

## Spatial Perspective of Creative Industries in Slovakia

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### Abstract

*Concepts of creative industries and their potential in facilitating urban and regional development are frequently discussed topics in both academic and public policy domain. Paper analyses and presents several spatial dimensions of individual creative industries in Slovak Republic, focusing on their tendencies to concentrate and form clusters on different levels of spatial units as well as inter-industry colocalization. Methodology is based on the combination of traditional (location quotient, Gini coefficient) and newer (Moran's I, LISA - Local indicators of spatial association) methods of spatial analysis. To minimize bias resulting from aggregation of information (considering we conceptualize space as discrete in the paper), nodal regions defined on the basis of interconnections and relationships between municipalities were chosen as opposed to statistical units. Proxy variable – number of entities according to NACE 4-digit classification was used since data on employment are not available on the given level. Results showed a significant tendency of creative entities to concentrate in certain regions and establish clusters, predominantly in highly urbanized regions, where they benefit from agglomeration effects. Results also indicate significant propensity among certain creative industries towards colocalization, which may result not only from similar localization factors of respective industries, but also from inter-sectoral spill-over processes.*

**Key words:** spatial analysis, concentration, agglomeration, colocalization

**JEL Classification:** R12

### 1 Introduction

Spatial dimension, where economic activities are realized, have recently been at the center of attention of many economists and researchers. Space and its components and characteristics affect and shape the location of economic activities and creative industries are not an exception to the rule. Regardless of whether the topic is examined from the perspective of creative industries or creative class, most authors (Florida, 2003, Andersson 1985, Scott, 1997) agree that creative industries and individuals belonging to the creative class tend to concentrate in cities, assumption also confirmed by several empirical studies (Lorenze, Vaarst Andersen, 2007), claiming that in fact it is the urban environment that has a unique set of location factors that attract creative individuals and creative industries.

Lazzaretti (2009) identifies several groups of factors that determine the concentration of creative industries in space. The first is the presence of cultural and historical heritage, which Campagni (2009) considers a component of the territorial capital, by quality of which he seeks to explain regional development disparities. When assessing the impact on the concentration of creative

industries, according Campagni and Lazzaretti, the concentration of cultural and historical heritage implies the importance of the place in a particular aspect, whether on regional, extra-regional or even on a global scale.

The second factor is the agglomeration effects, i.e. benefits from the concentration of economic entities and other institutions and organizations in space. It can be, however, assumed that the different nature of the individual creative industries also conditions different localization factors when accounting for benefits from the concentration. Taking advantage of positive externalities is a specific driver behind the concentration of creative industries, especially in terms of knowledge transfer (Raspe and Oort, 2008) and spill-over effects, which causes the clustering of creative industries or specific entities. Entities grouped in such cluster achieve competitiveness on external markets thanks to their ability to exploit localized knowledge spill-overs, concentrated specialized workforce and specialized institutional support systems, their concentration and spatial linkages allowing them to share both tacit and explicit knowledge (Vang, 2007).

## 2 Methodology and Data

The aim of the paper is to examine the localization behavior of the creative sector industries in terms of their spatial distribution, tendency towards concentration and the tendency to locate close to each other, which we will refer to as colocalization. Spatial clusters of creative industries in Slovakia will be identified as well.

When examining the spatial aspects of economic activities, relevant literature proposes two most common approaches. According to first, the space enters the analysis as a continuous variable, and the concentration of economic entities is usually measured using their spatial coordinates (Duranton et al., 2002). Methods based on this approach are challenging due to the limited accessibility of required information pertaining to individual economic entities. Because of this, in most studies focused on spatial localization and concentration of economic activities, space is regarded as a discrete variable.

This approach entails the segmentation of space in which the phenomenon is studied into spatial units that commonly represent statistical units, which is methodically relatively simple, given the nature and extent of required input (the majority of statistical data is aggregated at a certain level of spatial units). Methods based on this approach also impose certain challenges that need to be taken into account. Generally, the problems arising from discrete understanding of space are referred to as MAUP – modifiable area unit problem. Applying several statistical methods on one problem, Arlinghaus et al. (1996) demonstrated that the spatially aggregated input data can generate different results at different levels of aggregation (using linear regression model as illustration, they found statistically significant dependence of independent and dependent variables in the opposite direction at different levels of space).

In relation to the MAUP issue, we posit that this problem is not solely of methodological nature. The fact that statistical methods generate different results may reflect the actually different relationships in observed phenomena at different levels of space, which is certainly true when examining the localization tendencies of economic activities (e.g. shops with similar product

range have a tendency to concentrate in business districts or malls, but inside of them, they tend to disperse). Assertion that individual localization factors and agglomeration effects influence the concentration of economic entities at different levels of space with different intensity, in specific cases even diametrically differently, has been backed by several case studies (Yang, Ettema, 2012, Combes et al., 2008, Billings, Johnson, 2012), dealing with the methodological requirements for indicators quantifying the aforementioned phenomena.

In addition, spatial units are considered to be independent, which can significantly affect the credibility of the results. Regionalization of Slovakia on the county level is not appropriate in terms of the problem being analyzed in this paper. There is significant inherent variability in individual counties, since as administrative districts counties ignore the natural boundaries in the settlement structure. As one of the ways to address these problems, available literature recommends choosing the appropriate territorial aggregation. We decided to apply the regionalization according to Slavík (2005), who divides the territory of the Slovak Republic into 160 microregions (nodal regions are attributed with more coherent structure, as they were defined on the basis of interconnections and relationships among residential units).

Methodology of quantifying and measuring the localization behavior of economic entities, their concentrations and identification of clusters was conceptualized based on the recommendations of Guillain and Le Gallo (2007). Spatial aspects of creative industries are analyzed at the microregional level (spatial concentration tendency) and regional level (agglomeration tendency). Localization quotient values measured at the microregional level is the main input data, calculated using proxy indicator – the number of entities, as opposed to the more common industry output or employment indicators, which are not available at the municipal level. However, using this indicator, we can expect some degree of bias. Spatial concentration at the microregional level is measured applying Gini coefficient of concentration:

$$G_o = \frac{\Delta}{2L\bar{Q}}$$

Where:  $\Delta = \frac{1}{n(n-1)} \sum_{i=1}^n \sum_{j=1}^n |LQ_i - LQ_j|$ ; for  $n = 1, 2, \dots, 160 \wedge i \neq j$

$$\bar{LQ} = \frac{1}{n} \sum_{i=1}^n LQ_i; \text{ for } n = 1, 2, \dots, 160$$

Agglomeration tendency of creative industries at the regional level (i.e. spatial autocorrelation) was assessed on the basis of the global Moran's I statistic:

$$I_o = \frac{n}{\sum_{i=1}^n \sum_{j=1}^n w_{ij}} \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} (LQ_i - \bar{LQ})(LQ_j - \bar{LQ})}{\sum_{i=1}^n (LQ_i - \bar{LQ})^2}; \text{ for } n = 1, 2, \dots, 160 \wedge i \neq j$$

Where  $w_{ij}$  is the spatial weights matrix generated for type queen criterion for neighborhood in 1st order of contiguity, which takes into account all neighboring territorial units.

Specific spatial clusters of creative entities were identified by LISA – local indicators of spatial association, namely univariate local Moran's I:

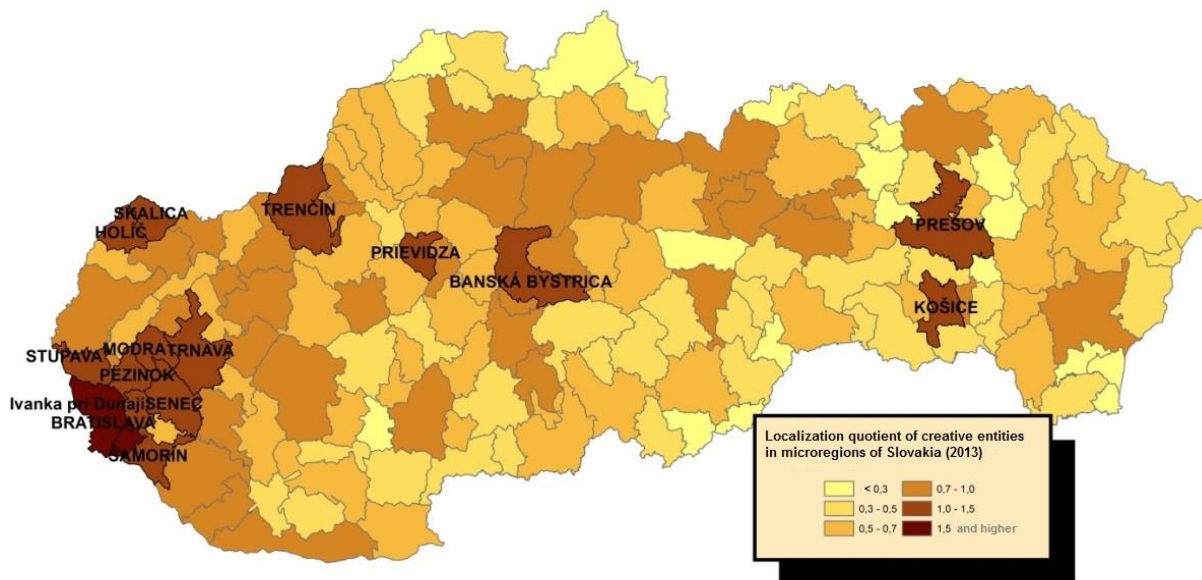
$$I_{oi} = \frac{LQ_i - \overline{LQ}}{\frac{\sum_{j=1}^n (LQ_j - \overline{LQ})^2}{n-1} - \overline{LQ}^2} \cdot \sum_{j=1}^n w_{ij} (LQ_j - \overline{LQ}); \text{ for } n = 1, 2, \dots, 160 \wedge i \neq j$$

The propensity of the individual creative industries entities for bilateral colocalization at microregional level was analyzed using simple correlation analysis (Kendall correlation coefficient) while the observed variable was the localization quotient.

Data on structure and size of the creative sector in Slovakia were obtained from the Register of economic subjects. Only entities belonging to private and non-profit sector were considered, while entities belonging to the public sector, e.g. state-owned enterprises (excluding contributory and budgetary organizations) were not taken into account.

### 3 Localization Tendencies of Creative Industries in Slovakia

Analyzing local values of localization quotient at microregional level, over-proportional concentration of creative entities was identified in Bratislava and several surrounding microregions, also in Holíč, Skalica, Trenčín, Banská Bystrica, Prešov and Košice.



**Fig. 1 Localization quotient of creative entities in microregions of Slovakia (2013)**

Source: own elaboration based on data RES SR (2013)

Fig. 1 shows evident polarization of Slovakia in west - east direction, while creative industries concentrate in western Slovakia. Below-average share of creative industries was also identified in peripheral regions, mainly in southern parts of the republic and in the most northern microregions. It can be asserted that the observed imbalance to a certain degree reflects disparities in other performance indicators. We determined significantly above average concentration in microregions were regional seats are located (Bratislava, Trnava, Trenčín, Banská Bystrica, Prešov and Košice). This concentration may be caused not only by the size and number of cities in a given spatial unit and degree of urbanization in these microregions, but also by the fact that these are territorial administrative centers where universities, important museums

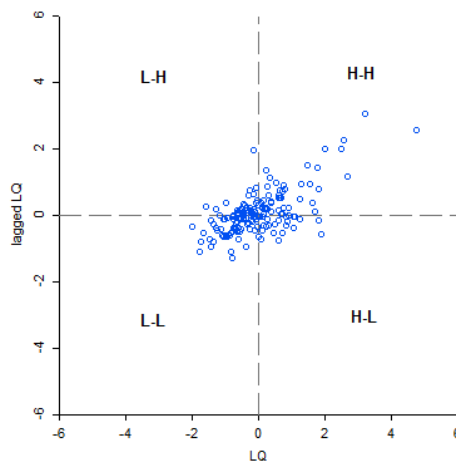
and other cultural facilities and public administration institutions are located, which were shown to be an important localization factors of creative industries in studies conducted in other countries. In urban areas, other than those already mentioned, localization factor of creative industries is probably the concentration of demand.

**Table 1 Concentration and agglomeration indicators of creative industries in Slovakia (2013)**

Creative industry	Gini coefficient of concentration	Global Moran's I	pseudo p-values of global Moran's I
Architecture	0,497	0,236	0,001
Digital media and entertainment	1	-0,003	0,080-0,110
Music, visual and performing arts	0,428	0,215	0,001-0,002
Marketing	0,333	0,344	0,001
Fashion design	0,640	0,317	0,001
Radio and television	0,881	-0,002	0,350-0,401
Software publishing	0,949	-0,047	0,142-0,189
Video, film and photography	0,369	0,307	0,001
Publishing	0,357	0,351	0,001
Crafts	0,412	0,155	0,001-0,006
Cultural and art education	0,450	-0,054	0,147-0,189
<b>Creative sector</b>	<b>0,264</b>	<b>0,447</b>	<b>0,001</b>

Source: own elaboration

Gini coefficient of concentration value (calculated at microregional level) and global Moran's I value (representing the spatial autocorrelation of microregional values of localization quotient) indicate that on microregional level creative industries are generally characterized by relatively weak tendency of concentration, but on the regional level have statistically significant agglomerating tendencies. Based on global Moran statistic and its values for individual creative industries, we argue that in regional context positive spatial autocorrelation dominates (clustering of similar localization quotient values in space). Random distribution of entities (the value of global Moran statistic approaches to the critical value -0,006, although statistically not significant) at the regional level was observed only in the case of these sectors: radio and television, software publishing and cultural and art education. We have to take into account the fact that the global Moran statistics do not reflect which values of variable, positive or negative, cluster in space.



**Fig. 2 Moran's scatter plot for normalized LQ values of creative entities on microregional level in Slovakia**

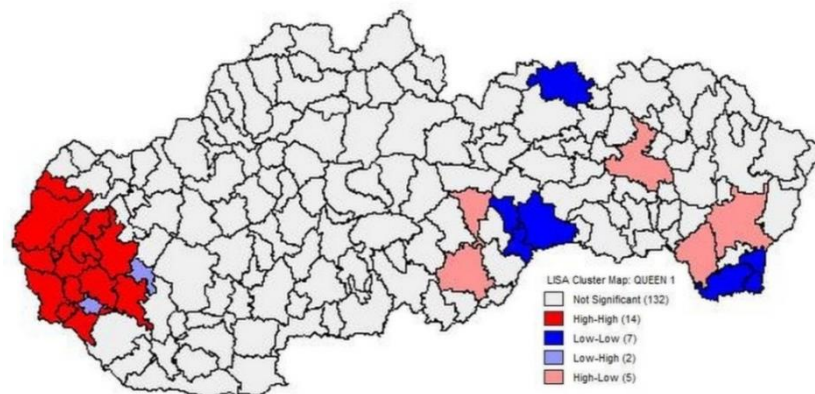
Source: own elaboration

Moran's diagram of dispersion (Figure 2) is graphical interpretation of spatial autocorrelation and its individual components. It shows values of observed variable and spatially lagged values of the variable – in this case, the values calculated for neighboring microregions. Quadrants in Moran's diagram indicate the proportion, with which different types of spatial dependence contribute to generation of the global Moran statistics value. The figure shows the existence of dependency between degree of creative industries concentration in one spatial unit and concentration in its neighboring units. It can also be pointed out that spatially clustered high values of LQ (HH quadrant) and spatially clustered low values of LQ (LL quadrant) account for large part of spatial autocorrelation present in the data set. Values in HL and LH quadrants signal the existence of outliers, i.e. microregions in which the concentration of creative entities is significantly higher or lower, respectively, than in their neighboring units. However, this spatial dependence may not be necessarily statistically significant at the local level.

Generally, at the regional level, agglomerating behavior is observed in entities of following sectors: video, film and photography, publishing, marketing and fashion design. Based on global Moran's statistic values we can assume that craft sector is localized rather randomly at the regional level (value is close to 0), a finding which is rather counterintuitive. Precisely for this reason we have to consider concentration measures and spatial autocorrelation measures together. For example, based on values of relevant variables (relatively high value of Moran's statistic and relatively low value of Gini coefficient of concentration) in marketing sector we can argue that on regional level the localization of economic entities is highly polarized, but in the context of these regional clusters the sector does not concentrate significantly. Radio and television entities, software publishing sector are dispersed in regional context, but significantly concentrated on microregional level. This leads to the assumption that entities concentrated in certain microregions produce mainly for the regional market. Economic entities in fashion design sector are highly concentrated in several microregions, but these microregions also create spatial cluster on the regional level.

#### 4 Clusters of Creative Industries at the Regional Level in Slovakia

The global Moran's I statistic indicates only whether spatial autocorrelation exists, but does not identify specific potential creative clusters in a given area. For this purpose the values of local Moran's statistic are analyzed in the following chapter.



**Fig. 3 Creative microregions agglomerations at the regional level (2013)**

Source: own elaboration

At the regional level, a cluster of creative entities was detected around Bratislava agglomeration (Figure 3). Although other significantly urbanized regions show over-proportional concentration of creative industries, for example Prešov and Košice, there is no statistically significant clustering of high levels of localization quotient present in their immediate vicinity. On the contrary, in the case of Prešov microregion high-low type of spatial dependence was identified, meaning that Prešov is an extreme in this context in the eastern part of the country. Based on these findings, we believe that Bratislava as a significant development pole in space has major impact on its surroundings and diffusion effects manifest, while the Prešov and Košice, although settlements with supra-regional influence, are currently still at the stage of contractive effects dominance, i.e. they are not sufficiently developed or matured to exhibit the same effects on a larger territory as Bratislava.

## 5 Colocalization of Creative Industries in Slovakia

Although it was proven in previous chapters that localization behavior of creative entities in individual sectors is not generally identical, some creative industries tend to form clusters at the regional level, which cannot be considered disjunct in space, suggesting that the localization of some creative industries is based on similar location factors, or that we could expect higher intensity of spill-over effects between the specific creative industries and other positive externalities. To determine which creative industries have similar localization behavior, correlation analysis of LQ measured on microregional level was conducted, identifying colocalized industries.

Kendall Tau b Correlation Coefficients, N = 160  
Prob > |tau| under H0: Tau=0

	Architecture	Digital_media	Music_arts	Marketing	Fashion_design	Radio_tv	Software_publ	Vid_film_photog	Publishing	Crafts	Art_education
Architecture	1.00000	0.05818	0.19293	0.41214	0.30954	0.26115	0.16231	0.27676	0.33792	0.14916	0.02201
Digital_media	0.05818	1.00000	-0.04625	0.05698	-0.01168	0.17001	0.07298	-0.02283	-0.00915	0.02624	0.08127
Music_arts	0.19293	-0.04625	1.00000	0.19318	0.37204	0.15313	0.20410	0.21927	0.26754	0.13960	0.11385
Marketing	0.41214	0.05698	0.19318	1.00000	0.34322	0.19252	0.21555	0.28712	0.40893	0.15474	0.09597
Fashion_design	0.30954	-0.01168	0.37204	0.34322	1.00000	0.11913	0.18964	0.19569	0.32569	0.09200	0.10062
Radio_tv	0.26115	0.17001	0.15313	0.19252	0.11913	1.00000	0.06459	0.18414	0.14730	0.06928	0.03329
Software_publ	0.16231	0.07298	0.20410	0.21555	0.18964	0.06459	1.00000	0.16098	0.17928	0.01917	0.14625
Vid_film_photog	0.27676	-0.02283	0.21927	0.28712	0.19569	0.18414	0.16098	1.00000	0.29458	0.24681	0.13225
Publishing	0.33792	-0.00915	0.26754	0.40893	0.32569	0.14730	0.17928	0.29458	1.00000	0.15846	0.08496
Crafts	0.14916	0.02624	0.13960	0.15474	0.09200	0.06928	0.01917	0.24681	0.15846	1.00000	0.12569
Art_education	0.02201	0.08127	0.11385	0.09597	0.10062	0.03329	0.14625	0.13225	0.08496	0.12569	1.00000

Fig. 4 Correlation coefficients of LQ values of creative industries in microregional structure of Slovakia

Source: own elaboration

Correlation analysis indicates that localization of crafts and cultural and art education is substantially different and determined by other mechanisms as opposed to other creative industries, which are each characterized by a statistically significant correlation coefficient. Absent concentration tendency in localization of institutions of education is easily explained by their dependence on the budgets of local and regional self-governments. Their relatively

dispersed localization in space is also the result of their public goods status in Slovakia, where ensuring equal access to education is imperative.

Propensity for colocalization is pronounced mostly among sectors of architecture, fashion design, marketing and publishing. Reasons behind colocalization of marketing and publishing sectors are rather apparent; in terms of localization behavior both are demand-oriented sectors, in addition to their inputs being almost identical. High interdependence in localization and concentration was observed between the fashion design industry and music, visual and performing arts industry; unsurprisingly, since these sectors are closely linked within the market (e.g. the important customer of fashion designers in the country's capital is the local music and performing arts community).

## **6 Conclusions**

The results of localization analysis presented in the paper largely support the theoretical assumptions about the spatial distribution of creative industries and localization behavior of creative entities, which tend to be concentrated primarily in the most urbanized areas of Slovakia, where they capitalize from agglomeration advantages that such environment provides, such as concentration of demand, but also the quality of infrastructure and supporting services. However, certain differences were identified in localization behavior between individual creative industries, whether on the microregional or regional level. In some cases, they exhibit tendency to concentrate on microregional level but significant agglomeration at the regional level is absent. These results support the argument that the chosen spatial unit in localization analysis is of the utmost importance with serious implications for design of methodology, since it tends to affect the results to a great extent. We, however, believe that fluctuations in results on different levels of space segmentation do not reflect problems exclusively of methodological nature, but also reveal real relationships between analyzed phenomena. This poses an imperative for addressing this issue when methods of localization analysis are applied. In a context of spatial distribution of creative industries (or any other economic activities for that matter) this would mean, for example, broadening the research to include individual settlements as spatial units. Another contribution of the paper is colocalization analysis, which tries to identify which creative industries tend to locate near each other. Significant colocalization is present among sectors of fashion design, publishing, marketing, architecture, music, visual and performing arts, implying the existence of spill-over effects between these sectors and/or similar localization factors. There is a clearly defined creative industries cluster in Bratislava agglomeration and surrounding microregions (the capital of the country has notable diffusion effect on the surrounding area).

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