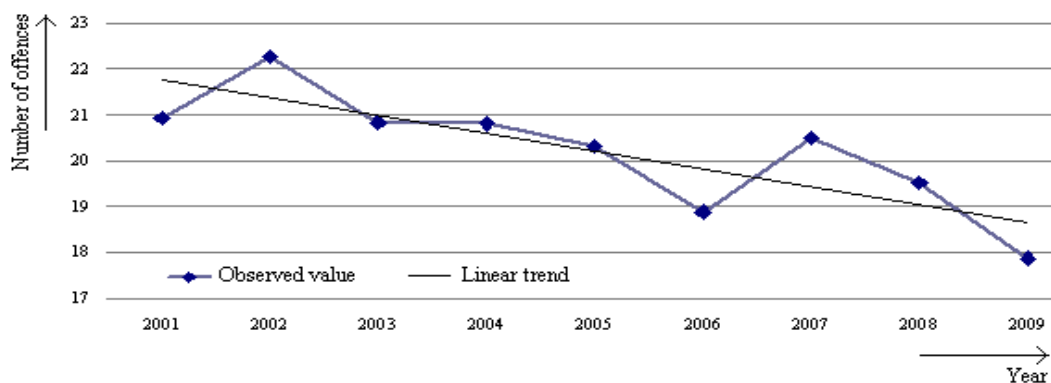


Fig. 2 Linear regression of Number of offences in Pardubice region per a thousand inhabitants

(Fig. 3),  $y_{CHR}$  for CHR,  $y_{SVIT}$  for SVIT (Fig. 4) and  $y_{UO}$  for UO in the Pardubice region by the following way:

$$y_{PCE} = 31.881 - 1.022x, \quad R^2 \text{ is } 0.7439 \tag{2}$$

$$y_{CHR} = 19.244 - 0.334x, \quad R^2 \text{ is } 0.05502 \tag{3}$$

$$y_{SVIT} = 17.344 + 0.039x, \quad R^2 \text{ is } 0.0153 \tag{4}$$

$$y_{UO} = 16.670 - 0.022x, \quad R^2 \text{ is } 0.0164. \tag{5}$$

Based on comparison of  $R^2$  we can use linear trend  $y_{PCE}$  and maybe  $y_{CHR}$ . We can not use linear trend  $y_{SVIT}$  and  $y_{UO}$  as relevant information into regional planning process.

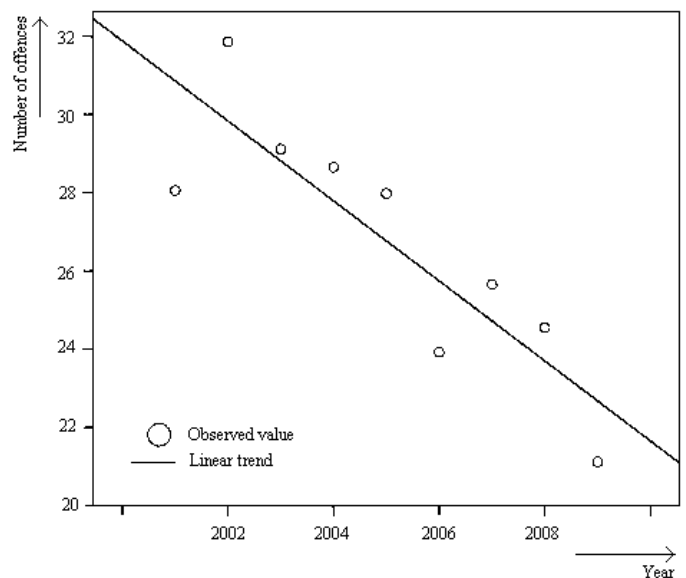


Fig. 3 Linear trend of Pardubice district

### B. Indicators Importance

Based on regional social expert discussion we defined set of “safety” region indicators (six basic and three super-structural indicators): Number of beds; Accessibility of health care; Number of places in the social care facilities; Number of pre-school facilities; Number of offences, from them disclosed cases; Number of households connected to the Internet; Number of accidents, injuries and death; Number of completely built flats; Number of cultural, sport and other

facilities.

Subjective evaluation of the pair wise comparison of the indicators, which assigns to individual components a numerical value. It expresses relative importance individual indicators by weights  $w_j$ .

We defined the Saaty's matrix  $S(m \times m)$  of the pair wise comparison of the indicators [34], [35]. This matrix  $S$  is positive and reciprocal:

$$S = \begin{bmatrix} s_{11} & s_{12} & \dots & s_{1m} \\ s_{12} & s_{22} & \dots & s_{2m} \\ \dots & \dots & \dots & \dots \\ s_{m1} & s_{m2} & \dots & s_{mm} \end{bmatrix} \quad (6)$$

Any set  $S$  [36, pages 19-28], [34] is a binary relation, which satisfies the reflexive, anti-symmetric and transitive law. The matrix has elements  $s_{ij}$ , where:

$$s_{ij} = w_i / w_j, s_{ij} = 1 / s_{ji}, \text{ and } s_{ii} = s_{jj} = 1. \quad (7)$$

Saaty's scale of relative importance was used for assigning the values of matrix elements  $s_{ij}$  (Table 5).

Table 5 Saaty's scale of relative importance

Number	Intensity of relative importance definition
1	Equal importance
3	Weak importance (of one over the other)
5	Strong importance
7	Demonstrated importance (of one over the other)
9	Absolute importance
2, 4, 6 and 8	Intermediate values between 1, 3, 5, 7 and 9

We calculated [37], [38] the largest eigenvalue  $\lambda_{max}$  and eigenvector  $\sigma = [\sigma_1, \sigma_2, \dots, \sigma_m]$ ,  $\sigma_i \geq 0$  of the matrix  $S$  and vector of weights  $w = [w_1, w_2, \dots, w_m]$  on the basis of formula:

$$S \sigma = \lambda_{max} \sigma, \quad (8)$$

$$w_i = \sigma_i / \sum_{j=1}^m \sigma_j. \quad (9)$$

We take the consistency index  $CI$  and consistency ratio  $CR$  as our indicator of "closeness to consistency" by the following way:

$$CI = (\lambda_{max} - m) / (m-1), \quad (10)$$

$$CR = CI / RI. \quad (11)$$

where  $RI$  depends on  $m$  and values are stated in Table 6 [39].

Generally, if this number of  $CR$  is less than 0.1, we may be satisfied with our judgment.

Table 6 Value of  $RI$

Variable	Value						
$m$	5	6	7	8	9	10	11
$RI$	1.12	1.26	1.36	1.41	1.46	1.49	1.52

When defining importance we focused on target group of individuals falling into the age group from 22 to 26 years of

age. Based on information and expert consultation Saaty's matrix for 6 basic ( $b_7, b_8, b_9, b_{10}, b_{11}$  and  $b_{12}$ ) and 3 super-structural ( $ss_4, ss_5$  and  $ss_6$ ) indicators was defined.

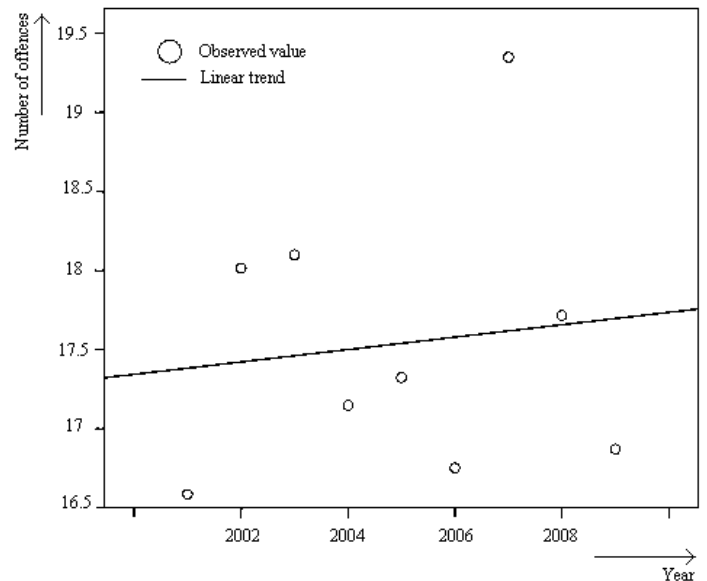


Fig. 4 Linear trend of Svitavy district

We used Saaty's matrix  $S(9 \times 9)$  for a suggestion of these in:

$$S = \begin{bmatrix} 1 & 1/3 & 3 & 1/5 & 1/3 & 1/4 & 2 & 1 & 3; \\ 3 & 1 & 5 & 1/3 & 1 & 1/2 & 4 & 3 & 5; \\ 1/3 & 1/5 & 1 & 1/7 & 1/5 & 1/6 & 1/2 & 1/3 & 1; \\ 5 & 3 & 7 & 1 & 3 & 2 & 6 & 5 & 7; \\ 3 & 1 & 5 & 1/3 & 1 & 1/2 & 4 & 3 & 5; \\ 4 & 2 & 6 & 1/2 & 2 & 1 & 5 & 4 & 6; \\ 1 & 1/3 & 3 & 1/5 & 1/3 & 1/4 & 2 & 1 & 3; \\ 1/3 & 1/5 & 1 & 1/7 & 1/5 & 1/6 & 1/2 & 1/3 & 1 \end{bmatrix} \quad (12)$$

Based on  $S$  is defined standardized weight vector of indicators  $w$  in the following way:

$$w = [0.073, 0.150, 0.025, 0.257, 0.150, 0.200, 0.045, 0.073, 0.026], \quad (13)$$

where maximal eigenvalue  $\lambda_{max}$  is 9.2397, consistency index  $CI$  is 0.030 and consistency ratio  $CR$  is 0.021 if  $RI$  is 1.46 for defined number of 9 criteria.

Interpretation of weight vector (13) is stated in Table 7. The most important is  $b_8$  "Accessibility of health care", and the least important is indicator  $b_{12}$  "Number of households connected to the Internet".

#### IV. CONCLUSION

The aim of the paper was the analysis of the selected indicators from the priority axis "Society, Human, Health" and "Stable and Safe Society" of the Strategy of the sustainable development.

Table 7 Rate of importance of “safety” region indicators

Indicator	Name of the indicator
$b_3$	Accessibility of health care
$s_4$	Number of accidents, injuries and death
$b_{11}$	Number of offences in the region, from them disclosed cases
$s_5$	Number of completely built flats
$b_{10}$	Number of pre-school facilities
$b_9$	Number of places in the social care facilities
$s_6$	Number of cultural, sport and other facilities
$b_7$	Number of beds
$b_{12}$	Number of households connected to the Internet

For the indicator “Number of offences” the linear regression analysis was used. Estimated linear line has correspondingly tested parameters and during the given period it showed the decreasing trend for the chosen region – Pardubice region.

For the selected set of the indicators from the priority axis the vector of importance of the given indicators was defined using Saaty’s matrix. Suggested matrix carries out a no equal convenient for the CR parameter. Mentioned analysis could be used as a support for decision making process of the regional management.

We assume that the provided analyses of “hard” data jointly with questionnaire surveys on the quality of life and similar can be used, on the regional level, for strategic planning of the selected communal policy area.

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