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Allocation of Financial Resources from EARDF in the Context of Typology of Slovak Regions

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Abstract:

The Common Agricultural Policy of the European Union (CAP EU) is one of the common EU policies that support vulnerable and disadvantaged EU regions. The allocation of EU structural funds is for a long time considered unequal and unjust. Especially money from European agricultural fund is not distributed directly to farmers. In the paper, we use cluster analysis to define the distribution of funds from the EAFRD (European Agriculture Fund for Rural Development) to individual regions of the Slovak Republic at NUTS 3 level in the previous programming period 2007 – 2013. The main objective of the paper is to identify the regions where most of the money form EARDF was allocated during this period. The results of the cluster analysis are clear - funds were not concentrated only in regions that are classified as predominantly rural (according the OECD methodology) but also in regions that were classified as intermediate or even predominantly urban.

Keywords: common agricultural policy; rural development; cluster analysis; EARDF

JEL Classification: Q10; R11.

Introduction

The Common Agricultural Policy of the European Union (CAP EU) is the most important EU policy that aspires to develop European agriculture and tries to solve its most crucial problems. Since its adoption in 1962, it is the most financial demanding of all EU policies (http://ec.europa.eu/budget/figures/interactive/index_en.cfm). Several reforms have been implemented already during the implementation of the CAP EU, which fundamentally changed the structure of the different types of financial support. Reforms were implemented due to a number of reasons – the high cost spent on implementing the CAP EU, the overproduction of some agricultural commodities and the unfair distribution of financial aid (Baldwin and Wyplosz 2008). The most important structural change was the split of financial support into two "pillars" (Pillar One and Pillar Two). In the Pillar One, direct support for farmers is concentrated, in Pillar Two support for rural development. At the same time, two instruments were created to finance each CAP pillar - the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD). With regard to the reform of the EU CAP, the multifunctional nature of agriculture has been emphasized. This is understood as a link between social, economic and ecological aspects (Huylenbroeck 2007). Many authors deal with the effectiveness of EU support mechanisms. It hasn't been proven link between the amount of support from the CAP support's schemes and the efficiency of its use (Baldwin and Wyplosz 2008, Camaioni, Esposti, Pagliacci and Sotte 2014, Czyzewski and Smedik-Ambrozy 2017, Espinosa *et al*. 2014). Some studies

confirmed statistically insignificant correlations between aids and their importance for production. However, these studies were not able to absorb all the differences especially with regard to environmental activities, rural development and, in particular regional disparities (Czyzewski and Smedik-Ambrozy 2017).

In general, it can be argued that significant subsidization of agricultural production has resulted in increased production, but not the productivity. Another fact is that support for agriculture within the EU CAP is unequal (Camaioni, Esposti, Pagliacci and Sotte 2014). After the accession of the new member states to the EU in 2004 and in 2007, the agriculture subsidizing from the CAP is considered to be discriminatory particularly for these countries. The existence of significant differences between EU regions is obvious. There is a question whether it is possible to apply a single universal support for all regions in order to deal with all of their problems - the rural economy, employment, income of rural population, education, preservation of cultural heritage and traditions, the tourism industry and, last but not least, environmental activities. The important thing is also to follow the revealed comparative advantages of the EU member states and their changes that occur under the influence of different factors (Fojtíková 2016).

Other authors reported other specific features in the allocation of financial support from the EU's CAP, as the degree of rural areas and agricultural activities. Camaioni *et al.* (2013) states, that there is a correlation between the amount of funds provided and the rural elements at the local level (Camaioni *et al.* 2013). The support from the individual structural funds has its general rules; it is intended only for the regions defined as poor. However, rural areas are characterized by their peculiarities even within regions that are not poor. Therefore, the EAFRD funds create opportunities for rural development across each EU Member State.

The aim of this paper is to provide a summary of the EAFRD support for NUTS 3 regions in the Slovak Republic in the programming period 2007 – 2013 in the context of the definition of regions according to OECD urban - rural typology (OECD 1994. Creating *rural indicators for shaping territorial policy*).

1. Description of the NUTS 3 regions in the Slovak Republic

The economy of the rural areas in Slovakia changed fundamentally after the socio-economic changes at the end of the 20th century, but especially after the accession to the EU in 2004. Besides the negative effects, the Slovak Republic's entry into the EU also had a very positive effect, namely the possibility of obtaining funds from EU financial instruments supporting agriculture - European Agricultural Guarantee Fund and the European Fund for Rural Development. The article focuses on supporting the countryside from the European Fund for Rural Development and its impact on the rural economy.

Today the multifunctional role of agriculture as a cross-cutting sector of national economies is emphasized. Agriculture has an impact on all areas of the EU Member States and the lives of its inhabitants. The basic function of agriculture is the production of food, raw materials for other sectors of the economy and also as a source of energy. Among other features the most important are social - agriculture is an opportunity for employment, it can provide various services for the population and improve the rural economy and region – it contributes to the preservation of rural settlement, improves infrastructure and local services, it preserves the culture and local traditions and contributes to the development of the tourism industry.

The share of GDP of agriculture and agricultural employment in EU member countries is decreasing every year. The share of GDP of agriculture in the EU decreased from 2.9 % in 1995 to 1.5 % in 2016 (https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=EU) and the share of agricultural workers decreased from 9.5 % 1991 to 4.5 % in 2015 (https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=EU). The consequence of the industrialization of agriculture was also the fact that the technological level of the individual activities increased, resulting in a lower need for labor but higher demand for qualified workers. One of the biggest problems among the whole EU is the rural depopulation – outflow of population from rural areas to urban areas.

Coming to the methodology of regions typology, the OECD classifies LAU2s[4] with a population density below 150 inhabitants per km² as rural (OECD 1994. Creating *rural indicators for shaping territorial policy*). NUTS 3 regions are classified as:

- predominantly urban (PU), if the share of population living in rural LAU2 is below 15 %;
- intermediate (IN), if the share of population living in rural LAU2 is between 15 % and 50 %;
- predominantly rural (PR), if the share of population living in rural LAU2 is higher than 50 %.

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[4]LAU - Local administrative unit, indicates the level of territorial government, which is lower than provinces, regions and similar large administrative units

According to the European Commission, urban – rural typology is consistent with the OECD typology and is also used in the Strategic Guidelines for RDP 2007-2013 (http://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:02006D0144-20090119&from=EN). The documents of the EU for the Slovak Republic defines the 4 regions at NUTS 2 level - Bratislava region, Western Slovakia, Central Slovakia and East Slovakia and 8 regions at the NUTS 3 - self-governing regions and Bratislavsky kraj, Trnavsky kraj, Nitriansky kraj, Trenciansky kraj, Zilinsky kraj, Banskobystricky kraj, Presovsky kraj and Kosicky kraj (http://www.apa.sk/index.php?navID=121).

According to the OECD, 11.2 % of the population lived in the urban areas of the Slovak Republic in 2008, 63.4 % inhabitants lived in the transition regions and 25.4 % of the population of the Slovak Republic lived in predominantly rural regions. Within the NUTS 2, the transition regions are central Slovakia, where 46 % of the population lives in rural areas, the western Slovakia, where 44.7 % of the population lives in rural areas and eastern Slovakia, in which 41.1 % of population lives in rural areas. The region with the highest urbanization is the Bratislavsky kraj, where only 13.4 % of the population lives in rural villages (OECD 2007. *Regions at a Glance).*

Table 1. The statistics of the regions of the Slovak Republic

Region	area in km²*	Inhabitants*	Settlements/of which number of cities*	Urbanization in %	GDP in p.p.p.. mil. EUR**	GDP/inhabit. in EUR**	unemployment rate in % **	number of companies in agriculture	Subsidy from EAFRD
Bratislavsky	2052	601 132	73/7	83,36	24 944,226	27 720,779	1,98	241	75028641
Trnavsky	4147	553 198	251/16	49,57	11 497,388	13 999,772	4,30	442	128462586
Trenciansky	4502	601 392	276/18	57,36	9 549,323	10 771,235	4,50	520	94263616
Nitriansky	6344	709 350	354/15	47,47	10 135,141	9 705,347	7,10	608	148082888
Zilinsky	6801	694 129	315/18	50,84	10 032,018	9 763,070	5,55	560	105092797
Banskobystricky	9455	658 368	516/24	53,97	8 406,214	8 686,398	14,10	724	170238204
Presovsky	8981	796 745	666/23	49,25	7 584,898	6 408,083	12,05	989	151792538
Kosicky	6752	770 508	440/17	56,27	11 019,143	9 639,788	13,02	588	134173028
Slovakia	49 034	5 384 822	2 891/ 138	55,55	93 168,353	11 684,071	7,99	4 672	1010642767

*data on 31.12.2004
 **data on 1.1.2008
Source: Štatistický úrad SR, Pôdohospodárska platobná agentúra

In the 2007-13 programming period, the rural development plan was implemented through the implementation of national strategic plans and rural development programs. These included a set of measures grouped in four axes:

Axis 1: improving the competitiveness of the agricultural and forestry sector;
Axis 2: improving the environment and the countryside;
Axis 3: quality of life in rural areas and diversification of the rural economy;
Axis 4: LEADER.

The individual axes contain tools that specify the area of support. Within Axis 1 human resources, physical capital, quality of agricultural production and products; in the framework of Axis 2 sustainable use of agricultural land, sustainable use of forestry land; within Axis 3, the quality of life, economic diversification, training skills acquisition and animation. The Axis 4-Leader supports the activities of Axis 1-3 for selected territories. [6] Under this regulation, CAP has a wide range of 44 rural support instruments, so that each Member State can choose of these instruments to implement in its rural development plans.

The Strategy of the Rural Development Program 2007 – 2013 is based on the Strategic Community Guidelines for Rural Policy (programming period 2007 - 2013) - Council Decision 2006/144 / EC, from the National Priorities for Sustainable Rural Development and the Rural Development Needs of Slovak Republic. In the programming period 2007 - 2013, rural development was supported by the EAFRD, unlike the previous programming period 2004-2006. The National Strategic Plan for Rural Development defines the rural development strategy and reflects the overall direction of support for rural development in the Slovak Republic. The global objectives are multifunctional agriculture, food, forestry and sustainable rural development (http://eur-

lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:277:0001:0040:EN:PDF). The Rural Development Program of the Slovak Republic covers the entire territory of the Slovak Republic, including the Bratislavsky region.

The main purpose of the paper is to provide an analysis of the spatial allocation of funds from the EAFRD in the Slovak Republic to the NUTS 3 regions in the context of the definition of the regions according to the OECD methodology. We proceed from the hypothesis that most EAFRD funds are allocated to predominantly rural regions at NUTS 3 level. The article is based on an analysis of scientific and professional literature, which analyzes the issues of CAP EU and rural development, the typology of rural and urban areas, the Rural Development Program of the Slovak Republic 2007 - 2013 and the programs for the development of higher territorial units of the Slovak Republic. Direct sources of data were the EU-Eurostat statistical databases, the OECD, the Statistical Office of the Slovak Republic and the documents of the Ministry of Agriculture of the Slovak Republic and the Agricultural Paying Agency of the Ministry of Agriculture and Rural Development of Slovak Republic.

In the paper we use the statistics in within each region according to the traditional methodology for classifying regions OECD (OECD 2007. *Regional Typology*). We decided to use this typology because it was applied in all member countries of EU – 27 in the period of 2007-2013. Further, we use rural development documents of the EU member states and the rural development programming documents of the Slovak Republic in the given time period. Within the NUTS 3 regions in Slovakia, there are two predominantly rural regions - Banska Bystrica and Nitra. Other regions belong to the group of intermediate regions - Trnavsky, Presovsky, Zilinsky, Kosicky and Trenciansky. Bratislavsky kraj is predominantly urban region (OECD 2007. *Regional Typology*). For the programming period 2007-2013, a single fund named European Agricultural Fund for Rural Development (EAFRD) has been created to finance rural development policy within EU- 27 (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32005R1290). The European Commission adopted in 2006 the decision to allocate 88 billions euro for rural development for period 2007-2013. Of this, approx. 1, 96 billion euros was allocated for Slovakia (http://ec.europa.eu/agriculture/sites/agriculture/files/publi/fact/rurdev2007/en_2007.pdf). The amount was divided within Axis I (620 mil. euros) Axis II (984 mil. euros), Axis III (265 mil. euros) and Axis (46 mil. euros), 39 mil. euros was the allocation for the technical assistance (https://ec.europa.eu/agriculture/sites/agriculture/files/statistics/rural-development/2008/rd_report_2008_chapter4.pdf).

2. Methodology

The main objective of the paper is to determine whether NUTS 3 regions in Slovak Republic classified as predominantly rural really got the most funds from the EARDF in the programming period 2007-2013 The NUTS 2 regions are divided on the basis of economic indicators and urban - rural typology therefore, we tried to determine whether the ERDF funds were mainly focused on the most vulnerable regions, where the money are the essentially needed. To achieve the objective, we used the cluster analysis. The cluster analysis divided the country into 4 clusters - regions at NUTS 3 level so that those regions are as similar as possible.

For the analysis, we selected regions predominantly rural and intermediate regions. We also included predominantly urban region - Bratislava. This cluster should be, in terms of getting funds from the EAFRD, different. The first step of the analysis was the identification of input data, which was not problematic in principle. The available macroeconomic data was drawn from the database of the Statistical Office of the Slovak Republic in the monitored period; some data were available since 2004 and some data from 2007. Data about EAFRD funds in individual NUTS 3 regions Slovak Republic were drawn from the the Agricultural Paying Agency of the Ministry of Agriculture and Rural Development of the Slovak Republic. As the 2007-2013 programming period was closed, the data were completed for the whole of the reference period.

In general, cluster analysis is useful and effective whenever it is necessary to classify large volumes of information to a form suitable for further processing. It's important to remember that cluster analysis is not used to find the right answer, but it allows us to find ways to look at the data differently and which allows us to understand the data better. The purpose of using cluster analysis is to group variables with similar features together, thus accomplishing a reduction of the original data which enables discovery of otherwise hidden structures in the data. The cluster analysis is used in a variety of areas. Hartigan (1975) wrote a large review of numerous published studies that includes the results received by cluster analysis techniques. Before applying cluster analysis to the data set, preferences have to be given to hierarchical/non-hierarchical method, divisive/agglomerative method and distance metrics. For the cluster analysis of the numeric data in our data set a hierarchical, agglomerative method with Euclidean distance metrics, recommended by Shaw is used (1980).

In our analysis we used ten indicators: area (in km^2), number of inhabitants, number of settlements (and of these, number of cities), urbanization (in %), GDP in p.p.p. (in EUR), GDP per capita (in EUR), unemployment rate (in %),

number of companies in agriculture, subsidies from EAFRD (in EUR). The data were standardized before used. With the help of cluster analysis, we divided the 8 self-governing regions of the Slovak Republic into clusters based on these indicators. For our cluster analysis, we used Ward's method. This method differs from all other methods, since it uses dispersion analysis methods to estimate the distances between clusters. The method minimizes the sum of squares for any two (hypothetical) clusters that can be formed at each step (Ward 1963). By this method, for each cluster, average values for all variables are calculated. Then, for each case, the Euclidean distance is calculated. These distances are summed up for all occasions. Clusters should be combined into one, which will increase the amount of the least. That is, this method minimizes the increase in the total sum of squares of intra-cluster distances. The general logic for conducting a cluster analysis is summarized in the Table 2.

Table 2. Description of analysis

Item	Value
Number of complete cases	8
Clustering Method	Ward's
Distance Metric	Euclidean
Clustering	Observations
Standardized	Yes

Source: authors own contribution, output form STATGRAPHICS software

We calculate a standardized value (a z-score), using the below formula.

$$z = \frac{X - \mu}{\sigma}$$

where:
X: the observation (a specific value that you are calculating the z-score for).
μ: the mean.
σ: the standard deviation.

And the Euclidean distance using the below formula:

$$\sqrt{\sum_{i=1}^{n}(x_i - y_i)^2}$$

xi – the value of x for the i- th object
yi – the value of y for the i- th object
n – number of attributes

An agglomeration distance plot that shows the contiguous minimum distances between the clusters in the alignment, ordered from lowest to highest similarity (left to right), when they were combined. Analyzing the agglomeration plot for our case (Figure 1) we can decide if our analysis is consistent in term of determination a reasonable value for the number of clusters. The agglomeration distance plot can be helpful in determining how many natural clusters exist in the data.

Figure 1. Agglomeration Distance Plot
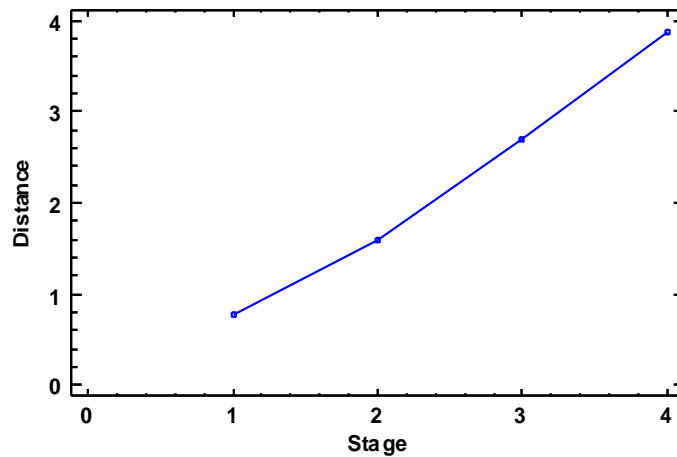
Source: authors own contribution, output form STATGRAPHICS software

The Table 3 shows the average value for each variable in each cluster, the clusters centroids.

Table 3 – Centroids

| Cluster	area	Number of inhabitants	villages	cities	urbanization	GDP ppp	GDP/ Inhabitants	Unemployment rate.	Number of agriculture companies	Subsidies from EAFRD
1	2052.0	601132.	73.0	7.0	83.36	24944.2	27720.8	1.98	241.0	7.50286E7
2	4324.5	577295.	263.5	17.0	53.465	10523.4	12385.5	4.4	481.0	1.11363E8
3	6632.33	724662.	369.667	16.6667	51.5267	10395.4	9702.74	8.55667	585.333	1.29116E8
4	9218.0	727557.	591.0	23.5	51.61	7995.56	7547.24	13.075	856.5	1.61015E8

Source: authors own contribution, output form STATGRAPHICS software

The clusters are groups of observations with similar characteristics. To form the clusters, the procedure began with each observation in a separate group. It then combined the two observations which were closest together to form a new group. After recomputing the distance between the groups, the two groups then closest together were combined. This process was repeated until only 4 groups remained.

The result of our analysis can be presented by dendrogram.

Figure 2 – Dendrogram of cluster analysis
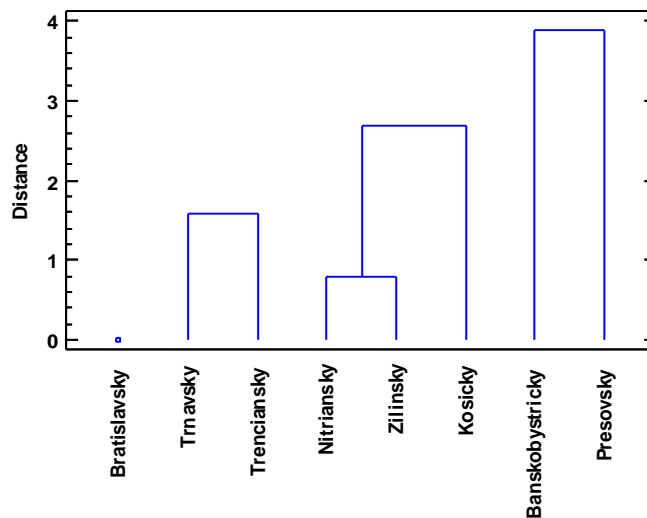
Source: authors own contribution, output form STATGRAPHICS software

Cluster summary, presented below in the Table 5, shows the number of clusters created and the percentage of observations placed into each cluster.

Table 4. Cluster analysis summary

Cluster	Members	Percent
1	1	12.50
2	2	25.00
3	3	37.50
4	2	25.00

Source: authors own contribution, output form STATGRAPHICS software

Table 5. Division into clusters

Region	Cluster
Bratislavsky	1
Trnavsky	2
Trenciansky	2
Nitriansky	3
Zilinsky	3
Kosicky	3
Banskobystricky	4
Presovsky	4

Source: authors own contribution, output form STATGRAPHICS software

The result of the analysis is the creation of four clusters. Bratislavsky kraj created separated cluster – it is significantly different from all other clusters. The best results achieved Trnavsky kraj and Trenciansky kraj, followed by Nitriansky kraj, Zilinsky kraj and Kosicky kraj. The poorest regions of Slovakia are Banskobystricky kraj and Presovsky kraj. The region with the smallest distance in the analysis is Nitriansky kraj and Zilinsky kraj.

Conclusion

The OECD classification methodology for NUTS 3 regions is used in statistical reporting across the EU. The basic indicator is the number of living inhabitants in the regions - predominantly urban regions, transitional regions and predominantly rural regions. The EAFRD is designed to support the development of the rural economy and it is therefore assumed that the money from this fund will be focused on these classified regions. The aim of the CAP is to provide the funds from for the countryside and directly to the rural regions and farmers living in these areas.

Based on our cluster analysis, we created 4 – four clusters. Cluster 1 is according the OECD methodology predominantly urban – Bratislavsky kraj. The share of the money flow into this cluster is higher than that of the population living in this region, which is 11.2 % of the Slovak population. This cluster has the best economic parameters. Cluster 2 consists of transition regions; it consists of Trenciansky kraj and Trnavsky kraj. Cluster 2 has a higher share of money flow than the proportion of the population living in their territory, which is 21.4 %. Cluster 3 consists of three regions - two intermediate – Zilinsky kraj and Kosicky kraj and one predominantly rural – Nitriansky kraj. This region has higher percentage inhabitants - 38.3 %, than money received.

The hypothesis that most of the EAFRD funds flew into predominantly rural regions was not confirmed. Cluster 3 and cluster 4 contain also predominantly rural and transition regions. In the hypothesis, we assumed that cluster 4 would consist of predominantly rural areas. This hypothesis was not confirmed, because cluster 4 consists of one predominantly rural region- Banskobystricky kraj and one transitional region – Presovsky kraj. Cluster 4, however, is the region with the worst economic characteristics, and at the same time it is the largest beneficiary of the EAFRD.
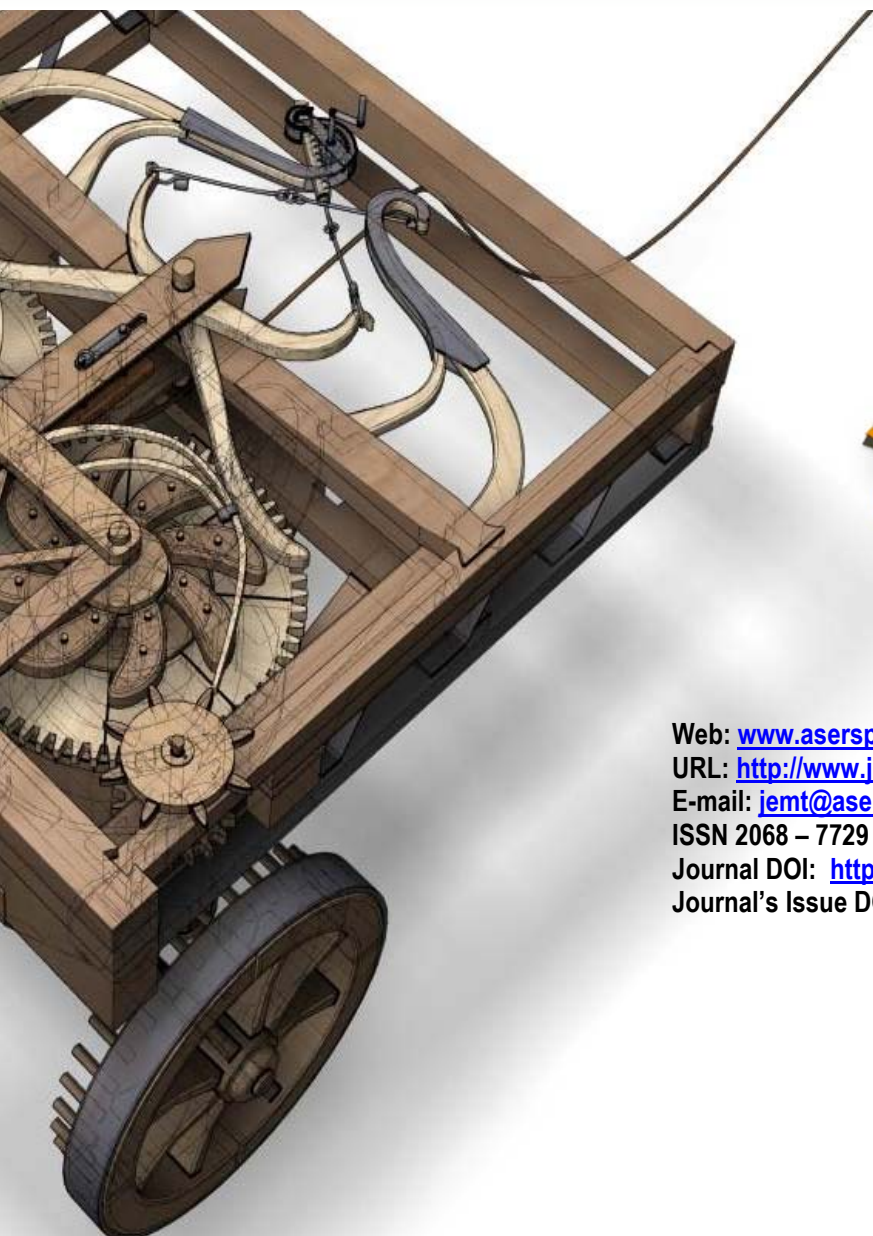
The cluster analysis includes data on the funds paid for successful applications for a non-repayable financial contribution from the EAFRD. This fact may distort to a certain extent the result of the analysis because the amount of aid paid is based on the quality of the projects and applications submitted. If we ignore this effect, cluster analysis confirms the fact that support for transition regions is greater than for the regions that are classified as rural. As EAFRD is primarily designed for rural development, this seems quite ineffective.

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