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Which attributes of culture can we measure?
The case of Hungarian micro-regions

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Abstract: Assessing the economic role of culture and interpreting it in connection with regional and urban development are becoming important. This paper aims to reflect on the possible means of quantification regarding the attributes of culture. Given that the authors are compelled to restrict the scope of analysis to the certain segments of culture attempts are made at investigating the properties of culture using multivariate statistical methods (factor analysis, K-means clustering, correlation) in the case of Hungarian micro-regions. After typifying the Hungarian micro-regions the paper conclude that significant differences are observed regarding the micro-regions of West and South Transdanubia, Northern Hungary and the Great Plain but there are also considerable disparities between the urban and rural areas of Hungary. Finally, the paper highlights some critical issues concerning the results and argues for an appropriate cultural policy in Hungary.

Keywords: attributes of culture; multivariate analysis; micro-regions; development; Hungary.

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1   Introduction

The concept traditionally referred to as 'culture' is undergoing transformation. However, it is seemingly impossible to give a common definition of culture and to list all elements of culture, scientists agree that the new movement of debate on culture started in the 1990s (Benko, 1998). According to Barnes (2003), a segment of the movement deals with the interactions of globalisation trends and local culture. Local aspects of culture are gaining importance and this fact indicates that regional science needs to focus on studying the components of culture and on analysing spatial patterns of culture in details, especially nowadays.

Geertz (1973) argues that culture offers new reference points for the development of local communities, in other words cultural endowments are important in regional development (Keating, 2001; Tabellini, 2005). Regions have not only economic but cultural resources as well; it means that culture has become an inseparable part in the process of value creation (Leriche and Daviet, 2010). According to Pratt (1997), cultural industries help diversify the economic-base especially in deindustrialised or highly specialised cities and regions. Throsby (2001) calls attention to the close interrelation between culture and sustainability. In addition, culture and the arts contribute to bring indirect economic benefits such as creativity of people (Böhm and Land, 2009) and following Jowell (2004), culture is an important investment in personal social capital. Malecki (2012) adds that regional cultures vary in the degree to which people trust and interact with one another.

Culture enhances the development of a creative environment and cultural activities can be regarded as sources of creativity that support the creation of a dynamic knowledge economy and attract highly qualified workforce that is able to operate it (Dziembowska-Kowalska and Funck, 1999; Peck, 2005). Whilst choosing a place of residence, skilled employees consider the availability and quality of high-level educational and cultural services. According to Florida (2002) locations where highly educated households prefer to live attract more industries and perform better economically. Culture connected with the image of a city can also give a boost to the growing importance of attractiveness (Bianchini and Parkinson, 1993, Kong, 2000). Kloosterman and Trip (2011) add that quality of place entails typical urban qualities of a rich culture.

The quantification of culture related to regional economy and development is of great important nowadays. However, Jepperson and Swidler (1994) documents that the greatest impediments to measure culture are conceptual rather than strictly methodological, attempts were made to measure the attributes of culture in spatial context. According to Beugelsdijk et al. (2006) economic development is an important driver for value change; in a research among 55 European regions it is found that cultural heritage leaves a permanent imprint and historical shocks influence the process of cultural change. Markusen (2010) uses survey and census data for two large California regions and concludes that the size of cultural economies is underestimated if confined to for-profit cultural industries. Olfert and Partrigde (2011) test an index of community-level ethnic diversity against the location decisions of workers in the culture occupations and find that greater ethnic diversity is consistent with a higher cultural occupations share in urban communities and the culture workers' share in an urban community appears highly persistent. Kloosterman and Trip (2011) use an analysis of the project plans, as well as a series of interviews in the case of Amsterdam and Rotterdam to get a better picture as to

how notions of quality of place play a role in the design of these areas and their immediate surroundings. Following van Duijn and Rouwendal (2013) investing in cultural heritage could be a powerful policy tool to attract highly educated households and stimulate growth. The authors used residential sorting model for studying household location choice on Dutch data and made clear that the success of a city does not only depend on job opportunities and transport facilities but also on cultural heritage as well.

Due to the rapid development of the issue approaches to the interpretation and analysis of culture of regions and towns are getting increasingly variegated. Culture is a key element of regional and urban economy; the interpretation and measurement of territorial cultural capacity has become one of the main fields of interest in regional and urban economics. It means that more attention should be given to further explorations in connection with the attributes of culture and the development of regions and towns in economic analyses.

Our primary interest is in giving an overview of the segments of culture in Hungary and presenting some empirical investigations. By attributes or segments of culture we mean all those amenities and activities that relate a relatively comprehensive approach to community culture. During the analyses we used multivariate statistical methods. The analyses were focussed on the year 2010 and during the data processing the software package SPSS 20.0 was applied. The data and the results of the factor analysis are mapped and explained in Section 2. The results of the K-Means cluster analysis are reported in Section 3. We made efforts to make comparisons with results gained under complex inquiries of regional development in Section 4. The conclusion of the study in Section 5 attempts to highlight some critical issues concerning our observations.

2   Attributes of culture: results of the factor analysis in Hungarian micro-regions

The system of planning-statistical regions in Hungary was enforced by Act XCII of 1999, but the structure of NUTS 1 was created according to Regulation No. 1059/2003/EC of the European Parliament and the Council. According to the regulation three larger territories were worked out on the first level of NUTS: Central Hungary, Transdanubia, Great Plain and North. The most developed part of Hungary is Central Hungary, comprising the capital, Budapest. Western areas (Transdanubia) are generally more developed than the eastern part of Hungary (Great Plain and North); it means that a west-east split can be observed. The disparities are apparent in settlement structure, demographic trends, state of economic development and quality of life but it has not been clarified yet whether there are disparities concerning the attributes of culture. In our case study we focus on Hungary's micro-regions which were established in the Annex of Act CVII of 2004 on micro-regional association of municipalities. According to the Annex modified in 2007, Hungary's micro-regions for regional development consist of 174 units (Figure 1).

Figure 1 Statistical micro-regions in Hungary (see online version for colours)

Source: Hungarian Central Statistical Office (2008)

Hungarian Central Statistical Office has been collecting and publishing data from different themes. The Hungarian regional statistical database comprises nearly 30 indicators in connection with culture which promotes a possible exploration of the cultural characteristics of micro-regions but unfortunately all segments of culture cannot be measured and analysed.

Our method applies a complex indicator system. If we intend to offer a clear portrait of the attributes of culture regarding the Hungarian micro-regions, we will need an examination encompassing multiple features and determinants on a local scale. It means that we must elaborate a system of indicators comprising at least of the following segments and components:

- institutions and infrastructure of culture (e.g., public institutions, museums, libraries, cultural sites, monuments, personal computers and internet subscriptions)

- participation in cultural activities (e.g., cinema and theatre spectators, library visitors, participation in various cultural events and in creative arts communities)

- characteristics of cultural sector (e.g., registered enterprises in scientific sector, in arts, entertainment and leisure sector and in education, employees and students at institutions of higher education, patent applications).

However, we decided to analyse the Hungarian micro-regions, Budapest, the capital of Hungary was excluded from further evaluations due to the outliers. It means that 173 micro-regions were included in the multivariate analysis. Around 30 relevant variables were contained in the initial database. Selecting potential indicators with the help of factor analysis lead to the relevant indicators that finally serve as the basis of the analysis. The suitability of available information was studied by different methods and

statistics of factor analysis. After accomplishing selection and weighting we received a database that is in line with the attributes of culture and that contains 26 standardised and weighted indicators. As a result of the Varimax rotation method we were able to plot our original variables across four factors (Table 1).

Table 1   The results of the factor analysis

Factors and variables	Rotated components
Factor no. 1.: 'Cultural sector, education and entertainment'	
1 Number of registered enterprises in scientific sector per 1,000 inhabitants	0.876
2 Number of cinema visitors per 1,000 inhabitants	0.796
3 Number of employees at institutions of higher education per 1,000 inhabitants	0.774
4 Number of registered enterprises in arts, entertainment and leisure sector per 1,000 inhabitants	0.772
5 Number of movie screenings per 1,000 inhabitants	0.772
6 Number of students enrolled at institutions of higher education per 1,000 inhabitants	0.765
7 Number of registered enterprises in education sector per 1,000 inhabitants	0.758
8 Number of internet subscriptions per 1,000 inhabitants	0.707
9 Number of cable TV subscriptions per 1,000 inhabitants	0.702
10 Number patent applications per 10,000 inhabitants	0.550
Factor no. 2.: 'Participation in forms of culture'	
1 Number of creative art communities per 1,000 inhabitants	0.831
2 Number of participants in creative art communities per 1,000 inhabitants	0.803
3 Number of regular cultural activities per 1,000 inhabitants	0.767
4 Number of cultural events per 1,000 inhabitants	0.732
5 Number of participants engaged in regular cultural activities per 1,000 inhabitants	0.608
6 Number of participants in cultural events per 1,000 inhabitants	0.594
Factor no. 3.: 'Museums and public institutions'	
1 Number of museum exhibitions per 1,000 inhabitants	0.757
2 Number of museums per 1,000 inhabitants	0.746
3 Number of monuments and cultural sites per 1,000 inhabitants	0.683
4 Number of museum visitors per 1,000 inhabitants	0.646

Notes: Eigenvalues over 1, rotation method: varimax with Kaiser normalisation,
        KMO measure of sampling adequacy: 0.757,
        Barlett's test of sphericity: $\chi2 = 3880.216$; df = 325; p = 0.00,
        Measure of sampling adequacy: between 0.520 and 0.916,
        Total variance explained: 62.209%

    Source: Own calculations, Hungarian Central Statistical Office (2008)
                Territorial Database

Table 1   The results of the factor analysis (continued)

Factors and variables	Rotated components
Factor no. 3.: 'Museums and public institutions'	
5 Number of public institutions with library per 1,000 inhabitants	0.628
6 Number of public institutions with computer network per 1,000 inhabitants	0.460
Factor no. 4.: 'Infrastructure of culture'	
1 Number of PCs per 1,000 inhabitants	0.885
2 Number of internet users per 1,000 inhabitants	0.843
3 Number of public libraries per 1,000 inhabitants	0.663
4 Number of cultural institutions per 1,000 inhabitants	0.540

Notes: Eigenvalues over 1, rotation method: varimax with Kaiser normalisation,
KMO measure of sampling adequacy: 0.757,
Barlett's test of sphericity: $\chi 2 = 3880.216$; $df = 325$; $p = 0.00$,
Measure of sampling adequacy: between 0.520 and 0.916,
Total variance explained: 62.209%

Source: Own calculations, Hungarian Central Statistical Office (2008)
Territorial Database

Containing ten variables, the factor 'cultural sector, education and entertainment' gives an overview on the number of officially registered enterprises that are related to the cultural segments and provides reliable figures on the number of employees and students in higher education, as well as statistics on the population's internet and cable TV subscriptions and cinema attendance. The components of factor no. 1 highlight the fact that the conditions of higher education are more favourable in those micro-regions where there are several enterprises concerning the cultural sectors. According to the factor scores, micro-regions of large or middle-sized cities and near the Hungarian capital show the finest results. It is by no means a surprise since as a rule these micro-regions have institutions of higher education and enterprises in scientific, education and arts sector. However, several micro-regions in the Great Plain and North Hungary along with some micro-regions near the borders are lagging behind, especially in South Hungary [Figure 2(a)].

Factor 'participation in forms of culture' includes six indicators. The factor reflects that participation in forms of culture is higher in micro-regions that do not have large cities than elsewhere. Consequently, the participation in forms of culture especially in creative art communities and regular cultural activities is a rural rather than an urban phenomenon. However, micro-regions of West, Central and South Transdanubia have the highest scores; Northeast Hungary is markedly lagging behind [Figure 2(b)].

It can be established that there is not significant correlation between the participation in forms of culture and the factor 'museums and public institutions'; the second and third factors are not interrelated according to the factor analysis. It is observed that micro-regions with the highest scores are located in Central Transdanubia but other micro-regions with relatively high scores do not form a contiguous area. The same is established for micro-regions that are lagging behind; however, micro-regions situated near Budapest have scores below the average, such regions are found scattered almost all over Hungary [Figure 2(c)].

Finally, the factor representing 'infrastructure of culture' integrates four variables. This dimension reflects a spatial structure which lends itself to differentiation and can be characterised with larger territorial units; micro-regions of West Transdanubia along with some South Transdanubian and North Hungarian micro-regions show a marked contrast to micro-regions near Budapest and in the Great Plain. In this respect, a virtual split running from the west to the east can be observed [Figure 2(d)].
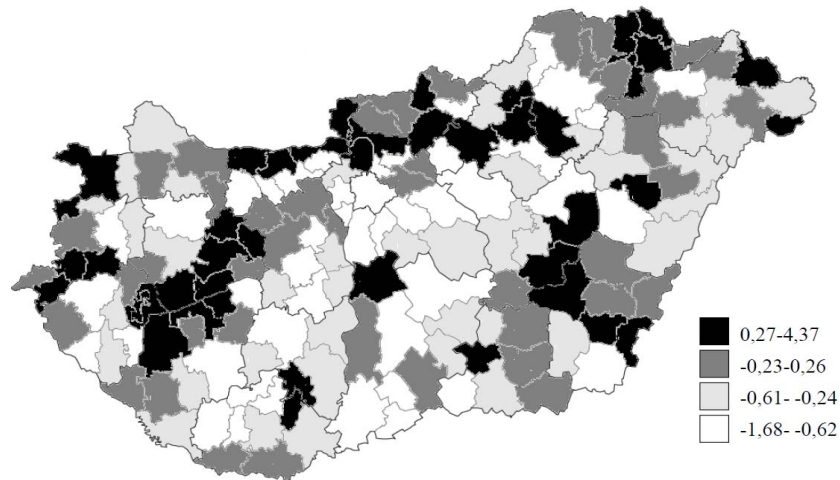
Figure 2   Factor scores of Hungarian micro-regions (a) Factor no. 1 (b) Factor no. 2
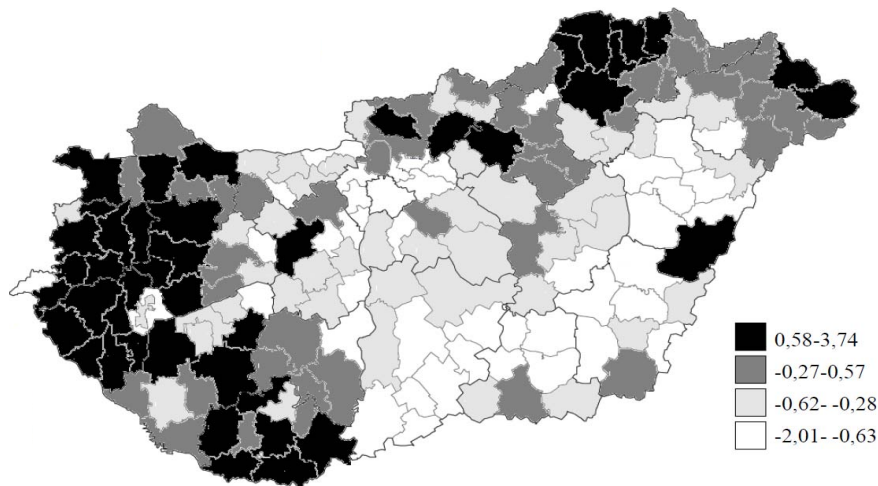   (c) Factor no. 3 (d) Factor no. 4

(a)

(b)
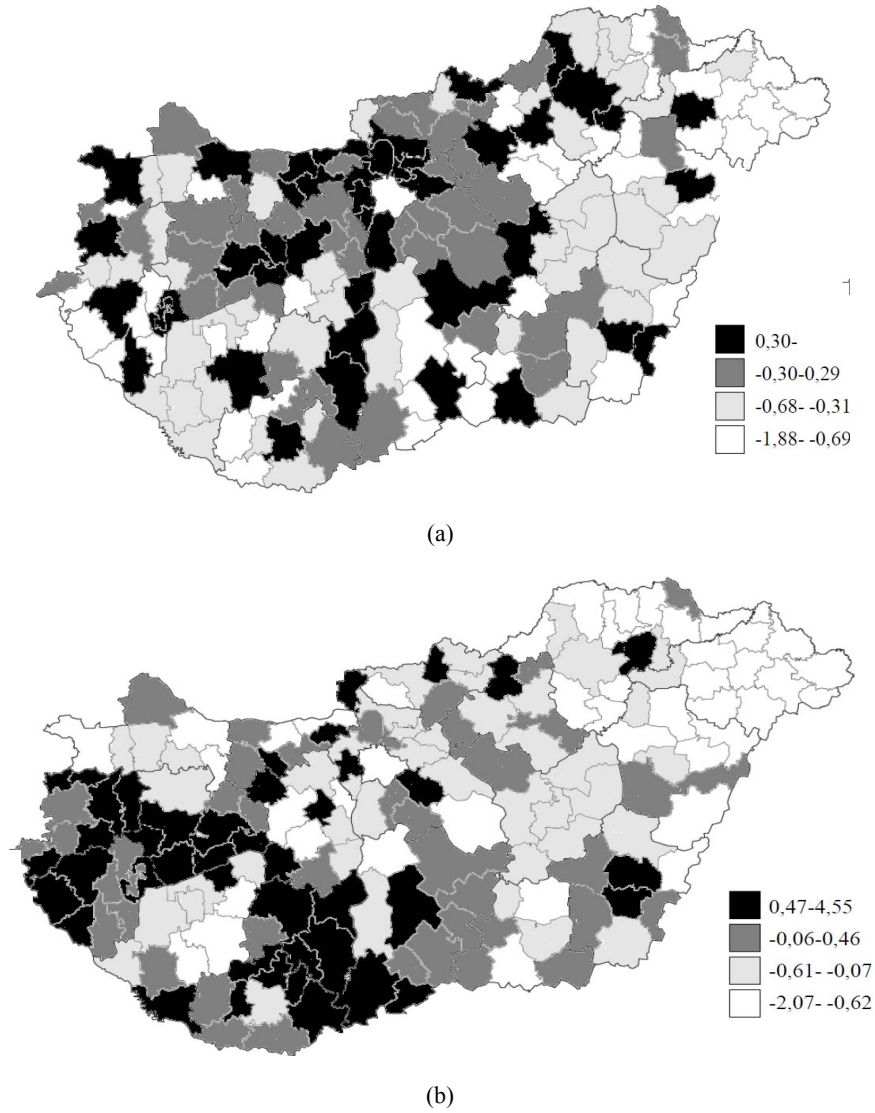
Source: Own calculations

Figure 2 Factor scores of Hungarian micro-regions (a) Factor no. 1 (b) Factor no. 2
(c) Factor no. 3 (d) Factor no. 4 (continued)


(c)

(d)

Source: Own calculations

3 Classification of Hungarian micro-regions

In the following, Hungarian micro-regions are analysed in cluster forming using the standardised values of the four factors. Territorial units are categorised with K-means cluster analysis based on Euclidean distance. The objective is to create homogenous groups of micro-regions with special regard to the attributes of culture. Following an assessment of several possible numbers of clusters, we decided to have the set of micro-regions broken into five groups; therefore, it seemed the most supported solution

(Figure 3). We paid attention to identify the cluster centres and the main characteristics of each clusters, too (Table 2).

Figure 3   Typifying the 173 micro-regions based on k-means clustering

Cluster 1. (24)
Cluster 2. (13)
Cluster 3. (11)
Cluster 4. (28)
Cluster 5. (97)
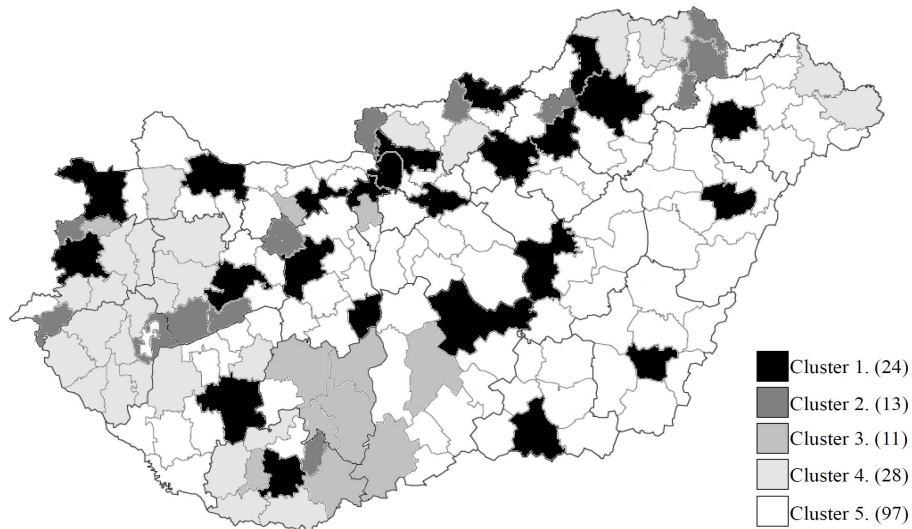
Source: Own calculations

Table 2   Final cluster centres

Clusters	N	Cluster centres							
		Factor no. 1		*Factor no. 2*		*Factor no. 3*		*Factor no. 4*	
1	24	2.01	High	–0.31	Medium	0.04	Medium	0.26	High
2	13	–0.31	Medium	0.72	Medium	2.69	High	–0.04	Medium
3	11	0.03	Medium	2.17	High	–0.69	Low	–0.33	Medium
4	28	–0.46	Medium	0.07	Medium	–0.17	Medium	1.51	High
5	97	–0.33	Medium	–0.29	Medium	–0.24	Medium	–0.46	Medium
Total	173								

Notes: When categorising the data into the groups of 'high', 'medium' and 'low',
       we relied on the trisection points (33.3%, 66.7%),
       N = number of micro-regions

Source: Own calculations

Upon a comparison of mean values, five types of Hungarian micro-regions can be created:

- *Cluster no. 1:* Hubs of considerable cultural capacities. In this group, the majority of micro-regions include a large or a medium-sized city. The main characteristic of the group is the presence of cultural sectors, educational and entertainment facilities and high-quality cultural infrastructure can be regarded, too.

- *Cluster no. 2:* Micro-regions with considerable capacities in museums and public institutions. This group includes micro-regions that score above the average

concerning cultural events and cultural activities, but the group members have moderate capacities regarding the cultural sector, the participation in forms of culture and the infrastructure of culture.

- *Cluster no. 3:* Micro-regions with considerable capacity in participation in forms of culture. However, the cluster contains micro-regions with high capacities concerning the participation in forms of culture; they are in a poor position with respect to the availability of museums and public institutions. The majority of these micro-regions are located in South Transdanubia.

- *Cluster no. 4:* Micro-regions with average (moderate) cultural capacities. Micro-regions fall into this group that perform average in each dimensions. The core of the category is composed of the micro-regions in West Transdanubia but some scattered examples can also be found in South Transdanubia and Northern Hungary.

- *Cluster no. 5:* Developing or culture-deficient regions. Containing a large number of micro-regions the group lags behind in terms of all dimensions. The members of this cluster are situated in the Great Plain, but some micro-regions of Central Transdanubia belong here, too.

4   Correlation between the attributes of culture and the development of micro-regions

As the last goal of the study, we sought to find out as to how groups defined with the cluster analysis are in line with the development of Hungary's micro-regions. The development of micro-regions reflects economic, infrastructural, social and employment-related features at the same time and was published by the Hungarian Central Statistical Office in 2008 (Figure 4).

**Figure 4**   Development of micro-regions
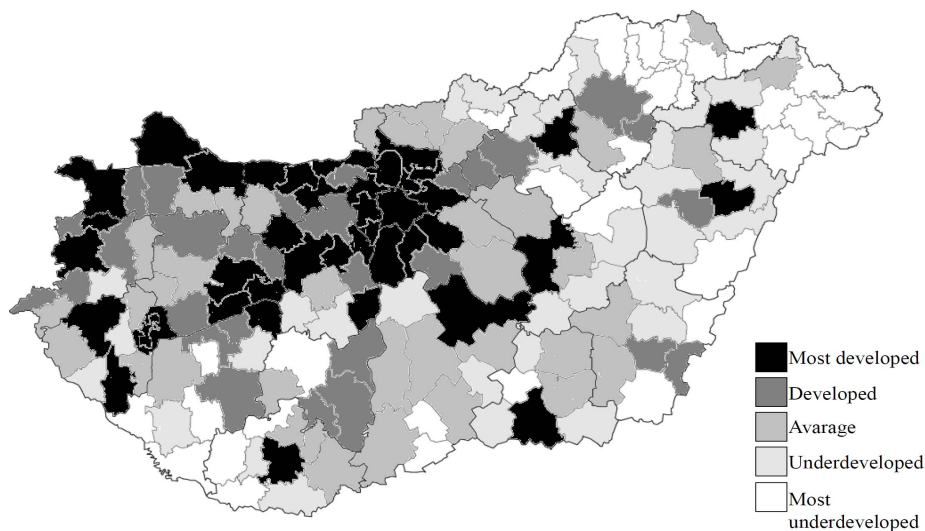
Source: Hungarian Central Statistical Office (2008)

The correlation between the development of micro-regions and the attributes of culture was studied separately for the four factors. Following Taylor's (1990) interpretation of the correlation coefficient we establish the followings:

- For factor no. 1, the correlation coefficient represents a moderate (modest) correlation with the development of micro-regions (R = 0.655; p = 0.00) which means that the correlation between the cultural sectors and educational and entertainment facilities and the development of micro-regions are having an important effect on each other.

- For factor no 2, the correlation coefficient is not meaningful (R = 0.278; p = 0.00) which reflects that the relationship between the participation in forms of culture and the development of micro-regions is weaker than the average.

- For factors no. 3 and no. 4, a weak (low) correlation was established, which means that there is no significant correlation between the availability of museums and public institutions, the infrastructure of culture on the one hand and the development of micro-regions on the other hand.

A map was also compiled to illustrate the relationship between the development and the attributes of culture in the case of micro-regions (Figure 5).

Figure 5   Combined typing of attributes of culture and development of micro-regions
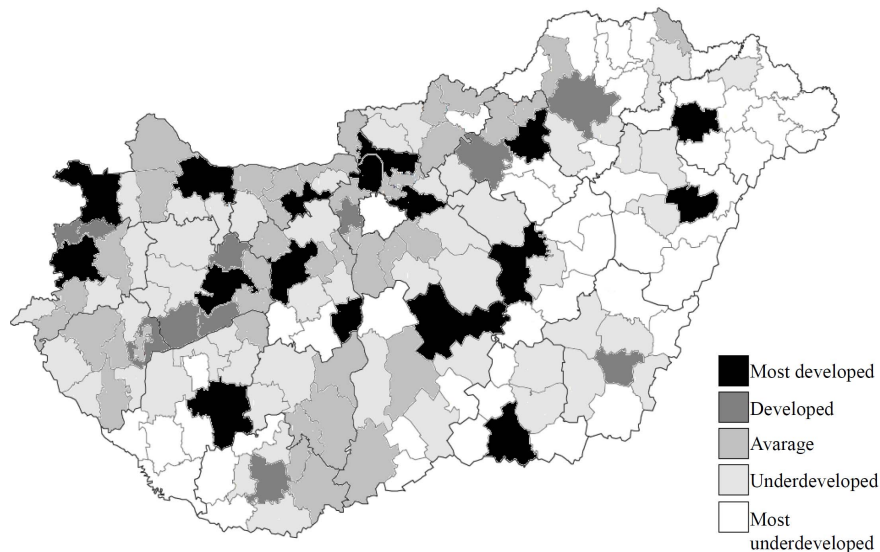
Source: Own calculations

In this research, those micro-regions qualified as 'most developed' ones which in terms of development fell into the 'most developed' category and were categorised as a micro-region in the first cluster. The 'developed' group includes micro-regions that are 'developed' or 'most developed' according to the Hungarian Central Statistical Office and have 'considerable cultural capacities in museums and public institutions' or 'considerable cultural capacities in participation in forms of culture' at the same time. The 'underdeveloped' cluster of micro-regions was defined along two main principles.

On the one hand, a micro-region is 'underdeveloped' if it is 'underdeveloped' following the Hungarian Central Statistical Office and qualifies as 'developing or culture-deficient micro-regions' simultaneously. On the other hand, a micro-region is 'underdeveloped' if it qualifies as 'average' micro-region according to the Hungarian Central Statistical Office yet fall into the category of 'culture-deficient regions'. The 'most underdeveloped' group includes micro-regions where underdevelopment is accompanied by cultural deficiency; these micro-regions are in an unfavourable position in every dimension. All other micro-regions were classified in the 'average' group.

As the result of the analysis, we managed to identify 17 micro-regions that are among the leaders regarding the development and properties of culture. The majority of these micro-regions include a large or a medium-sized city. Micro-regions of the second group are located close to the 'most developed' micro-regions; it means that real cultural relations may cross micro-regional boundaries; therefore, the cultural capacities may derive from the spillover effect of the neighbouring micro-regions. A great number of micro-regions is to be found in the 'underdeveloped' or 'most underdeveloped' categories (51 and 53 micro-regions) which reflects a correlation between underdevelopment and the lack of attributes of culture. The majority of the 'most underdeveloped' regions are located in East, Northeast and Southwest Hungary.

5 Conclusions

The paper attempted to overcome the difficulty of measuring the properties of culture in Hungarian micro-regions. The objective was to give an overview of a topic that suffers from a lack of data. By all means, the scope of statistical data fails to cover the real content of the cultural economy. Due to the limits of data collection this study cannot be compared with a cultural research where information gained with quantitative and qualitative tools are both at hand. A part of the limitations inherent in the applied approach derive from the sub-national level analysis. Related to the measuring of attributes of culture, an uncertainty is apparent concerning what to measure and what do we really taken into account.

Our analysis explored without doubt that a large number of micro-regions do not possess the means needed to establish adequate cultural environments that are required for the development of the economy. We intended to offer a categorisation based on cultural capacities. The analysis shed light on the differences of the most important mid-level or high-level centres and the rural regions lagging behind. The cultural 'engines' are the micro-regions of county centres and towns with county authorities. According to the cluster analysis more than half of the Hungarian micro-regions have average or worse parameters in all dimensions while another 20% fights such a trend. These results were corroborated by the simultaneous analysis of attributes of culture and development. Interestingly, participation in forms of culture is related to rural spaces; yet with regard to this dimension there are marked contrasts and enormous disproportions, especially between West and East Hungary. In the future, micro-regions with considerable cultural capacities can increase their cultural performance while micro-regions with relatively weak cultural capacities may fall behind.

In our opinion we received a new approach to explore and evaluate Hungarian territorial disparities. The essence of the method is that it analyses territorial disparities based on the properties of culture, but the survey also demonstrated that Hungarian

micro-regions are in very different phases of development; consequently their further development can only be improved by clear strategies.

Without any doubt the demand related to cultural goods and services emerges in all territories, yet the satisfaction of culture-related demands continues to be related to major centres. With this regard, a very important question arises: how can the culture generated by urban areas be extended to rural areas in order to improve the balance of the two areas? Culture still has to demonstrate its significance to wider policy concerns in Hungary. Presently it seems that Hungarian decision-makers have to realise the connection between culture and regional and urban development. An appropriate policy that attributes great importance to the segments of culture can by all means contribute to the preservation of the conditions and infrastructure of culture, to the support of cultural activities, sectors and participation. To have social impacts beyond the Hungarian micro-regions with large and medium-sized cities traditionally associated with high-culture, the arts must reach a wider population in rural areas. Matarasso (1997) reported on the success of Finnish projects and pointed out that the participation in the arts could have a positive impact on the development of skills, creativity and imagination. There is a need for strong focus on the importance of cultural activities in formal education in Hungary and the correct usage of some cultural principles can also contribute to the quality of life.

The results necessarily call for the continuation of research. This study can nevertheless provide an adequate basis for further inquiries on the subject of 'cultural economy'. It is worth to study and evaluate attributes of culture not only in a domestic but in an international context as well. It is to be emphasised that our variables ought to be taken into account for the purposes of the examination of territorial competitiveness.

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