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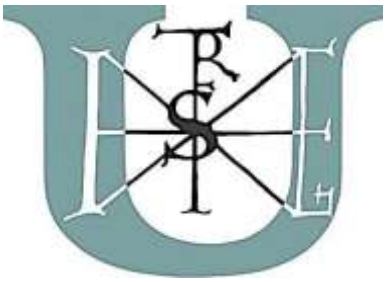

THESES OF DOCTORAL (PHD) DISSERTATION

NEW SITUATION ANALYSIS METHOD BY SYSTEM APPROACH TO DEVELOP THE RURAL AREAS

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GÖDÖLLŐ

2012

PhD School

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scientific field:	**Regional Sciences**
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INTRODUCTION

"I hear you say "Why?"
Always "Why?"
You see things;
and you say "Why?"
But I dream things that never were;
and I say "Why not?"'
(GEORGE BERNARD SHAW,
Back to Methuselah, 1921)

A lot of studies and research discuss the topic of sustainability and try to find the best alternatives of permanent sustainable development, therefore such a paper can be started from several approaches.

By recognizing the limits of endless growth (MEADOWS, 1972), the ideas of harmonic development and improvement have become into the limelight. The efforts that aim solely the economic growth seem to be a failure and are replaced by new approaches which underline the importance of the role of environment and society.

Statement of KORTEN (1996) according to which the economy is for the society and not the society is for the economy seems to be confirmed. The human society is closely fit into the natural environment and if the environmental boundary conditions are damaged, the human society is endangered, too. Therefore the possible outcomes of interventions, their positive and negative impacts should also be considered in the implementation of developments.

A development project will not bring any resounding success for a region or a local community if the intervention was not cautious enough. The output of actions and reactions can be realized in many forms, so it would be impossible to model all the combinations, therefore a general approach is required which can serve as a basis for each intervention. There is no perfect pattern for introducing investment ideas, and individual measures cannot be concretized because it would easily result distortions in the communities coping with different problems.

My doctoral dissertation starts from the system approach and accepts the principles of general systems theory. The general systems theory of LUDWIGVON BERTALANFFYis introduced as a coherent axiom system. It is the backbone of the dissertation and the starting point of a new approach that is entitled general spider web theory. The essence of the theory is that it regards the local community as a specific „spider web" arrangement. The interventions made in this arrangement are like in case of the spider web: when one point is touched all the points are trembling.

We often face the question how a development strategy can be maintained. What sustainability means and is there a general approach which is able to describe these condition systems in any region or community of a country. Each area has different physical and mental characteristics and one certain development concept can be applied in one country but the same concept causes damages to the other (and it can be true even for the different regions and communities of one country). The dissertation outlines general guidelines that are suitable for describing complex problems.

The development of rural areas can be defined as an interdisciplinary field of science synthetizing more scientific fields and built from different approaches due to its complexity. These approaches often have system theory roots and their overall review is required very much. The present doctoral dissertation sets four main objectives which provide the basis for me to draft the starting hypotheses:

1. My former research confirmed that the system-oriented thinking helps to define developments in order to find appropriate responses to the problems of an area or community. Therefore ***the first hypothesis*** of my doctoral dissertation is to highlight ***the possibilities of implementing general system theory*** within the development of rural areas and to ***synthetize*** the already available and applied ***system-oriented system analysis*** in a new approach.

H1*:The synthesis of system-oriented system analysis methods is not elaborated in the development of rural areas therefore the development results of rural areas can be improved by the implementation of general system theory and new type of synthetization of system-oriented system analysis.*

2. The different situation analysis methods stress the soft and hard statistical data differently. Some schools perform regional research mainly by

reviewing regional databases and do not apply field survey in the situation analysis. Other schools perform only deep field work and using statistical databases is not typical in their research. ***The second objective*** of my dissertation is to create a ***bridge between objective and subjective statistical inquiries*** and to develop a methodology that helps to explain both valuable sources of information together.

H2*: The regional situation analysis methodologies require the harmonization of objective and subjective statistical examinations with which we can obtain more balanced and comprehensive results.*

3. One of the difficulties of sustainable development projects and planning is that the quantity and quality of information available for planners is not enough. It is hard to generate sustainable development for a region or a community if we are not fully aware of the features of characteristics behind these systems. Therefore ***the third objective*** of my doctoral thesis is to ***make a complex situation analysis methodology*** with the help of which the experts and local stakeholders can get a properly structured picture about the area or community to be developed.

H3*: In order to enhance the planning for generating sustainability, it is necessary to create system-oriented, logically coherent, complex situation analysis methods.*

4. One of the traps in development strategies, in my opinion, is that these developments aim the improvement of the state of only one or a few sub-systems, whereas the mapping of interactions between development subsystems and the examination of the interactions of development interventions can be regarded equally important. ***The fourth objective*** of my doctoral dissertation is to underline the importance of ***relations between development subsystems*** of rural areas.

H4*: On the basis of system theory principles it is not enough to examine the development subsystems of rural areas. Mapping of interactions between individual subsystems is also required.*

The doctoral dissertation is divided into four main units in order to reach the objectives set. The individual units are connected to each other within a system-oriented logical framework. Although each unit offers new or novel

scientific achievements, the novelty of the dissertation is given by the complex explanation of units and the logical relations between them.

The first unit is the ***Review of Technical Literature***(*Chapter 1)*, which deals with the development of general system theory and the impact of the theory on social and regional sciences. Separate subsection reviews the development of systems and the role of their endogenous sources within the development of rural areas. Based on my former research of technical literature I introduce five approaches of system analysis. First I define two general approaches for the study of systems, namely the ***cross-sectional and the development*** approaches. Then I investigate the ***holistic, functionalist and reductionist*** approaches – that can be used for the analysis/evaluation of subsystems of systems - from the aspects of rural development. At the end of the unit I define the ***general spider web theory,*** which is suitable for the synthetization of these five methods of system analysis.

The second unit of the paper is the ***Materials and Method (****Chapter 2)* which introduces the theoretical basis of a new situation analysis methodology. One of the objectives of my dissertation is to develop a new situation analysis system and my novel scientific statements can be defined partly within the context of this chapter.

The third unit is the ***Results*** chapter (Chapter 3), in which I demonstrate the applicability of the new situation analysis methodology through a selected case study. This chapter includes the ***New and Novel Scientific Results,*** as well as ***the results of examining my starting hypotheses.***

In the fourth unit of my dissertation (chapter titled ***Conclusions and Recommendations)*** I write down the conclusions drawn from my research results and draft some recommendations for the implementation of the newly developed situation analysis method in future research projects.

MATERIAL AND METHOD

In the chapter titled ***Material and method*** I introduced the frames of a new situation analysis method on the basis of general spider web theory, closely connected with processing the references. Special attention was given to system approach, the subsections were drafted in this regard, too. The chapter about the material and methodology is nothing but the systematic system-oriented summary of the already known situation analysing methods which were listed in a logical order. This logical order defines a new situation analysing system.

The chapter is divided into two main parts: ***introduction of material*** (development of inputs and input conditions); and ***introduction of applied methods*** (transformation process and evaluation of outputs).

I made a subsection titled „***Development of input conditions"*** in order to introduce the material and defined three separate steps. I described the ***determination of spider web pillars*** in details in the first chapter of my doctoral dissertation. The indices suitable for the description of pillars are defined with an expert methodology based on processing the technical references, preliminary research and multiple testing of the index system. Many criteria should be considered in the development of the system of indicators (e.g. each type of indicator, SMART criteria, primary/secondary content, dilemma of different regional levels, static/dynamic features, etc.). The political, economic, social, technological and environmental dimensions of the five pillars of spider web were determined on the basis of the above. Each pillar has its own internal and external circumstances with which the so-called PEST-SWOT matrix is created. In the first step – ***the determination of the primary content of indices –*** I have investigated the regional statistical databases, from which the indices can be projected on another index. On the basis of this, I have built up a database of secondary data. ***Drafting of the secondary content of indices*** determined the secondary content of the selected indices. It was measured with the help of questionnaires. The information I received helps to build the database of the primary data.

The applied methods are described in two subsections. First in the subsection titled „***Transformation of Data"*** which was divided into three steps. The first step is the determination of relative position of indices projected on one unit of area. Secondly, I outlined the determination of sustainability dimensions of spider web pillars.

The third step was the introduction of correlation calculation, with the help of which the objective cohesion (OC), subjective cohesion (SC) and adjusted cohesion (AC) can be determined.

The second unit is the „***Evaluation of Outputs"*** divided into two parts. The first output is the review of ***pillar analysis*** that helps to define the (external/internal) sustainability of pillars, the saturation of pillars on the basis of objective indices, the saturation of pillars on the basis of subjective indices, the reasons of differences between objective and subjective indices and the saturation of pillars on the basis of corrected indices. The second output is the ***analysis of spider web entropy*** which leads to the determination of spider web entropy. The logical structure of the chapter can be seen on ***Figure 1***.

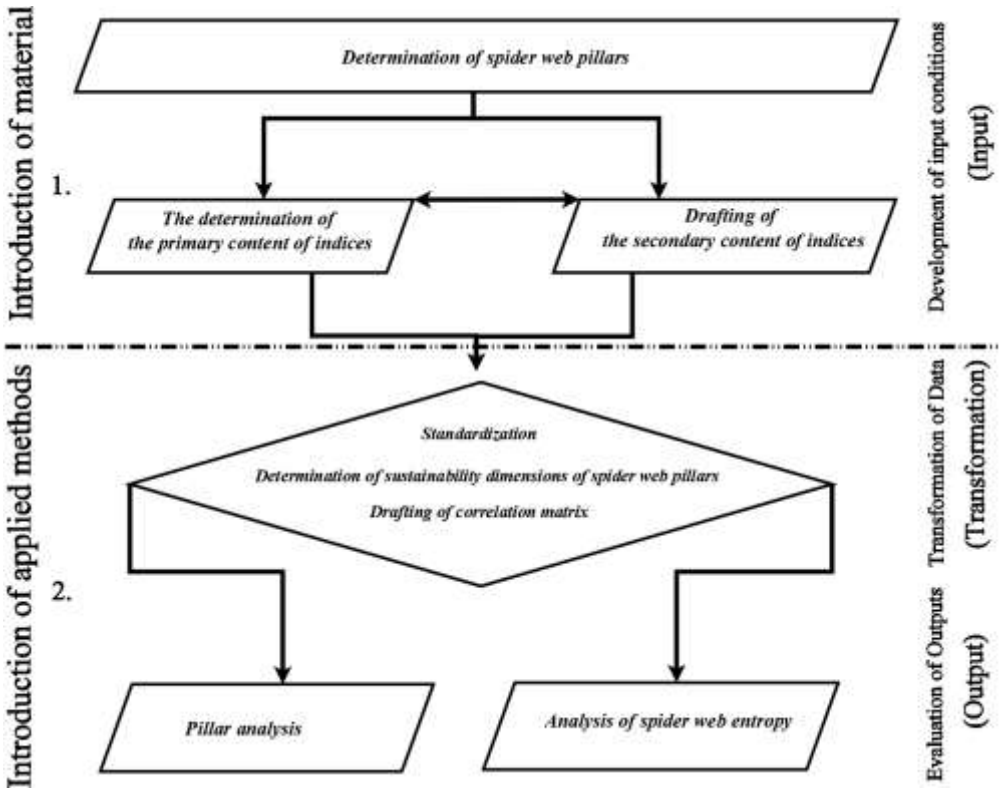

Figure 1: Logical Structure of Material and Method chapter

Source: Own edition 2012.

RESULTS

Relying closely on the system-oriented methodology of three parts (input, transformation, output), the ***Results*** chapter was built up according to the same logical frame, therefore the first three subsections of this chapter got the following titles: ***Development of Input Conditions, Transformation of Data*** and ***Evaluation of Outputs. The New and Novel Scientific Results*** were drafted also in this chapter together with the confirmation of my starting hypotheses.

In this part of my dissertation I aimed to introduce the applicability of the new situation analysis methodology through a selected case study. Considering the length limits of doctoral dissertation I did not want to detail each result of my research[1], I rather wanted to illustrate systematically the steps of the new methodology through a particular example.

The selected case study introduced the new methodology through the example of the microregion of Veresegyház. There were two reasons for choosing Veresegyház: firstly it seemed to be an appropriate model; secondly, the geographical location of Veresegyház microregion (Pest county, Central Hungarian region) highlighted some extremely interesting directions of analysis.

Due to the length limits of the theses, only part of the results of my doctoral dissertation is introduced, namely the methodological results of the evaluation of outputs.

EVALUATION OF OUTPUTS

The evaluation of outputs were made from two well-separable approaches. On the one hand, the pillars should be examined separately, and on the other hand, they should be evaluated together.

[1]I tested the analysis methodology in all the NUTS II regions, altogether in 17 microregions: Microregion of Dabas, Gyál, Aszód (2008), Microregion of Rétság, Budaőrs (2009); Microregion of Tét, Edelény, Cegléd (2010); Microregion of Gárdony, Gyöngyös, Kecskemét, Kőzseg, Szekszárd, Szob, Vác, Veresegyház and Szolnok (2011).

EXAMINATION OF PILLARS (OUTPUT 1)

The results of examining the pillars separately were explained according to the following three types of system analysis approaches: ***reductionist system analysis approach*** (differences between objective and subjective regional subindices), ***development-type system analysis approach*** (determination of pillar saturation), and the ***cross-sectional system analysis approach*** (examination of sustainability dimensions of pillars).

EXAMINATION OF DEVIATIONS BETWEEN OR AND SR SUBINDICES[2]

The deviations between the primary and secondary content of each indices should be examined. Both the OR and SR subindices were determined in percentage form. If there is more than 10 percent difference between ORI_{p_i} and SRI_{p_i}, the basic index refers to a problem.

The individual subindices were determined on the basis of the following formulas[3]:

$$ORI_{p_{ij}} = \frac{X_{p_{ij}} - X_{p_{imin}}}{X_{p_{imax}} - X_{p_{imin}}}$$

where: $ORI_{p_{ij}}$: The j objectiv regional subindices of pillar i

$X_{p_{ij}}$: index value j of pillar i in terms of microregion in the researched region

$X_{p_{imin}}$: The minimum of index value j of pillar i in terms of microregion in the researched region

$X_{p_{imax}}$: The maximum of index value j of pillar i in terms of microregion in the researched region

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[2]Reductionist system analysis

[3] If the low value can be regarded good: $\mathrm{ORI}_{\mathrm{p_{ij}}} = 1 - \left(\frac{\mathrm{X_{p_{ij}} - X_{p_{imin}}}}{\mathrm{X_{p_{imax}} - X_{p_{imin}}}}\right)$

If the index has a theoretical optimum:

if $\mathrm{X_{p_{ij}}} < \mathrm{X_{p_{iEO}}}$ (theoretical optimum), then $\mathrm{ORI_{p_{ij}}} = \frac{\mathrm{X_{p_{ij}} - X_{p_{imin}}}}{\mathrm{X_{p_{iEO}} - X_{p_{imin}}}}$

if $\mathrm{X_{p_{ij}}} > \mathrm{X_{p_{iEO}}}$ (theoretical optimum), then $\mathrm{ORI_{p_{ij}}} = \frac{\mathrm{X_{p_{ij}} - X_{p_{iEO}}}}{\mathrm{X_{p_{imax}} - X_{p_{iEO}}}}$

wherel: $\mathrm{X_{p_{iEO}}}$: The theoretical optimum of index value j of pillar i in terms of microregion in the researched region

$$SRI_{p_{ij}} = \frac{\left(\sum_{j=1}^{n} X_{p_{ij}}\right) - X_{p_{imin}} * n}{\left(X_{p_{imax}} - X_{p_{imin}}\right) * n}$$

where: $SRI_{p_{ij}}$: The j subjectiv regional subindices of pillar i

DETERMINATION OF THE INTERNAL SATURATION OF PILLARS[4]

The saturation of each pillar can be determined on the besis of objective, subjective, corrected indices and the regional index of external conditions. The internal and external attributes were examined separately. First I introduce the results of examining the internal saturation of pillars, which helps to determine whether the given pillar can be considered weak or strong within the microregion. The internal saturation is explained on the basis of ORI, SRI and ARI. In order to get more precise picture about the processes within a microregion, the results of all the three regional indices should be evaluated.

We have a lot more information about the internal characteristics than the external conditions, and the internal characteristics can be directly changed by a microregion, while the external conditions appear as possibilities and limits. It means that a microregion by itself is not able to form the external conditions but these should by all means considered in the process of strategy-making.

The ORI results determine the situation of a given pillar on the basis of objective statistical data, according to the following equation:

$$ORI_{p_i} = \frac{\sum_{i=1}^{n} ORI_{p_{ij}}}{n}$$

where: ORI_{p_i}: objectiv regional index of pillar i

$\sum_{i=1}^{n} X_{p_{ij}}$: Sum of indices of pillar i

n : Number of indices in pillar i

The SRI demonstrates how the stakeholders of a microregion evaluate the secondary content of indices in a given pillar, according to the following formula:

[4]Development-type system analysis

$$SRI_{p_i} = \frac{\sum_{i=1}^{n} SRI_{p_{ij}}}{n}$$

ahol: SRI_{p_i}: subjectiv regional index of pillar i

$\sum_{i=1}^{n} X_{p_{ij}}$: Sum of indices of pillar i

n : Number of indices in pillar i

The degree of deviation between the indices depends on the fact, how realistically can the local stakeholders judge the state of an internal index. That's why I considered it inevitable to examine the adjusted outcomes. AR index was determined as the median of ORI and SRI, on the basis of the following formula:

if it is true that $ORI_{Pi}, SRI_{Pi} \in R_0^+$ és $ORI_{Pi}, SRI_{Pi} \in Z^+$, then

$$ARI_{Pi} = \sqrt[2]{ORI_{Pi} * SRI_{Pi}}$$

if it is not true that $ORI_{Pi}, SRI_{Pi} \in R_0^+$ és $ORI_{Pi}, SRI_{Pi} \in Z^+$, then

$$ARI_{Pi} = \frac{ORI_{Pi} + SRI_{Pi}}{2}$$

where: ARI_{p_i}: the j adjusted regional subindices of pillar i

$ORI_{p_{ij}}$: the j objectiv regional subindices of pillar i

$SRI_{p_{ij}}$: the j subjectiv regional subindices of pillar i

On the basis of the above, the saturation of a pillar and whether it can be considered weak or strong can be defined. It is worth performing the examination for all the three internal regional indices because the analysis of a pillar from multiple approaches will help in the development of strategies. In spite of this, in my opinion, the AR indices give the result that is the closest to reality. The strength or weakness of a pillar can be defined as follows:

if, ORI_{Pi}<50% , the ORI of the given pillar indicates weakness

ORI_{Pi}>50% , the ORI of a given pillar indicates strength

SRI_{Pi}<50% , the SRI of a given pillar indicates weakness

SRI_{Pi}>50% , the SRI of a given pillar indicates strength

ARI_{Pi}<50% , the ARI of a given pillar indicates weakness

ARI_{Pi}>50% , the ARI of a given pillar indicates strength.

DETERMINATION OF EXTERNAL SATURATION OF PILLARS[5]

EQRI highlights the external qualities of a microregion, on the basis of which it can be assessed whether the environment of a microregion means threat or possibility for the microregion. The external regional subindices were determined on the basis of the following equation:[6]:

$$EQRI_{p_{ij}} = \frac{X_{p_{ij}} - X_{p_{imin}}}{X_{p_{imax}} - X_{p_{imin}}}$$

where: $EQRI_{p_{ij}}$: the j external qualities regional subindices of pillar i

$X_{p_{ij}}$: index value j of pillar i in terms of county

$X_{p_{imin}}$: The minimum of index value j of pillar i in terms of county

$X_{p_{imax}}$: The maximum of index value j of pillar i in terms of county

Following the calculation of subindices, the regional index of external qualities can be defined for all pillars. The EQRI of pillars can be expressed as the arithmetic average of subindices made of external indices belonging to the given pillar. It determines the saturation of each pillar according to the following formula:

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[5]Development type system analysis

[6]If the low value can be regarded good: $EQRI_{p_{ij}} = 1 - \left(\frac{X_{p_{ij}} - X_{p_{imin}}}{X_{p_{imax}} - X_{p_{imin}}}\right)$

If the index has a theoretical optimum:

if $X_{p_{ij}} < X_{p_{iEO}}$ (theoretical optimum), then $EQRI_{p_{ij}} = \frac{X_{p_{ij}} - X_{p_{imin}}}{X_{p_{iEO}} - X_{p_{imin}}}$

if $X_{p_{ij}} > X_{p_{iEO}}$ (theoretical optimum), then $EQRI_{p_{ij}} = \frac{X_{p_{ij}} - X_{p_{iEO}}}{X_{p_{imax}} - X_{p_{iEO}}}$

wherel: $X_{p_{iEO}}$: The theoretical optimum of index value j of pillar i in terms of counties

$$EQRI_{p_i} = \frac{\sum_{i=1}^{n} EQRI_{p_{ij}}}{n}$$

where: $EQRI_{p_i}$: external qualities regional index of pillar i

$\sum_{i=1}^{n} X_{p_{ij}}$: Sum of indices of pillar i

n : Number of indices in pillar i

The opportunities or threats of a pillar can be defined according to the following:

if, $EQRI_{Pi}$<50% , the EQRI of the given pillar indicates threat

$EQRI_{Pi}$>50% , the EQRI of a given pillar indicates opportunity

The level of saturation indicates the value of the examined regional indices within the examined unit of area. The closer is this value to hundred, the higher is the saturation level.

DETERMINATION OF SUSTAINABILITY OF PILLARS[7]

Following the definition of sustainability dimensions of pillars, the economic, social and environmental sustainability of each pillar can be determined:

Social dimension:

$$SD_{P_i} = \frac{\sum \left(ORI_{p_{ip}} + ORI_{p_{is}} + SRI_{p_{ip}} + SRI_{p_{is}} + EQRI_{p_{ip}} + EQRI_{p_{is}} \right)}{n}$$

[7]Cross sectional system analysis

where: SD_{p_i}:The social dimension of pillar i

$\sum ORI_{p_{ip}}$: The sum of objective political regional subindices of pillar i

$\sum ORI_{p_{is}}$: The sum of objective social regional subindices of pillar i

$\sum SRI_{p_{ip}}$: The sum of subjective political regional subindices of pillar i

$\sum SRI_{p_{is}}$: The sum of subjective social regional subindices of pillar i

$\sum EQRI_{p_{ip}}$: The sum of external qualities political regional subindices of pillar i

$\sum EQRI_{p_{ip}}$: The sum of external qualities social regional subindices of pillar i

n: number of elements of all the regional subindices

Economic dimension:

$$ED_{P_i} = \frac{\sum(ORI_{p_{ie}} + SRI_{p_{ie}} + EQRI_{p_{ie}})}{n}$$

where: ED_{p_i}:The social dimension of pillar i

$\sum ORI_{p_{ie}}$: The sume of objective economic regional subindices of pillar i

$\sum SRI_{p_{ie}}$: The sum of subjective economic regional subindices of pillar i

$\sum EQRI_{p_{ie}}$: The sum of external qualities economic regional subindices of pillar i

n: number of elements of all the regional subindices

Environmental dimension:

$$EnD_{P_i} = \frac{\sum(ORI_{p_{it}} + SRI_{p_{it}} + EQRI_{p_{it}})}{n}$$

where: EnD_{p_i}:The social dimension of pillar i

$\sum ORI_{p_{it}}$: The sum of objective environmental/technological regional subindices of pillar i

$\sum SRI_{p_{it}}$: The sum of subjective environmental/technological regional subindices of pillar i

$\sum EQRI_{p_{it}}$: The sum of external qualities environmental/technological regional subindices of pillar i

n: number of elements of all the regional subindices

This analysis provides more precise picture about the structure of a pillar. The criteria of sustainability are drafted as follows:

if, SD_{P_i}< 50% , then the given pillar cannot be sustained in terms of society

ED_{P_i}< 50% , then the given pillar cannot be sustained in terms of economy

EnD_{P_i}< 50% , the given pillar cannot be sustained in terms of environment.

The examination helps to understand the operation of a pillar much better. Measures beyond the development of strategies can be drafted for a microregion.

EXAMINATION OF RELATIONS BETWEEN PILLARS (OUTPUT 2)

Besides the examination of pillars one by one, the other objective of situation analysis is to map the relations between pillars. This objective can be fulfilled by spider web entropy analysis.

SPIDER WEB ENTROPY ANALYSIS

The mathematical basis of spider web entropy analysis is provided by the objective, subjective and corrected cohesion.

Objective cohesion indicates the strength of relation between the statistical data of pillars (basis of objective regional subindices). The correlations of indices within one pillar are not considered as the results of correlation matrix, because the aim is to determine the strength of relations between pillars and not to examine the strength of relations within a pillar. The „r_i" values received are regarded as weight in the determination of relations between two pillars. The relation between two pillars is expressed as the product of multiplication of individual objective regional subindices and the belonging „r_i" value. Thus the relation of two pillars can be described as the weighted average of OR subindex number „n", weighted with „r_i" value. On the basis of this, the objective cohesion of two pillars can be expressed with a calculation consisting of several steps.

Following the drafting of correlation matrix, the first step is the determination of average correlation of indices to another pillar. The determination of average correlation should be calculated with geometric mean, but due to the correlations outlined in the dissertation, the average correlation can be calculated in two ways:

if it is true that $rp_{i_j-p_{j_i}} \in R_0^+$ és $rp_{i_j-p_{j_i}} \in Z^+$, then

$$\overline{r}\, p_{i_1-p_j} = \sqrt[n]{\prod rp_{i_1-p_{j_k}}}$$

if it is not true that $rp_{i_j-p_{j_i}} \in R_0^+$ és $rp_{i_j-p_{j_i}} \in Z^+$, then

$$\overline{r}\, p_{i_1-p_j} = \frac{\sum_{i=1}^{n} rp_{i_j-p_{j_i}}}{n}$$

where: $\overline{r}\, p_{i_1-p_j}$ is the average correlation of the first index of pillar i to pillar j

The average correlations and the formerly calculated objective regional subindices will help to draft the objective cohesion (OC) of two pillars, according to the following calculation:

$$\overline{OC}p_{i-p_j} = \frac{ORI_{p_{i_1}} * \overline{r}\, p_{i_1-p_j} + \cdots + ORI_{p_{in}} * \overline{r}\, p_{i_n-p_j} + ORI_{p_{j_1}} * \overline{r}\, p_{j_1-p_i} + \cdots + ORI_{p_{j_1}} * \overline{r}\, p_{j_n-p_i}}{\sum \overline{r}\, p_{i_n-p_j} + \sum \overline{r}\, p_{j_n-p_i}}$$

where: $\overline{OC}p_{i-p_j}$ is the objective cohesion of pillar i and j

Subjective cohesion expresses the strength of relation between data of pillars coming from questionnaires (basis of subjective regional subindices). The theoretical process of calculating subjective cohesion is the same as the calculation of objective cohesion. Values „r_i" are calculated from the correlation matrix made of responses given to the questionnaire.

The relation between two pillars are given as the product of multiplication of individual subjective regional subindices and the belonging „r_i" values. Thus the relation between two pillars can be described as the average of SR subindices number „n", weighted with given „r_i" value. The methodology of calculating „r_i" value is the same as the calculation used for objective cohesion.

The subjective cohesion (SC) of two pillars can be drafted with the help of average correlations and the formerly calculated subjective regional subindices, according to the following equation:

$$\overline{SC}p_{i-p_j} = \frac{SRI_{p_{i_1}} * \overline{r}\, p_{i_1-p_j} + \cdots + SRI_{p_{in}} * \overline{r}\, p_{i_n-p_j} + SRI_{p_{j_1}} * \overline{r}\, p_{j_1-p_i} + \cdots + SRI_{p_{j_1}} * \overline{r}\, p_{j_n-p_i}}{\sum \overline{r}\, p_{i_n-p_j} + \sum \overline{r}\, p_{j_n-p_i}}$$

where: $\overline{SC}p_{i-p_j}$ is the subjective cohesion of pillar i and j

The adjusted cohesion for the relation of two pillars can be given by the geometrical average of objective and subjective cohesion, by applying the following equation:

$$\overline{AC}p_{i-}p_j = \sqrt[2]{\overline{OC}p_{i-}p_j * \overline{SC}p_{i-}p_j}$$

where :$\overline{AC}p_{i-}p_j$ is the adjusted cohesion of pillars i and j

$\overline{OC}p_{i-}p_j$ is the objective cohesion of pillars i and j

$\overline{SC}p_{i-}p_j$ is the subjective cohesion of pillars i and j.

The conclusions in the examination of entropy are made from the cohesion outcomes. I distinguish three states: spider web of low entropy, medium entropy and high entropy. These states are determined as follows:

if, $\overline{AC}p_{i-}p_j \vee \overline{OC}p_{i-}p_j \vee \overline{SC}p_{i-}p_j = 1,$

then the relation of the two pillars has ***low entropy***

$1 > \overline{AC}p_{i-}p_j \vee \overline{OC}p_{i-}p_j \vee \overline{SC}p_{i-}p_j \geq 0{,}5,$

the relation of the two pillars has ***medium entropy***

$0{,}5 > \overline{AC}p_{i-}p_j \vee \overline{OC}p_{i-}p_j \vee \overline{SC}p_{i-}p_j = 0,$

the relations of the two pillars has ***high entropy***

where:$\overline{OC}p_{i-}p_j$ is the corrected cohesion of pillars i and j

$\overline{OC}p_{i-}p_j$ is the objective cohesion of pillars i and j

$\overline{SC}p_{i-}p_j$ is the subjective cohesion of pillars i and j.

The examination of spider web entropy is assisted by a visualization method that I have invented[8]. Each pillar has four points of contact to the other pillars. The relation of pillars to themselves is not examined, therefore it always has fix value in the model. There are altogether sixteen contacts on the figure, which is equal to eight real contacts, because each relation between two pillars appears twice but contains the same information. The

[8] The visualisation of spider web entropy can be made with the help of a so-called spider web software. The software was made by Márton Áron Goda. The software helps to illustrate the relations in two dimensions instead of „n-1" dimension representation, even in case of pillars with element number „n".

model demonstrates the relation in an inverse proportion. If the tightness of relation is close to zero, the hole on the web becomes visible.

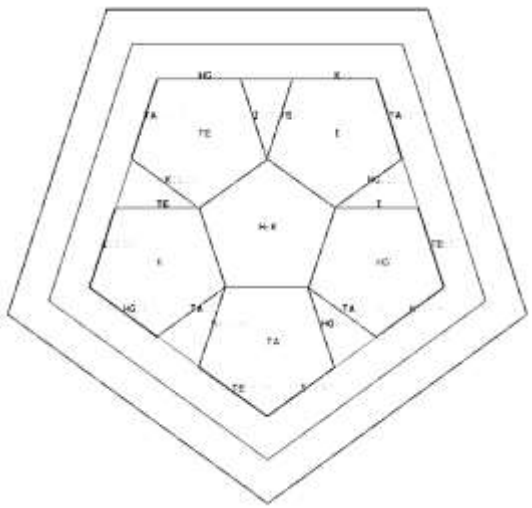
The spider web with low entropy is a theoretical spider web in which the relation of all the pillars show ***low entropy.*** The relations between pillars can be seen and sensed clearly. Completely sustainable balance is formed in this system. The structure of the spider web is in order, there is no hole in it.

The spider web of medium entropy is a theoretical spider web, in which the relations of all the pillars have ***medium entropy,*** and there is a fractional hole on the spider web. The relations between pillars are not clear and sometimes cannot be detected. There is a potential for sustainability within the system, but not in its current state.

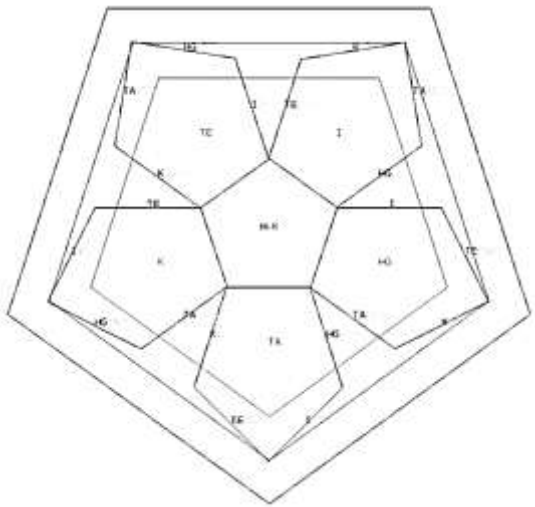
The spider web with high entropy is a theoretical spider web where the relations of all the pillars have ***high entropy,*** there is a full hole on the spider web. The relations between pillars are not clear and cannot be detected. There might be a possibility of sustainability within this system but in its current state, it is unable to enhance it (***Figure 2).***

The spider web entropy examinations on ***Figure 2*** can be regarded theoretical cases. There are almost innumerable possibilities of variation for relations between pillars. The outlined figures are basic categories, with the combination of which we can meet during the research work. ***Figure 3*** demonstrates the logical system of a new situation analysis method.

The spider web with low entropy



The spider web with medium entropy



The spider web with high entropy

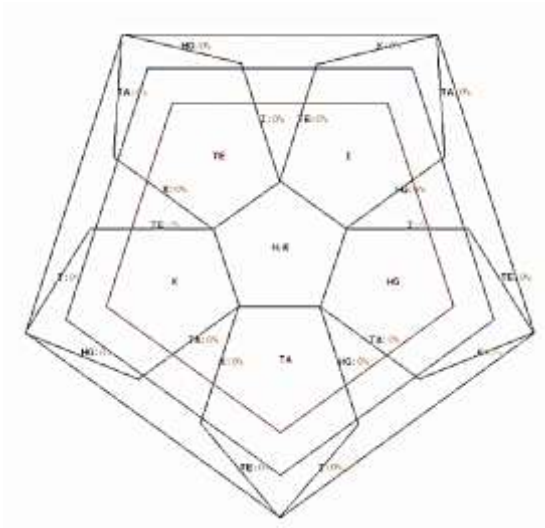


Figure 2: Theoretical cases of the spider web entropy

Source: Own edition 2012.

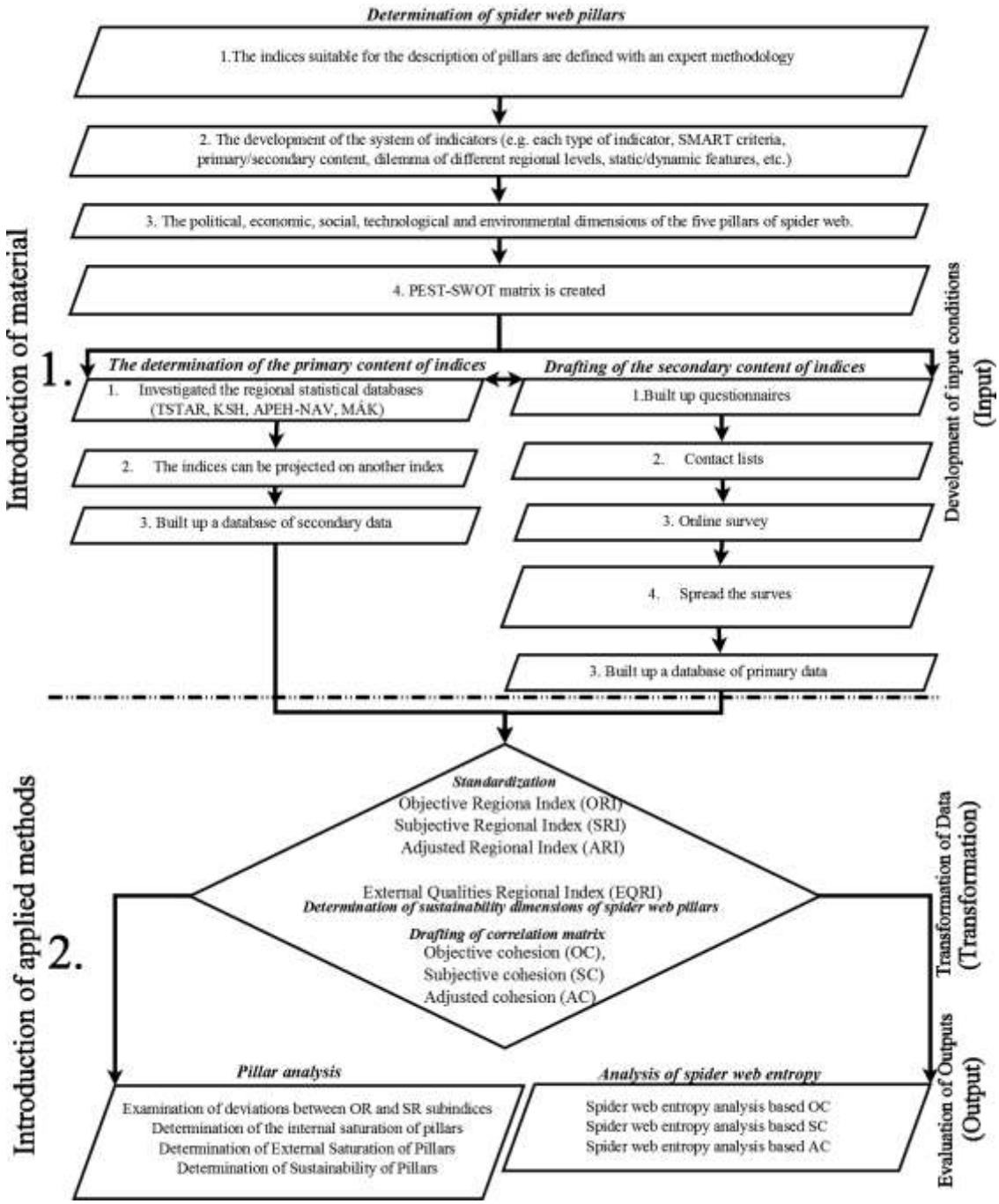


Figure 3: Logical Structure of the situation analysis method by the Spider Web Theory

Source: Own edition 2012.

RESULTS OF HYPOTHESIS EXAMINATIONS

H1: My first hypothesis was that ***the synthesis of system-oriented system analyses is not elaborated in the development of rural areas, therefore the development results of rural areas can be improved by the implementation of general system theory and new type of synthetization of system-oriented system analyses.*** I have proved through the five types of system analysis introduced in ***Literature Review*** chapter that these system theory elements can be explored in the development of rural areas but ***the synthesis between the different approaches is deficient.*** Therefore – in my opinion – the first hypothesis was proved.

H2: My second hypothesis was that ***it is necessary to harmonize the objective and subjective statistical research in the regional situation analysis methodology in order to get more balanced and comprehensive results.*** The new situation analysis method described in chapter two and three underlined that the common explanation of objective and subjective data is inevitable. ***The corrected regional indices and the adjusted cohesion*** helps to get more precise picture in connection with the operation of an area than by examining them separately, therefore I consider my second hypothesis proved, too.

H3: My third hypothesis was that ***it is necessary to create system-oriented, logically coherent, complex situation analysis methods in order to enhance planning that aims the generation of sustainability.*** Due to the complexity of sustainability-related issues, it is indispensable to examine each dimension separately. ***The sustainability analysis of pillars*** highlighted that a system might not be sustainable in its complexity, but an appropriately thorough and in-depth analysis can help to find the currently sustainable elements of the system. In order to carry out this analysis, however, a complex methodology is needed. Therefore I regard my third hypothesis proved, too.

H4: My fourth hypothesis was ***that it is not enough to examine the development subsystems of rural areas on the basis of system theory principles, but it is also necessary to map the interactions between individual subsystems.*** With the help of ***spider web entropy analysis*** I revealed that the relations between development subsystems should also be examined. The methodology I have developed helped to create a more precise picture about the possible outcomes of development interventions and the interactions between subsystems. Therefore I regard my fourth hypothesis well-based and proved.

NEW AND NOVEL SCIENTIFIC RESULTS

I draft the ***new and novel scientific results*** of my doctoral dissertation on the basis of my research, processing of technical literature and ***the results of hypothesis examinations.*** These are as follows:

1. I have revealed the directions of ***applicability of system theory within rural and regional development.*** I have summarized and synthetized the system analysis approaches that have been already known in rural and regional development.

2. I have created ***the general spider web theory*** on the basis of system analysis approaches. The theory is able to explain the problems of an area or community in a complex way.

3. I have developed a ***new situation analysis methodology which includes the marks of five types of system analysis approaches.*** The new situation analysis methodology – which consists of multiple steps built systematically on each other – helps to examine and explain the ***objective and subjective statistical data together.*** It is proven that the regional index system I developed supports this.

4. With the help of cross-sectional system analysis approach I processed the subject of sustainability in a new way. I am the first to set up new concepts for sustainable development projects. I have underlined that it is not enough to examine the whole system from the aspects of sustainability, but the ***sustainability dimensions of individual subsystems*** should also be examined.

5. I have worked out a new analysis method on the basis of spider web theory. The name of the new method is ***spider web entropy analysis.*** The method is suitable for mapping ***the relations between subsystems*** of rural and regional development and for highlighting the directions of intervention.

CONCLUSIONS AND RECOMMENDATIONS

In the first part of my doctoral dissertation I dealt with the development and applicability of system theory as well as the possibilities within the development of rural areas.

All the five system analysis methods that were introduced are suitable from their own aspects to highlight the problems of an area and to provide basis for drafting the future developments. The detailed examination of individual models, however, showed clearly that they have weaknesses and they try to describe the problem not in its complexity but according to a randomly chosen logical system.

- ***The cross-sectional system analysis approach*** helps to understand the different outputs of relations and interactions between individual systems.
- ***The development system analysis approach*** highlights that an area can be regarded a system and this system has subsystems namely the economy, society, environment and infrastructure.
- ***The functionalist system analysis approach*** tries to define the functions in the system. The determination of functions within a system is essential for drafting the developments.
- ***The holistic system analysis approach*** highlights the complexity of an area and helps to explain the system as a whole.
- ***The reductionist system analysis approach*** breaks the system down into its components and tries to draft the development concepts from the totality of elements. .

On the basis of the above, such a situation analysis and strategy development attitude is required which is able to synthetize the individual system analysis methods appropriately. The general spider web theory can be regarded the synthetization of the five types of system analysis approach. These main characteristics are as follows:

- Each pillar is considered an ***open system*** that is able to make contact with its environment, affect it and be affected (*functionalist system analysis).* These pillars are linked to each other like a spider web.

- The spider web is regarded a new open system, ***the subsystems of which are the pillars*** *(holistic system analysis).*
- If we intend to carry out a development in a local community, we should not deal only with one pillar and develop only one because ***a hole can be created in the web*** *(development system analysis).* ***The harmony within the system is very sensitive*** and this harmony may disappear from the system due to a careless intervention.
- Each pillar has its own ***political, economic, social, environmental and technological dimension,*** out of which the sustainability of pillars can be determined (*cross-sectional and reductionist system analysis).*

In the second half of my doctoral dissertation I introduce the situation analysis method I developed. The methodological conclusions and recommendations connected with the situation analysis method are divided into three parts. I draft my comments and conclusions first in connection with the creation of input conditions, then the transformation of data, finally the evaluation of outputs.

DEVELOPMENT OF INPUT CONDITIONS

- One of the difficulties of selecting indices is that the data in the regional databases cannot always be regarded up-to-date. Therefore those indices which convey interesting characteristics but are older then four years, are not worth listing in the index system. Always the „latest" data should be searched in the selection of indices.

- The basic data in themselves contain a lot of dimensions and their comparison is enhanced by the so-called projecting process. On the basis of the ***Results*** chapter it is necessary to find the most suitable projection base for each basic data. It should be determined separately in case of internal as well as external indices.

- The projection basis and the projected basic data should come from the same time line, except only for those indices which have been originally defined dynamically. In these cases, the projection basis can be determined by a chronological median within one time interval.

TRANSFORMATION OF DATA

- A lot of different problems should have been eliminated in the determination of different regional indices. In the index system coming from secondary data I have worked out some basic indices which could be calculated from more basic data. These basic data should have been unified before calculating the regional indices. Since all the regional indices are built on the extent of dispersion, those indices in case of which the minimum and maximum values were equal, should have been replaced with another index because it makes no sense to standardize for a dispersion extent of zero value.

- ***The standardization made for dispersion extent*** deprives the basic data from their dimension. It has highlighted that the basic data should not be projected on thousand people, the permanent population is always enough. It is because the regional indices determine the relative positions compared to each other in the individual data series and in this case, the multiplication by thousand is an unnecessary procedure.

- The determination of t***he theoretical optimum*** is a strongly subjective factor, the confirmation of which encounters serious technical difficulties, therefore I do not suggest to define theoretical optimum in either case.

- In case of ***subjective regional subindices*** the dispersion extent should be determined as the multiplication product of the difference of ***possible maximum and minimum*** values and „n". If we use other types of calculation, the dispersion extent often gets zero value. In this case it is pointless to standardize the dispersion for extent.

- It is enough to perform correlation examination between ***objective and subjective regional subindices*** and it is not necessary between the basic data.

- ***The results of the correlation matrix*** are valid only for ***the examined region and only within the examined time dimension,*** therefore these results cannot be generalized. That's why I regard more advantageous to ***define correlation as a weight*** between two pillar relations.

EVALUATION OF OUTPUTS

- ***The corrected regional indices*** create a bridge between subjective and objective data. If the deviation is higher than 10% in case of the majority of indices between ***objective and subjective regional subindices***, it is absolutely necessary to revise the research and the presumed reasons for deviation should be made clear in the interpretation of results.
- The ***subjective evaluation*** does not always show more positive picture about the state of a region. The local people often consider the state of the region worse than it is seen from the objective survey.
- The separate examination of pillars and the spider web entropy analysis should always be made collectively because the separate explanation can be misleading. Although a lot of information can be received from both outputs, the picture will be complete only if the analysis is made together.
- The outputs do not determine actual interventions and operative measurement but draw the attention to system-level transformations.

Next I summarized the ***advantages and limits*** of the new situation analysis method. It helps the regional researchers, regional planners and local stakeholders in the future implementation of the method.

LIMITS

- The new situation analysis method drafts strategic directions and not specific acts of intervention.
- Due to the difficulties in reaching objective basic data (e.g.: they are not always trustworthy, they are not collected in the examined period), the fineness of the system is distorted and is not able to filter out the difficulties.
- The most adequate basic data cannot always be found for the characteristics to be examined.
- The disinterest of local stakeholders (e.g. passivity, not appropriate list of contacts) destroys the credibility of final results.
- The system is able to highlight the local specialities but only partly.
- The examinations also build on the external qualities which are permanently changing, therefore the cyclical feedback is essential.

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ADVANTAGES

- The new situation analysis methodology helps to determine the directions of development using an active and reductionist system-oriented analysis in the life of a microregion and in a relatively short period of time.
- It highlights the root of the problems which could be determined by research before but with great difficulties or only partly.
- ***The saturation analysis of pillars with the help of adjusted regional indices*** gives a precise picture about the state of each development subsystem. .
- ***The spider web entropy analysis*** helps to map the interactions of impacts caused by individual interventions.
- It offers a useful guide for regional researchers for carrying out investigations.
- The ***multilevel and many sided*** inspection of problems helps to draft real directions for development.

The dissertation set new directions for future research, out of which the most actual are as follows:

- The new situation analysis methodology by the methodological transformation of index system can be made suitable for carrying out inquiries and situation analysis in the settlements.
- With the new situation analysis methodology it is possible to implement a national microregional monitoring system with which the research results can be involved into dynamic examinations.
- It could enhance the support and foundation of precise microregional and regional strategic programs by involving local stakeholders.

PUBLICATIONS CONNECTED WITH THE SUBJECT OF DISSERTATION

SCIENTIFIC PUBLICATIONS (BOOKS, BOOK CHAPTERS, RESEARCH REPORTS)

In foreign language:

Goda P. (2009): Definition and notions of multiculturalism in the reality of the Hungarian society. In.: Farkas T. – Puskás J. (eds.) (2009) Working in multicultural environment for European citizenship, Szent István Univerity Press 2009., p. 85-96., ISBN: 978-963-269-104-6

Kollár K. **- Goda, P. (2009):** The assessments of economic subsystems for improving the potential of the Hungarys economic competitiveness. In.: Káposzta, J. (eds.) (2009): New elements and research in spatial economy. Scientific Book. Research Institute of J. Selye University, Komarno, 2009., p. 138-148. ISBN 978-80-89234-72-1

SCIENTIFIC ARTICLES

In foreign language:

Zsuzsanna Kassai **– Pál Goda (2011):** Evaluation of Local Rural Development Strategies in Hungary. In: Annals of The Polish Association of Agricultural and Agribusiness Economists, Vol. XIII, No. 6, p.83-89., ISSN 1508 3535.

Goda P. - Tóth T**. (2009):** Opportunities and challenges of the Rural Territories and Communities in the Changing Europe. Bulletin of Szent István University 2009., p. 127-136., ISSN 1586-4502

Goda P.- Kollár K.- Tóth T**. (2009):** The main dimension of the regional competitiveness: Hungary vs. India. Delhi Business Review 2009., Vol. 10, No.2, p. 109-110., ISSN: 0972-222x

Goda P. – Tóth T. – Kollár K. **(2008):** How to use the reductionist approach for evaluating subsystems to research the elements of the development. Bulletin of Szent István University 2008., p. 172-182., ISSN: 1586-4502

In Hungarian language:

Kassai Zs. **– Goda P. –** Mubarak R. Al-B. **(2011):** A 2004-2010 közötti gazdaságfejlesztő és regionális Operatív Programok értékelése. In: VIKEK Közlemények, IV. évf. 1-2. szám, ISSN 1789 6339.

Goda Pál – Kassai Zsuzsanna **(2011):** Gazdaság- és regionális fejlesztő operatív programok összehasonlító kistérségi vizsgálata. In: Gazdaság és Társadalom, III. évf. 2. szám,. ISSN 0865 7823.

Kollár K. **– Goda P. (2009):** A földhasználat, térbeli koncentrációk és a területi versenyképesség alapvető összefüggései hazánkban, SZE Regionális – és Gazdaságtudományi Doktori Iskolák találkozója, évkönyv, Győr 2009., p. 441-451., ISSN 2060-9620

PRESENATIONS HELD AT SCIENTIFIC CONFERENCES AND PUBLISHED IN CONFERENCE PROCEEDINGS

In Hungarian language:

Béndek R. – **Goda P.(2009):** Rendszerszemlélet a fenntarthatóság kutatásában, egy részben megújuló energiaforrásokat felhasználó hőerőmű példájának bemutatásán keresztül. Környezettudatos energiatermelés- és felhasználás, MTA DAB Megújuló Energetikai Munkabizottság, Debrecen 2009., p. 59-64., ISBN: 978-963-7064-20-3

Tóth T. – **Goda P.** – Urbánné Malomsoki M. **(2009):** Fenntarthatóság elemei a terület- és vidékfejlesztésben. Környezettudatos energiatermelés- és felhasználás, MTA DAB Megújuló Energetikai Munkabizottság, Debrecen 2009., p. 292-299., ISBN: 978-963-7064-20-3

Goda P. – Tóth T. **(2008):** A fejlesztés elemeinek felkutatása, fenntarthatóság generálása a lokális terekben (mélyreható rendszerszemléletű megközelítés, a közösségi pókháló megalkotása). 11th International Scientific Days, Károly Róbert Collage Gyöngyös 2008., p. 702. ISBN: 978-963-87831-2-7

In foreign language:

Kassai Zs. – Ritter K. – **Goda P. (2011):**The role of Local Rural Development Programs in the most disadvantaged regions of Hungary. Global Management Conference, Gödöllő, 4-7 May 2011. Full paper: p. 43-48. Abstract: 43.p. ISBN: 978-963-269-233-3.

Kassai Zs. – **Goda P**. – Péli L. **(2011):** Evaluation of Operational Programmes aiming at reducing territorial inequalities in Hungary. Development Prospects of rural areas lagging behind in the CEE region Conference, Gödöllő, 24-27 May 2011. Full paper: pp. 178-183. Abstract: 178.p. ISBN: 978-963-269-234-0.

Goda P. et all **(2011):**The evaluation of the Cohesion Funds in the Visegrad group countries by the assist of the new Modified Human Development Index. What Future for Cohesion Policy? An Academic and Policy Debate, 2011. Bled p.20

Goda P. – Nagy A. **(2010):**Regional analysis of the development actions of tourism between 2007 and 2010 in the NHDP. ,,Cross-border initiatives to facilitate economic and social development in the V4 countries and in Ukraine, 2010. Gödöllő, p. 213-222., ISBN 978-963-269-182-4

Goda P. et all. **(2010):** Dilemmas of the Integrated and Non- Integrated Regional and Rural Development Strategies. 11th International Conference, Global Economy: Challenges and Perspectices, Nitra 2010., p 92. ISBN: 978-80-552-0386-7

Goda-Béndek R. – **Goda P.** – Tóth T. **(2010)**: Creating sustainable Forest Management System (FMS) approach for evaluating the sustainability of the forest sector. 12th International Scientific Days, Károly Róbert Collage Gyöngyös 2010., p. 175. ISBN: 978-963-9941-09-0

Kollár K. – Széles I.- **Goda P.(2010):** Overview of the land use in Europe with special regard to the Hungarian situation. Problems and perspectives of World Agriculture's Innovative Development, Saratov 2010., p. 16-19. ISBN: 978-5-91818-058-7

Goda P. (2009): System approach in Rural Development. Conditions of Development of Village and Rural Areas, Wroclaw 2009., p.127-132. ISBN: 83-920715-5-7

Goda P. – Tóth T. **(2009):** Sustainability in Spatial Development Planning. UN Millenium Development Goals: Challenges and perspectives, Gödöllő 2009., p. 23. ISBN: 978-963-269-102-2

Tóth T. **- Goda P.** – Lampertné Akócsi I. **(2009):** Theoretically reachable fortunes in the Spatial and Regional Development. UN Millenium Development Goals: Challenges and perspectives, Gödöllő 2009., p. 63. ISBN: 978-963-269-102-2

Kollár, K**. - Goda, P. (2008):** The main coherences of Hungary's economic competitiveness. 32th Conference of Agricultural Students with International Participation. Novi Sad 2008., p. 154-159. ISBN: 978-86-7520-150-2

TECHNICAL BOOK, BOOK CHAPTER OR TEXTBOOK

Textbook:

Goda P. (2010): A gazdasági-társadalmi fejlődés törvényszerűségei, In.: Káposzta J. (szerk.) (2010): Integrált területfejlesztés jegyzet, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2010, p. 5-20. (1. fejezet)

Goda P. (2010): A gazdaság térbeliségének összefüggései, In.: Káposzta J. (szerk.) (2010): Regionális- és városgazdaságtan jegyzet, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2010, p. 5-24. (1. fejezet)

Goda P. (2010): Dilemmas of integrated and non-integrated Regional and Rural Development Strategies, In.: Káposzta J. (eds.) (2010): Integrated Regional Development course book, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2010, p. 47.-84. (4. fejezet)

Goda P. (2009): A gazdaságfejlesztés támogatáspolitikai összefüggései, In.: Tóth T. (szerk.) (2009): Regionális gazdaságfejlesztés és menedzsment jegyzet, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2009, p. 51.-56. (3. fejezet)

Goda P. (2009): A területfejlesztés és gazdaságfejlesztés kapcsolata, In.: Tóth T. (szerk.) (2009): Regionális gazdaságfejlesztés és menedzsment jegyzet, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2009, p. 57.-78. (4. fejezet)

Goda P. (2009): A területi politika főbb összefüggései, In.: Tóth T. (szerk.) (2009): Területfejlesztés jegyzet, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2009, p. 58.-77. (5. fejezet)

OTHER PUBLICATIONS PRINTED OR ELECTRONIC FORM

Goda P. (2010): Esélyek a piramis alján, avagy vidékfejlesztés az általános pókháló elmélet alapján. Vidék Hangja Magazin, Gödöllői Innovációs Központ Kft, Gödöllő, 2010., HU ISSN 2061-7127, URL:

http://mnvh.hu/ptPortal/index.php?mod=news&action=showNews&newsid=11622&lang=hu

Goda P. (2009): Kiaknázatlan lehetőségek… . Vidék Hangja Magazin, Gödöllői Innovációs Központ Kft, Gödöllő, 2009., HU ISSN 2061-7127, URL:

http://mnvh.hu/ptPortal/index.php?mod=news&action=showNews&newsid=10836&lang=hu

Goda P. (2009): Esélyek a piramis alján, avagy vidékfejlesztés az általános pókháló elmélet alapján. XXIX. Országos Tudományos Diákköri Konferencia Agrártudományi szekció, SZIE MKK Gödöllő 2009, p. 368. ISBN: 978-963-269-095-7 ***(I. helyezés, Különdíj)***

Goda P. (2007): Esélyek a piramis alján, avagy vidékfejlesztés az általános pókháló elmélet alapján. Tudományos Diákköri Konferencia SZIE GTK Gödöllő 2007, p.103., ISBN: 978-963-9483-5 ***(I. helyezés, Különdíj)***

Goda P. (2005): Bevezetés az indiai vidékfejlesztésbe, egy indiai organikus farm bemutatása. Tudományos Diákköri Konferencia SZIE GTK Gödöllő 2005, p.82., ISBN: 963-9483-54-0 ***(Különdíj)***

RESEARCH PROJECTS

Káposzta J. - Tóth T. - **Goda P.** – Kollár K. **(2010) :** A Téti Kistérség komplex helyzetfeltárása, stratégia alkotása és forrástérkép készítése, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2010

Tóth T. – Béndek D. – **Goda P.** – Goda-Béndek R. **(2010)**: Az erdei tér fenntartható használata a Gemenc Zrt.-nél, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2010

Tóth T. – **Goda P.** – Goda-Béndek R. **(2009)**: Az FMS- elemzés módszertana a fenntartható erdőgazdálkodásban, Szent István Egyetem, Regionális Gazdaságtani és Vidékfejlesztési Intézet, Gödöllő 2010