

## CASE STUDY ON SPIDER-NET ENTROPHY INVESTIGATION IN RURAL AREAS

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### ABSTRACT

The theoretical background of the research was published in 2012. We present a part of a result of a complex research, in which we investigated spider-net entropy from the development aspects of rural areas. The paper introduces a new type of situation analyses as a case study. The selected study area is Veresegyház micro region. Based on the complexity of inequalities of the territories is not advantageous to do an examination only in one dimension NAGY- KÁPOSZTA (2006). KÁPOSZTA et al. (2008) highlight the subsystems of the development are in sum and part relationship with each other, and they act as a sensitive system. The abstract way of thinking the meaning of entropy theory formed the so-called spider web-entropy analysis, which helps to find out how the structure order between the pillars of the spider web is.

**Keywords:** Rural areas, Spider-net entropy, Situation analyses

### INTRODUCTION

The entropy analysis is not unfamiliar way of territorial researches. The phenomena of entropy come from the Information Theory, which can be used for comparing the distribution of two territories' quantitative criterion (NÉMETH, 2005). Based on the researches of PESTI (2009), the agricultural production structure analysis of the entropy can be used in practice. The index that varies between the items "ordered" refers to the distribution. NEMES NAGY (1998, 2005, 2009) also deals with the problem of orderliness in his scientific research, mainly in the order of the regional spatial structure understanding.

#### *Spider web entropy analysis*

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. 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. The correlations of indices within one pillar are not considered as the results of correlation matrix, because the objective 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 objective regional 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. The examination of spider web entropy is assisted by a visualization method we developed. 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 the relation between two pillars appears twice but contains the same information. The introduces the relation in an inverse proportion. If the tightness of relation is close to zero, the hole on the web can be observed (GODA, 2012; GODA – NAGY – PÉLI 2012).

## RESULTS

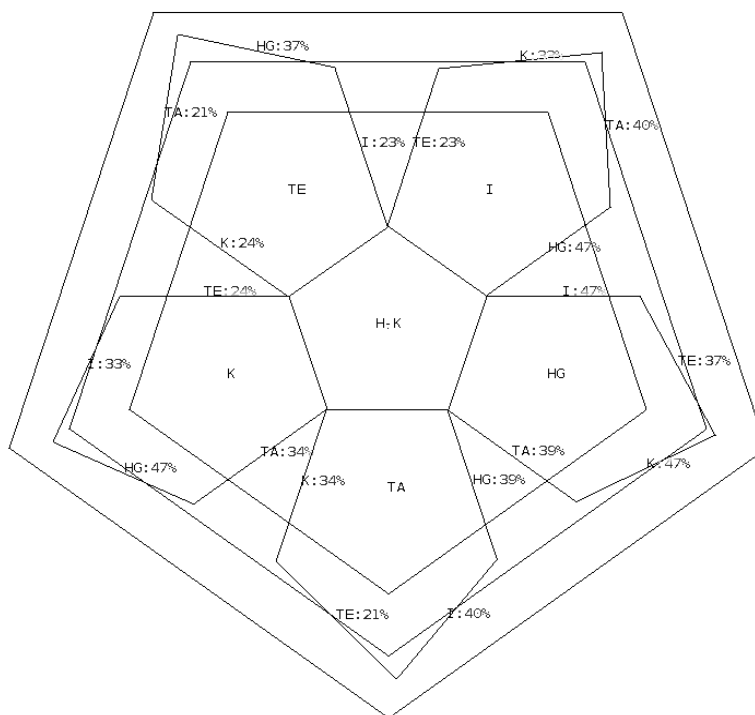
Eight settlements are located in the Veresegyházi micro region, each of which was involved in the research. The questionnaire survey did not aimed at the whole population, but only at the actors that could actively shape the future of the region. Three segments were contacted in each settlement: the local government, entrepreneurs and non-governmental organizations (funds, associations, local action groups, churches). Thirty request letters were sent as an average. That means a total of nearly two hundred and fifty questionnaires in the micro region. The rate of the willingness to respond was 20%, which is considered as sufficient for the purposes of the research. Although the settlement of Veresegyház plays a significant role in the life of its micro region, it was over-represented in the aspect of responses, which was definitive in the assessment of the results (*Table 1*).

**Table 1.: Resident population and the distribution of questionnaires**

DESCRIPTION	RESIDENT POPULATION (PERSONS)	RESIDENT POPULATION (%)	COMPLETED QUESTIONNAIRES (PC)	COMPLETED QUESTIONNAIRES (%)
Csomád	1467	4%	3	5%
Erdőkertes	7690	20%	6	10%
Galgamácsa	1932	5%	1	2%
Órbottyán	7053	19%	3	5%
Vácegres	889	2%	1	2%
Váckisújfalu	479	1%	1	2%
Vácrátót	1817	5%	1	2%
Veresegyház	16187	43%	42	72%
<b>VERESEGYHÁZ MICRO REGIONS</b>	<b>37514</b>	<b>100%</b>	<b>58</b>	<b>100%</b>

Source: GODA, 2012

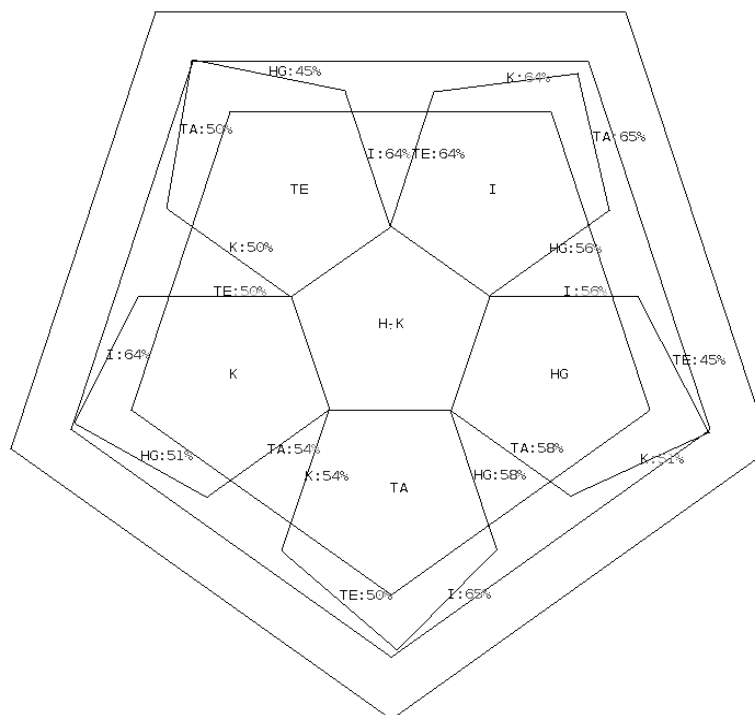
Based on objective cohesion (OC), each pillar relation of the Veresegyházi micro region has high entropy. The relation between the pillar of Tourism/Extern links and the pillar of Social activity (21%) has the largest tear in the spider web. Although the relation of the Infrastructure pillar and the pillars of Environment and Local government show complete tear (47%), yet these relations are considered the strongest on the micro regional spider web based on the objective cohesion.



**Figure 1.: Spider web structure of Veresegyház micro region based on OC**

Source: GODA, 2012

The entire spider web has high entropy, which means that there are complete tears in the spider web, the relations between the pillars are equivocal and cannot be detected. The micro region is unable to face the micro region is



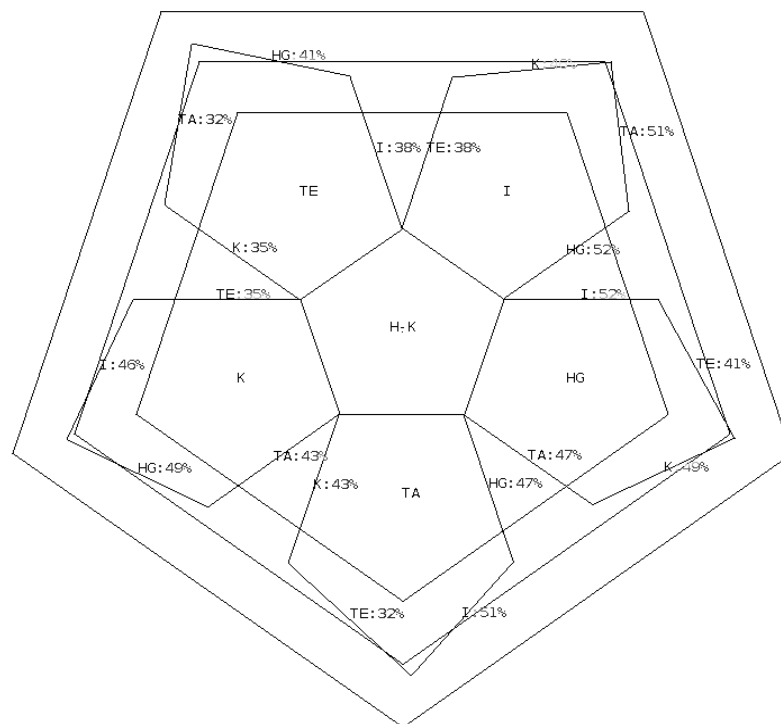
**Figure 2 Spider web structure of Veresegyház micro region based on AC**

Source: GODA, 2012

Based on subjective cohesion, the spider web of the micro region shows a much more balanced structure (*Figure 2*). Among the relations of the eight pillars, only the relations of Local government and Social activity pillars (45%) has high entropy. The entire spider web typically has moderate entropy, which means that there are partial tears in the spider web, the relations between the pillars are not always unequivocal and sometimes cannot be detected. The micro region has sustainability potential, but not at its current state.

The two types of entropy tests had significantly different results, so we considered it essential to define the adjusted cohesion, which interprets the two tests together. In our opinion, the closest state to reality can be obtained by these values.

According to the adjusted cohesion, the spider web of the micro region shows an entirely different picture than the previous two entropy studies (*Figure 3*). Among the relations of the eight pillars, only two has moderate entropy, the rest of the relations have high entropy. The strongest relation within the spider web is the relation between the Local economy and Infrastructure pillars (52%). The relation between the pillars of Infrastructure and Social activity also shows a partial tear (51%).



**Figure 3.: Spider web structure of Veresegyház micro region based on CC**

*Source: GODA, 2012*

In overall, the spider web of the Veresegyházi micro region shows an unstructured picture, which cannot properly convert its existing resources. Previous researches proved that often the problem of an area is not the absence of appropriate inputs, but that the transformation ability of an area does not allow the conversion of inputs. The transformation ability of an area is inversely proportional to the spider web entropy on that area. The lower the spider web entropy within an area, the higher the transformation ability. The examination of the relations between the pillars is necessary to determine in which points of the area developments should be started.

## CONCLUSION

Strategic objectives can be defined along two principles. First, development plans should be drafted within the micro region to repair complete tears between the pillars. This indicates that within the Veresegyházi micro region the relation between Tourism/extern links pillar and the Social activity pillar and the relation between Tourism/extern links and Environment pillar should be emphasized during the planning of developments.

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