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The Nexus between Creative Actors and Regional Development

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Abstract: The paper aims to deepen our understanding of the relationship and the impact of creative actors on regional development and investigates the nexus between them. The novelty of the paper lies in constructing an original criteria matrix of creative actors' indicators which might serve as a basis for further research and policy implications. The original criteria matrix consists of two groups of indicators measuring the creative people and creative capital in the region, their mutual relationships and impact on regional development. We found that creative actors are not distributed equally across the regions in Slovakia. The strong dominance of the region with the capital city (Bratislava) was detected. We also discovered a strong direct positive relationship between representatives of the creative people and a strong direct relationship between the creative people and the emergence of small and medium enterprises (SMEs).

Keywords: creativity; creative actors; criteria matrix; regional development; Slovakia



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1. Introduction

The origin of creative actors originates in the study of Andersson [1]. He defines creativity as the ability to combine knowledge and competence to create something new. This implies that desirable change is at the center of creativity. Moreover, creativity is essentially immaterial and enforceable. There are different types of creativity, e.g., scientific creativity, technological or innovative creativity, economic or entrepreneurial creativity, and artistic or cultural creativity (for more information see Florida [2]). Different types of creativity might be, to a certain extent, mutually dependent in the sense that they may stimulate, enhance, or reinforce each other when located in the same area, particularly an urban region. However, it is well known that artists such as painters, novelists, and poets may develop a high level of creativity also in rural areas and peripheral regions [3].

Creative places and regions have favorable conditions to develop innovative ideas, to design new forms of technology or architecture, to experiment with new business models in order to come up with original design, product, or marketing concepts, and thus to explore new roads to sustainable development [4] on condition that responsible behavior towards the environment is observed and a positive impact on society is achieved [5,6]. However, not all cities, regions, and even countries are able to use the opportunity for sustainable development based on creativity. Slovakia, for example, has currently zero absorption of financial subsidies from the EU funds aimed at the support of creative actors

in its regions. In other words, in Slovakia, not enough attention is paid to the importance and impact of creative actors on regional development, both at national and regional level. In addition, the interplay between creative actors remains scarcely investigated, especially from an empirical perspective. This is the research gap that we strive to fill in.

There is a lack of evidence and even empirical data available that might be utilized for identification and quantification of creative actors, their distribution, impact, and the nexus between them. Moreover, the relationship between creative actors in Slovakia has not yet been systematically assessed while just suggesting that the interaction between different types of creative actors favors regional development. Therefore, the objective of this paper is to identify the distribution of creative actors across the regions in Slovakia, to investigate the nexus between creative actors, and to evaluate their impact on regional development in Slovakia.

The paper is structured as follows: Section 2 conceptualizes the theory on creative people and creative capital. Section 3 is dedicated to creative actors and the ways how these can be measured. In this section, the details of our database are shown and the robust methodology is presented. The description of data sources and apparatus of mathematical and statistical methods employed for our research are carefully explained. Section 4 aims at presenting our original empirical research results. Based on the results from the two previous sections, the last section (Section 5) discusses the most important results, concludes policy lessons learnt, and suggests future steps for research.

2. Theoretical Foundations for Creative People and Creative Capital

Creativity in terms of developing creative ideas is the first step of knowledge or innovation production [7–9]. Karlsson [10] defines creativity as an intangible human resource. He adopts the definition from Boden [11] (p. 1) who defines creativity as ‘the ability to come up with ideas that are new, surprising, and valuable’. Glaeser [12] labels this ability as creative capital. Holders of creativity are people, creative people, or the so-called creative class. The twin notions of the creative people, or creative class and creative capital, were made popular by Richard Florida in his book *The Rise of the Creative Class* [2]. Florida claims that the creative class “consists of people who add economic value through their creativity” [2] (p. 68). When considering the characteristic of the creative class, it is stressed that its members engage in professions where the forming of new meaningful forms is typical. The best way of measuring creativity is by considering an individual’s profession [13]. Based on this assumption, Mellander and Florida [14] and Florida et al. [15] claim that a particular set of occupations compose the ‘creative class’, and that this measure of human capital outperforms the conventional use of educational attainment because it accounts for utilized skills rather than mere potential talent [14,16].

The creative class consists of the creative core and creative professionals. The creative core includes scientists and engineers, university professors, poets and novelists, artists, entertainers, actors, designers, and architects, as well as the “thought leadership” of modern society, namely non-fiction writers, editors, cultural figures, think-tank researchers, analysts, together with other opinion-makers. Beyond this core group, the creative class also includes creative professionals who work in a wide range of knowledge-intensive industries such as high-tech sectors, ICT, financial services, the legal and healthcare professions, and business management [2].

There is no doubt that human creativity should be used for the benefit of society as new ideas can generate economic profit [2,17–19], trigger necessary and more environment-centered thinking, and thus contribute to sustainable development. The creative class gives rise to new ideas, mobilizes the creative potential of places in the form of new products, services, information, technological innovations, non-technological processes, and outputs that generate creative capital that is increasingly important for the growth of cities and regions [20,21]. Florida [2] assumes that creativity is a driving force of economic growth and competitiveness of cities and regions. He emphasized that creative people are holders

of creativity from which their significant impact on society is derived. Creativity is thus perceived as a “driving force in regional economic growth and prosperity” [2] (p. xxvii).

Howkins [18], in his study, focused on the question how to transform creativity into money, profit, and capital. According to his theory, creativity itself does not have economic value. Therefore, it is necessary to transform creativity into a product that has a market value for buyers and active sellers. At the same time, he underlines that the basic legal rules must be followed. On the contrary, Mundelius [19] characterized creativity as a key factor in creating an economic profit due to an unrestricted comparison with other sources. These ideas resulted in the formation of so-called creative industries, represented mainly by business activities based on individual creativity, skill, and talent. Such an understanding of creative industries primarily include advertising, architecture, art, crafts, design, fashion, film, music, performing arts, publishing, R&D, software, toys and games, TV and radio, and video games [18]. Hence, if cities and regions want to be successful and competitive, they need to create suitable conditions for attracting and retaining creative people producing creative capital as these are considered the principal driver of economic growth and urban spatial development [2,20–23].

Florida’s theory of the creative class initiated a huge discussion among academics and was criticized by many of them (inter alia [24–29]). The critique is principally evolving around the impacts of Florida’s thoughts on (not) solving but rather increasing inequalities in cities. Peck [24] argues that the creative class theory is lacking causality; other authors talk about Florida’s too excessive attention on large cities [30] and underestimating the concentration of creativity in the lesser-sized cities and their creative milieu. In order to reflect on the criticism of the creative class and its methodology as proposed by Florida [18], the Australian Centre of Excellence for Creative Industries and Innovation developed a concept of creative trident [31]. According to this approach, the creative working population is divided into three groups of workers: workers with a creative job in creative industries, workers with a non-creative job in creative industries, and workers with a creative job outside creative industries (for more information see Throsby [32]). It seems that, as a society, we incline to this approach as creativity is nowadays an inevitable attribute in many professions and industries, and has become a highly-required competence. The creative and innovative potential and its gradual targeted use in cities and regions is becoming a key criterion when deciding on the establishment of new businesses producing higher added value, the formation of clusters and industrial parks, attracting tourists, or locating foreign investment. For example, in terms of locating foreign direct investment, the presence of creative actors in a region can make a positive contribution to the creation of patents, licenses, new technologies, and, in particular, major innovations.

Due to this process, there is also a synergistic effect in the form of so-called sectoral spill-overs. Creative actors themselves become the so-called core of the elements of regional competitiveness and are the bearers of internal competitive advantage. On the contrary, the absence of creative actors slows down these processes, and finally, in the long run, there is a decrease in competitiveness at the regional level [33,34]. All the above-mentioned are closely related to the development of the quaternary sector of the economy [35]. The recognition of the dominant role of creativity is based on radical changes in economic, social, and cultural structures in society [36]. Globalization and the increasing degree of interconnectedness have enabled people and companies to widen their geographical scope and to push product development and service production into new areas (inter alia [2,37–39]). Creative actors are representatives of creativity reflecting the above-mentioned challenges of the current world. For the purpose of this paper, we perceive creative actors as creative people and creative capital, while their identification and applied measures are precisely described in the next two sections.

3. Materials and Methods

3.1. Measuring Creativity

It was only recently that creativity became a relevant research topic. While the scientific debate on this issue is rich from a theoretical point of view, the same cannot be said about the related empirical evidence [40] which is still debatable [41]. A lot depends on definitions and measurement methods. Defining a level of creativity is indeed a very difficult task, essentially as the concept is a bit fuzzy, intangible, and moreover, of a multidimensional nature, and because obviously different types of creativity were defined [42]. The creativity research has mainly followed two pathways, namely the economic growth potential of creative sectors and the urban-geographical pattern of creative actors in cities [43]. There has been a growing debate on how to define creative industries and the creative class and how they develop at local and regional levels [44–46]. The works of several authors (inter alia [45–49]) show that creative industries and the creative class are enhancing the economic development at the local, regional, and consequently national level. However, there is less research trying to identify how different national and regional understandings, economic systems, and geographic and institutional contexts influence the way these industries work. We also do not know much about what type of policies should be implemented to support the development of creative industries and attracting and maintaining the creative class [43].

Florida [2] has also been deeply interested in measuring the creativity of individual geographical areas or cities. As Marlet and van Woerkens [50] (p. 2) state, ‘the creative class sets a better standard for measuring human capital’. Florida, together with his colleagues and research fellows, composed a creativity index based on four key components, namely Creative Class concentration, the High Technology Index, the Innovation Index, and the Diversity Index. The creative capital theory says that “regional growth comes from the 3Ts of economic development and to spur innovation and economic growth a region must have all three of them” [50] (p. 11). Numerous critiques of Florida’s approach appeared as the theory does not respect whether it fits the specific regional and urban settings or not [50]. To reflect this concern, the creativity index has undergone several significant changes and variations. Florida and Tinagli [51] extended the concepts and indicators of the Creativity Index. They developed new indicators for the creative class and competitiveness based on the 3Ts of economic development (Technology, Talent, and Tolerance). This index was further improved by Eurostat under the name the Euro-Creativity Index in order to solve shortages in the previous model based on 3Ts. The major shortcomings include a low amount of observed data, and the impossibility to exploit the proposed model for smaller regional units. A general lack of available data is undoubtedly the main flaw. On the other hand, the advantage of this model is its database based on the data from audits conducted by Eurostat which undertakes unified and measurable data for all European countries [52,53].

In order to reflect the lack of data at the regional level and different databases existing in various European countries, we created a modified index of creativity for the purpose of this paper that is, in our opinion, suitable for Slovakia. Our modified index of creativity is based on the 3T index (including the indicators for Talent, Technology, and Tolerance as defined by Florida [2]), and the Euro-Creativity Index. The comparison and modification of indexes including partial indexes is shown in Table 1.

The choice of criteria of the modified index is influenced by the availability of data and the intention to quantify creative actors. It consists of talent partial indexes (Creative Class Index, Human Capital Index); two indexes within technology (Research and Development Index and Innovation Index); and two indexes that belong to tolerance (Diversity Index and Bohemian Index). The modified index of creativity covers a wide spectrum of population related to creativity. Therefore, for the purpose of this paper, we perceive creative people as those whose work is related to creativity. Based on the previous studies, availability of secondary data and primary data, we set a criteria matrix of creative actors’ indicators focused on the identification and measurement of creativity in Slovak regions based on the

occurrence of creative people and their impact on the regional development via creative capital. We use indicators as follows:

- (1) A set of indicators identifying the creative people in a region:
 - The share of the creative class (CC), the share of the population with higher education (PHE), the share of inhabitants representing Bohemians (B).
- (2) A set of indicators identifying creative capital in the region, which is divided into three subgroups:
 - Intellectual property (IP) measured via the number of applications for patents (P), utility models (UM), designs (D), and trademarks (T);
 - Entrepreneurship (E) measured via the establishment of small and medium-sized enterprises in creative industries (SMECI) and outside the creative industries, marked as small and medium-sized enterprises in others (SMEOTH);
 - Innovation (I) measured via innovation activities of enterprises, namely innovation enterprises in creative industries (INCI), innovation outside creative industries, marked as innovations in others (INOTH), and innovation in enterprises with more than a 75% share of employees with higher education (INEHE).

Table 1. Modified index of creativity for Slovakia based on creativity indexes.

	3T Index	Euro-Creativity Index	Modified Index of Creativity for Slovakia
Talent	Human Capital Index Creative Class Index	Creative Class Index Human Capital Index Scientific Talent Index	Human Class Index Creative Capital Index
Technology	Innovation Index High-tech Index	Innovation Index High-tech Index Research and Development Index	Research and Development Index Innovation index
Tolerance	Gay Index Bohemian Index Immigration Index	Attitudes Index Value Index Self-expression Index	Diversity Index Bohemian Index

Source: [2,12,51,53–55].

As was pointed out by several authors (inter alia [2,18,19]), creative people are important as they give rise to ideas, information, and technology outputs that are important for the growth and urban development of cities and regions. The localization of creative industries is closely related to the location of people who work in creative professions. According to Florida [2], creative people move to creative cities with high-tech industries, fuelling creativity and innovation. The localization factors for creative people are the occurrence of universities, a community of successful entrepreneurs, business angels, and risk investors, and the presence of bohemians, immigrants, and generally a diversity of population. It truly seems that openness, tolerance, and open relationships are a magnet for creative people. Vaňová [56] adds that it is important to support the development of human talents and creativity, and to attract and show tolerance in relation to diversity. This approach forms the basis for the formulation of sustainable competitive and creative urban development strategies of municipalities, cities, or regions.

3.2. Research Hypotheses

This paper focuses on the study of the nexus between creative actors (creative people and creative capital), and their impact on regional development. The main objective of this paper is to identify the distribution of creative actors across the regions in Slovakia, to investigate the nexus between creative actors, and to evaluate their impact on regional development in Slovakia. The concept of the paper is based on robust methodology, extensive literature study, data collection and evaluation through a repertoire of mathematical and statistical methods. We set three research hypotheses:

Hypothesis 1 (H1). *The presence of creative actors contributes to regional development in Slovakia.*

Hypothesis 2 (H2). *The distribution of creative people across Slovak regions is not equal.*

Hypothesis 3 (H3). *There is a direct positive relationship between indicators of creative actors.*

3.3. Materials and Data

The formulation of the objective of the research and hypotheses is based on the analysis of human capital [57,58], and identification of its skills and qualities [59] focused on human talent and creativity [2,17–19]. Creative people have the ability to transform talent and creativity into a product or service with a certain value [18,19] and create creative capital in the form of new ideas and entrepreneurial spirit. In addition, creative people are able to respond to new challenges creatively [60]. Therefore, creativity is perceived as a crucial factor in spatial development [2,20,23,61,62]. For the success of a region or a city, it is essential to attract and maintain creative people in the region by using the proper methods and tools (for more information see for example [2,56,63,64]).

Determining and setting the criteria for evaluation of the significance and impact of creative people on regional development is based on the works of [2,18,21,65–70] and applied on the condition of the self-government regions in Slovakia (NUTS3 level). Criteria are based on a modified index of creativity, as depicted in Table 1 (please see above). Distribution of creative people in regions is evaluated via the population with a university degree and the creative class divided into three subgroups by ISCO 88 (Creative Core, Creative Professionals, and Bohemians).

By conducting research in Slovakia, we have encountered a similar problem as in many European countries, which is the lack of data at the national and regional level. Therefore, data mining required the usage of several databases, registers, and data sources, namely the state and regional strategies, the Population, home and housing census in the year 2011, several statistical surveys such as a selective statistical survey on the innovations in the years 2010–2012, 2014–2016 (Statistical Office of the Slovak Republic), register of organizations (the Statistical Office of the Slovak Republic), register of the Industrial Property Office of the Slovak Republic, the register and identifier of legal entities, entrepreneurs, and public authorities (the Data Center of the Ministry of Finance of the Slovak Republic). In order to obtain the data in the required form and quality, we also carried out primary research in the form of a survey and we conducted personal consultations at the aforementioned offices between October 2017 and April 2018.

3.4. Methods

As was mentioned in the introductory part, creators of creative capital are creative people with their talents and creativity. As creative people, we understand the creative class, in other words, a share of the population with a higher level of education and the representatives of bohemians. Consequently, we understand creative capital as a result of the activity of creative people. For the purpose of our paper, creative capital consists of indicators related to intellectual property, entrepreneurship, and innovation.

For the measurement of regional disparities or equality in distribution of creative people, we use the coefficient of variation that is a highly suitable method for making comparisons as it is not dependent on the magnitude of the measured values [71] (p. 201). Thus, this coefficient is suitable for measuring various variables and may be utilized. The variation coefficient (V_k) expresses how much of the arithmetic mean value represents the standard deviation. The higher the value, the greater the variability of the given set:

$$V_k = \frac{S_x}{\bar{x}}, \quad (1)$$

where S_x —standard deviation, \bar{x} —mean.

In order to investigate the nexus between creative actors, we opt for using correlational analysis, namely the Pearson correlation coefficient (PCC) and the Spearman correlation coefficient (SCC).

Creative capital is a result of the activity of creative people. Identification and quantification of creative capital in Slovakia is based on the criteria matrix as defined above. For the evaluation of the impact of creative people on the regional development, we created a modified index of creativity suitable for the conditions of Slovak regions. For the evaluation of the regions in Slovakia, we employed the methods of the multi-criteria decision analysis consisting of the following steps:

The identification and classification of indicators is based on the criteria matrix of creative actors' indicators as described above. For the purpose of our paper, we use maximization of the evaluation criteria, which indicates that a higher value means a better variant. Before processing the data, it was necessary to adjust the acquired data for the criteria innovation. Since the criteria values in the area of innovation were measured for the NUTS 2 level of the EU's statistical regions only, we decided to evenly allocate the criteria to each of the NUTS 3 regions.

The importance of the criteria is determined on the basis of the qualitative knowledge-based analysis of the theoretical knowledge and empirical experience in Slovakia and abroad and existing legislation. We determine the importance of the criteria by comparison with other criteria and thus create a ranking based on the sequence ranging from the most important to the least important.

The determination of the criteria weights is based on differentiating the indicators according to their significance. The purpose is to determine the weights of the individual indicators in this step. We opt for using the Saaty method [72]. The Saaty method is a comprehensive approach of estimating the weighting criteria, where the decision-maker compares all possible criteria pairs. We have processed the weights in the online system at <https://bpmsg.com/ahp-online-system/> (accessed date: 25 April 2019). The scale ranges from 1 to 9, with a value of 1 indicating that the compared criteria *i* and *j* are equally important. A value of 9 indicates that the criterion *i* absolutely dominates the criterion *j* in its importance.

In the final stage, we evaluate the results, determine the preferential order of the variants, and select the best option. For this purpose, we chose the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) and the SAW (Simple Additive Weighting) methods [73]. The TOPSIS method is based on selecting the alternative closest to the ideal value and furthest from the basal value. This method requires that all criteria are maximized. Our data satisfies this assumption, therefore there is no need for their transformation or adjustment for this purpose. The TOPSIS algorithm expresses the following:

- (a) a decision matrix normalization— y_{ij} criteria are transformed to r_{ij} values:

$$\frac{y_{ij}}{\sqrt{\sum_{i=1}^n y_{ij}^2}}. \quad (2)$$

- (b) the specific criteria values in the matrix are multiplied by the weight of the criterion:

$$w_{ij} = v_j r_{ij}. \quad (3)$$

- (c) the ideal variant (h_1, h_2, \dots, h_n) and the basal variant (d_1, d_2, \dots, d_n) are determined from the elements of matrix **W**:

$$h_j = \max (w_{ij}), \quad (4)$$

$$d_j = \min (w_{ij}). \quad (5)$$

- (d) the distances of the variants from ideal and basal variations are calculated by:

$$d_i^+ = \sqrt{\sum_{j=1}^k (w_{ij} - h_j)^2}, \quad (6)$$

$$d_i^- = \sqrt{\sum_{j=1}^k (w_{ij} - d_j)^2}. \quad (7)$$

- (e) the regions are then ranked from the perspective of human capital creativity based on descending values of an indicator c_i defined as follows:

$$c_i = \frac{d_i^-}{d_i^- + d_i^+}. \quad (8)$$

As the comprehensive data for all criteria are only available for the year 2011, it is not possible to monitor the regional ranking in a longer period.

The TOPSIS method, which is focused on a relative comparison, is supplemented by the SAW method, which helps to compare the regions absolutely. The SAW method uses the degree of goal fulfilment in terms of criterion. We use the same weights as determined by using the Saaty and the scoring methods. In the case of using the SAW method, we replace the value of the criteria by the points from 0 to 10 which express our expert opinion, as the value of the criterion meets the ideal status of what the region should achieve in the given criterion. In other words, how the region meets the sub-target in terms of the criteria value. One point is interpreted as fulfilling 10% of the objective from the criteria point of view. Ten points thus represent a 100% fulfilment in terms of the criteria. A ten-point scale, in our opinion, corresponds to the sensitivity with which an expert is able to quantify the fulfilment of the sub-objective.

To process the collected data and provide calculations as indicated below, we used statistical systems and the following statistical and analytical software: R 3.5.1 for Statistical Computing (R Core Team 2018), MS Excel, AHP online, Openxlsx [74], Topsis [75], and Factoextra [76]. The following Figure 1 sums up the comprehensive methodology. The methodology used in our research is as robust as possible exploiting several scientific and statistical methods.

3.5. Summary of the Methodology Applied

The main goal of the paper was—as was mentioned before—to identify the distribution of creative actors across the regions in Slovakia, to investigate the nexus between creative actors, and to evaluate their impact on the regional development in Slovakia. The exploratory scientific research on creativity in Slovak regions is based on a consistent literature review, statistical analysis, comparisons, and evaluation of comprehensive data sets. Firstly, we set a criteria matrix of creative actors' indicators, which consists of two groups of indicators identifying the creative people and creative capital in a region. The creative people part of the matrix consists of creative class (CC), population with higher education (PHE), and Bohemians (B). Creative capital consists of indicators related to Intellectual Property (IP), Entrepreneurship (E), and Innovation (I) and their sub-indicators as defined above. Verification of the Hypothesis 2 (H2) is based on a comparison of indicators which belong to the creative population via the Variation coefficient (Vc). For the verification of the Hypothesis 1 (H1) and the Hypothesis 3 (H3) we employed the Pearson and Spearman correlation coefficients (PCC, SCC), the TOPSIS and SAW method. The robustness of methodology used in this paper and the exploitation of the repertoire of mathematical and statistical methods is the main valuable contribution of this paper.

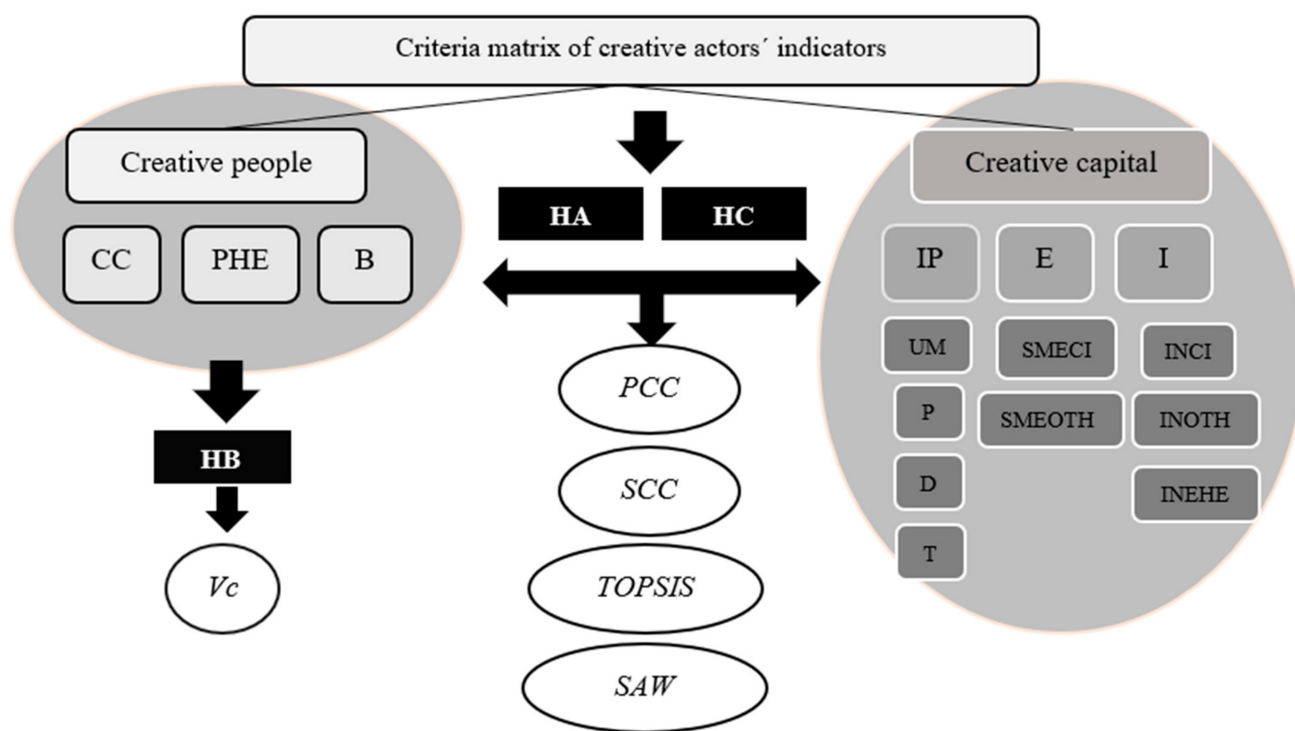


Figure 1. Methodological approach applied.

4. Results

The following section is divided into two sub-sections. The first, Section 4.1 aims to accomplish the first part of the scientific objective of this paper which is to identify the distribution of creative people across the regions in Slovakia (and to verify the Hypothesis 2 (H2)). The second, Section 4.2 is focused on the execution of the second part of the objective which is to evaluate the impact of creative actors on the regional development in Slovakia, and to investigate the nexus between creative actors (and to verify the Hypothesis 1 (H1) and the Hypothesis 3 (H3)). In this section, the research results on the distribution of creative people in the regions of Slovakia are presented together with our finding on the nexus between creative actors and their impact on the regional development measured via creative capital and the ranking of the Slovak regions.

4.1. Distribution of Creative People in the Regions of Slovakia

The analysis on the distribution of creative people is based on the evaluation of indicators that characterize and define creative people: the share of the creative class (CC) in the selected sectors of the economically active population, the share of the population with higher education (PHE) and the share of inhabitants representing Bohemians (B). Table 2 shows the distribution of creative people according to the above-mentioned indicators in the regions of Slovakia (all numbers included are in percentages). In addition, this table depicts the equality, or rather the inequality in the distribution of creative people in Slovak regions based on the above-mentioned indicators.

Data on the representation of creative people in the self-government regions (NUTS 3 regions), as displayed in Table 2, shows the dominant position of the Bratislava Region where 9.20% of economically active people work in creative sectors. This region involves the metropolitan area of the capital city and the share of people working in creative industries is almost three times higher in comparison to all other regions of Slovakia. The average share of university-educated people in Slovakia was 14.03% in 2011, dominating the Bratislava Region with a share of 26.17%. The rest of the seven Slovak regions reached similar values with the lowest share in the Trnava Region. The share of the population with higher

education is, as in the previous case, highest in the Bratislava Region. This is caused by a higher concentration of universities in the capital city but also by the metropolitan character of the city that is highly attractive for creative people and higher-educated people. This confirms the results of the study by Hansen and Niedomysl [67] that correlation between people with higher education and creative people is high. The share of Bohemians in Slovak regions truly brings an interesting result. In the case of five Slovak regions (Bratislava, Nitra, Presov, Kosice, and Banska Bystrica), the share of Bohemians is higher than the national average. This indicator, along with Florida's statement (Bohemians play an important role in acquiring other creative categories and are a sign of urban cultural tolerance), suggests a potential for the development of appropriate regional development strategies to attract and maintain creative people in lagging areas [66]. Presov, Kosice, and Banska Bystrica regions belong to the regions with the lowest regional GDP, higher unemployment, and the highest labor outflow. When comparing the four selected indicators, we can see inequalities in the distribution of creative class (0.46) and the population with higher education (0.33) across Slovak regions (see Table 2).

Table 2. Inequalities in distribution of creative people in Slovak regions (in %).

Region	Creative Class	People with Higher Educational	Bohemians
BA	9.20	26.17	6.99
TT	3.63	11.50	5.23
TN	3.04	12.51	4.65
NR	3.44	11.99	6.10
ZA	3.69	12.96	4.74
BB	3.71	12.33	5.87
PO	3.01	11.70	6.32
KE	3.86	13.06	6.06
Slovakia	4.19	14.03	5.74
Standard deviation	1.9135	4.6196	0.7601
Average	4.1947	14.0279	5.7445
Vk	0.45617	0.3293	0.1323

Legend: BA: Bratislava Region, BB Banska Bystrica Region, TT Trnava Region, TN Trenčin Region, PO Presov Region, NR Nitra Region, KE Kosice Region, ZA Zilina Region. **Source:** own processing based on the data from the Statistical Office of Slovak Republic from the year 2011.

Based on the previous results on the distribution of creative people, we opt to examine the dependencies between the creative class and a set of selected indicators as in the previous cases based on the correlation analysis by using the Pearson correlation coefficient. The results of the correlation analysis are described in Table 3 below. The Pearson correlation coefficient is usually regarded as an appropriate method for measuring the linear association between two sets of variables of interest as it is based on the method of a covariance. It provides the information about the magnitude of the association, or the correlation, as well as the direction of the mutual relations.

Table 3. Dependencies between the occurrence of creative people and a set of selected indicators in Slovakia.

Indicators	Creative Class	People with Higher Education	Bohemians
Pearson coefficient	1	0.958 **	0.993 **
Research areas	8	8	8

Source: own processing by using R 3.5.1 for Statistical Computing (R Core Team 2018). ** correlation is significant at the 0.01 level (2-tailed).

We can observe a strong direct positive relationship between the population with a higher education and the occurrence of creative class (with a correlation coefficient of 0.958). There is a strong direct positive relation between the size of the creative class and the number of Bohemians. Our research results also showed a strong direct positive nexus between the representatives of creative people.

The secondary data on the occurrence of creative people allowed us to quantify and measure their representation in Slovakia. The research results and their evaluation verify the Hypothesis 2 (H2) that states that the distribution of creative people across the Slovak regions is not equal. The research results also show that there is a strong dominance of the Bratislava Region, while the remainder of the regions are more or less at the same level. In the next section, we focus on presenting the nexus between creative actors and their impact on regional development.

4.2. Creative Capital and Regional Development in Slovak Regions

In the previous section, we identified and quantified the occurrence of creative people and their spatial distribution across the regions of Slovakia. In order to meet the objective of this paper, we further need to identify the relationship between the occurrence of creative people and creative capital. For this purpose, we opt for the deployment of the Spearman correlation coefficient and we use all the indicators as defined in the criteria matrix in Section 3. The results are displayed in Table 4.

Table 4. Nexus between the occurrence of creative people and creative capital in Slovakia in the year 2011.

	SMEOTH	SMECI	P	UM	D	T	INOTH	INCI	INEHE
CC	0.857	0.786	−0.119	0.311	0.049	0.095	0.000	0.000	0.346
B	0.833	0.738	−0.310	0.072	0.049	−0.095	−0.037	0.210	0.037
PHE	0.881	0.548	−0.119	0.503	0.272	0.000	−0.210	0.037	0.037

Source: own processing in MS Excel. **Legend:** creative population consists of the following indicators: the share of the creative class (CC), the share of the population with higher education (PHE), the share of inhabitants representing Bohemians (B). Creative capital consists of the following indicators: a number of applications for patents (P), utility models (UM), designs (D) and trademarks (T), small and medium-sized enterprises in creative industries (SMECI) and outside the creative industries, marked as small and medium-sized enterprises in others (SMEOTH), innovation enterprises in creative industries (INCI), innovation outside creative industries, marked as innovations in others (INOTH) and innovation in enterprises with more than 75% share of employees with higher education (INEHE).

The investigation of the nexus between the creative people and the selected indicators of creative capital in Table 4 has shown a strong direct relationship between the occurrence of creative people and the emergence of SMEs in both creative industries and other industries. Moreover, each of the indicators of the occurrence of creative people shows a strong direct relationship to the emergence of SMEs. The research results also showed a moderate positive correlation between the occurrence of people with a higher education and utility models, and a weak direct correlation of utility models and the creative class. Our research results regarding the weak negative correlation between the creative class and the occurrence of the patents are consistent with the results from the study of Boschma and Fritsch [66] (p. 417). This might probably be caused by the fact that the creative class works primarily in cultural and creative industries that are not technology-intensive. A more in-depth study on the distribution of the copyrights seems to be needed here as it might serve a more appropriate and relevant indicator.

The following part of this section is dedicated to the ranking of Slovak regions as far as their creative capital is concerned. The measurement of creative capital in Slovak regions is based on a criteria matrix of creative actors' indicators as defined in Section 3 and consists of indicators covering entrepreneurship, intellectual property, and innovation.

The creation of the ranking is based on the TOPSIS method exploitation. Due to the need for comprehensive data including those from the population census, we must use the most recent data from the year 2011 when the last census was organized. Before applying the TOPSIS method, we need to determine the weights of the criteria. For this purpose, we use the Saaty method as indicated in Section 3 (The procedure of assigning weights through the Saaty method can be seen at <https://bpmsg.com/ahp-online-system/> (accessed date: 25 April 2019) under the name of the Creativity Index project using the email address and password that we can provide in the case of any interest.).

In order to apply the more comprehensive view on the identification and measurement of creativity in Slovak regions, we additionally used the SAW method which reflects the order of the regions from the actual values of the examined indicators. In this method, we replaced the absolute values with points. When assigning points to the individual (NUTS 3) regions and to the absolute values of variables, we used the comparison with available values (the average values) measured in the European Union. The weights for the variables are the same as described by the TOPSIS method (the Saaty method). Assigning the points to absolute values according to the available EU data is based on a set of indicators identifying the occurrence of creative people and creative capital.

A set of indicators identifying the occurrence of creative people in the regions of Slovakia is based on multiple data sources as follows:

- The share of the creative class (CC), for which we used the map of creative class localization in Europe created by the European Spatial Planning Observation Network (ESPON) (For more information, see <https://www.espon.eu/search/node/creative%20workforce> (accessed date: 25 April 2019));
- The share of the population with a higher education (PHE) that is based on the data from the applied research report of ESPON (For more information, see <https://www.espon.eu/topics-policy/publications/synthesis-reports/third-espon-2013-synthesis-report> (accessed date: 25 April 2019));
- The share of inhabitants representing Bohemians (B) is based on work by Boschma and Fritsch [66] (p. 404).

A set of indicators identifying creative capital in the region is divided into three subgroups:

- The intellectual property measured via the number of patent applications (P), utility models (UM), designs (D), and trademarks (T). All variables occurring in this group were compared with the data available from the research and ranking of the European commission which evaluates Slovakia as a moderate innovator (For more information, see https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en (accessed date: 25 April 2019)).
- Entrepreneurship measured via the establishment of small and medium-sized enterprises in creative industries (SMECI) and outside the creative industries, marked as small and medium-sized enterprises in others (SMEOTH). We have analyzed both variables based on the data from EC (For more information, see <https://ec.europa.eu/digital-single-market/en/policies/startup-europe> (accessed date: 25 April 2019)) and the world business monitor [70]. The available documents contain the data on an existing start-up ecosystem but do not include country ranking. For this reason, based on the comparison and deduction of available data, we have assigned points for the SME variables.
- Innovation measured via innovation activities of enterprises, namely innovation enterprises in creative industries (INCI), innovation outside creative industries, marked as innovations in others (INOTH), and innovation in enterprises with more than a 75% share of employees with higher education (INEHE). We used the data from the European Innovation Ranking in the group of indicators on intellectual property.

We further evaluated the Slovak regions by using the TOPSIS method and the SAW method. In addition, we added the rank of the regions according to indicators of the

creative population to bring a comprehensive view on the distribution of creativity in Slovak regions. Table 5 shows the ranking of the Slovak regions based on the criteria matrix of indicators focused on the identification and measurement of creativity (as defined in Section 3).

Table 5. Ranking of creativity in Slovak regions based on the criteria matrix of creative actors' indicators.

Region	TOPSIS Method		SAW Method		Creative People Rankings		
	Score	Rank	Score	Rank	Rank CC	Rank PHE	Rank B
BA	1	1	0.688	1	1	1	1
TT	0.0839	8	0.469	7	5	8	6
TN	0.1253	6	0.438	8	8	4	8
NR	0.1451	3	0.499	4	7	6	4
ZA	0.1403	5	0.482	6	4	3	7
BB	0.1156	7	0.496	5	3	5	5
PO	0.1435	4	0.509	3	8	7	3
KE	0.1812	2	0.559	2	2	2	2

Source: own processing in MS Excel and the R programme. **Legend:** BA Bratislava Region, BB Banská Bystrica Region, TT Trnava Region, TN Trenčín Region, PO Prešov Region, NR Nitra Region, KE Košice Region, ZA Žilina Region. **Comment:** Creative population consists of the following indicators: the share of creative people (CP), the share of the population with higher education (PHE), the share of inhabitants representing Bohemians (B).

The research results summarized in Table 5 show that the Bratislava Region is closest to the ideal value and at the same time furthest from the basal value according to the TOPSIS method. It is followed by the Košice Region, the Nitra Region, the Prešov Region, the Žilina Region, and the Trenčín Region.

The research results also indicate the dominant position of the Bratislava Region leading in all inspected indicators. The second-best position we found for the Košice Region that reached the second-best results in all investigated indicators. It is noteworthy that the Košice Region includes the second biggest city of Slovakia (Košice) which was awarded the title of the European Capital of Culture in 2013. Košice invested more than 71 million euros in the development of the city and its urban infrastructure. This caused a significant increase in the number of facilities offering cultural products, services, and events, including the Kulturpark, Kunsthalle, and the SPOT community art centers. It is evident that hundreds of new jobs were created as a synergy effect of the title of the European Capital of Culture [77]. Before receiving the title, the Košice Region belonged to the least developed regions in Slovakia, with the highest unemployment rate and the lowest regional GDP. Synergies related to the preparations, reaching and benefiting from being the European Capital of Culture started a creative destruction run by young artists and activists leading to a new European image of the city and the expansion of creative industries [78]. It is also noteworthy that the Košice Region belongs to the peripheral region of the EU on the borders with Ukraine. As confirmed by our research results, the localization of creative people indeed assists and helps to produce creative capital. It is thus obvious that with sufficient financial and organizational support, it is possible to enhance the regional development via creativity. The following section aims to discuss and conclude the most interesting research results and to propose policy implications accordingly.

5. Discussion and Conclusions

The main objective of this paper was to identify the distribution of creative actors across the regions in Slovakia, to investigate the nexus between creative actors, and to evaluate their impact on the regional development in Slovakia.

To achieve this goal, we set three hypotheses. The Hypothesis 2 (H2) related to the inequality in the distribution of creative people across Slovak regions was verified in Section 4.1 (see Table 2). The research results show the dominant position of the Bratislava Region, followed by the Kosice Region. Our research results are in compliance with recent studies of [79–82] that highlight the prominent positions of the regions including nation's capital cities. If we compare our results with the average in the European Union, all Slovak regions are above the average values. The best evaluation was detected in the case of the Bratislava Region with a score of 69% of the EU average. The Kosice Region and the Presov Region reached a score above 50% of the EU level. The Banska Bystrica Region and the Nitra Region are just slightly below 50%, and the rest of the regions are below 50% of the European average (see Table 5 in the Section 4.2, row no. 3).

The Hypothesis 3 (H3) was tested through the investigation on the nexus between creative actors and the nexus between creative people and selected indicators of creative capital. Our research results indicate a strong direct positive nexus between the representatives of creative people and a strong direct dependence between the creative people and the emergence of SMEs in both creative industries and other industries. We can observe a moderate positive correlation between the occurrence of the people with a higher education and utility models, a weak direct correlation of utility models and creative class, and a weak negative correlation between creative class and the occurrence of the patent applications. Therefore, the Hypothesis 3 (H3) was verified only partially.

The Hypothesis 1 (H1) stating that the presence of creative actors contributes to the regional development in Slovakia was also verified only partially by the example of the Kosice Region. The Kosice Region includes the second biggest city of Slovakia (Kosice), which was awarded the title of the European Capital of Culture in 2013. The Kosice Region, especially the City of Kosice, heavily invested in the creative infrastructure. As a synergy effect of reaching the title of the European Capital of Culture, there is a shift to the concept of culture-led urban regeneration [83,84], which is stimulated by the young organizers and entrepreneurs. These young creative people brought knowledge from other European cultural centers and implemented them in Kosice [81]. The position of the Presov Region may be the consequence of positive externalities and desired synergic effects, given the proximity to the neighboring Kosice Region. This result points to a spatial dependence and the existence of a spatial autocorrelation among the regions, as it seems that the region's creative performance may be linked to the level of creativity of its neighbors (for more details please see [82,85]). This is a piece of evidence for the political representatives of the regional authorities that the investments into culture and creativity might indeed bring a significant impact on regional development. It seems to be clear that the support of creativity leads to the regional development, as was confirmed by both our research results and evidenced by the theory and practice from all over the world.

It should be noted here that the dynamics of regional development in a given region consist of many mutually inter-related elements, creating their own original regional mix of human, intangible, and physical resources. Some of these elements, such as the natural environment and the location, are in some respects 'given' or 'fixed', while other resources, such as the population structure and the structure of the economy, are highly variable and have great potential to be influenced and directed by the target support or a suitable regional development strategy [86–90]. In this sense, enormous space for the sustainability transitions could be found in the forming of the regional economic structures. Moreover, the changes in the social and economic organization of cities and regions may lead to shifts in whole sectors of the economy where the people are able to produce creative capital.

The peripheral regions of Europe situated on its eastern border (two of them, the Kosice Region and the Presov Region, are located in Slovakia) are importantly challenged by company closures, job losses, and outward migration, which creates financial and social challenges for many peripheral municipalities. Therefore, it is of the utmost importance to better understand how to attract, maintain, and develop creative people and generally the creativity. The study of Hansen and Aner [91] on the location dynamics of highly

educated people migrating to peripheral regions of Denmark shows that it is important to promote jobs, highlight the quality of jobs, and the higher levels of responsibility that creative people may experience in a job in peripheral or lagging regions. The effort to retain newly graduated people in the regions appears to be important as they can be seen as an important and undervalued resource for local employers and the future of these regions. It has been proved that these people are more interested in developing their activities, are more loyal and regionally patriotic if they are considered to be a valuable part of the local community. Their dynamic and flexible approach may spill over into the host enterprise or organization and enhance the creation of new SMEs in or outside the creative industries. In the broader local or regional environment, this might help to increase regional creativity and competitiveness. Therefore, the main role of places, no matter if they are metropolitan regions or peripheral and rural regions, is to create conditions for attracting and retaining creative people who are producing creative capital.

In most of the EU member states, increased attention is being paid to promoting creativity, creative industries, and attraction of creative people. The benefits of this policy are visible and mapped. There is strong competition among the regions to attract creative people which causes positive effects for more creative regions, and on the contrary, causes outmigration of creative people from the lagging regions which is not so positive. In Slovakia, minimal attention has been paid so far to the support of creative industries and attraction or support oriented towards creative people. This statement seems to be also confirmed by our research results. The inability of Slovakia to absorb the financial support from the European Union aimed at enhancing creativity in the regions is manifested by all Slovak regions lagging behind the EU average in creativity and attracting creative people. On the other hand, investment in culture, support of creative industries, attracting and retaining creative people in the region brought a significant impact on the regional development, as investigated in the case of the peripheral Kosice Region. This is in compliance with the recent study of Yum [92] that creative infrastructure and culture are important elements of creativity. As pointed out by Florida in his last book *The New Urban Crisis* [93], we can still believe in the value of the creative class as an engine for economic prosperity in cities and regions, but not as an isolated strategy. Its successful implementation would require a broader change in the way cities and regions are planned, designed, and developed.

We have ascertained that creative people are not distributed equally across the regions of Slovakia. The objective of our research is fulfilled as our empirical research results showed that indicators of the occurrence of creative people and creative capital are critical parameters for the development of the regions, *ceteris paribus*. We investigated the nexus between creative actors, and we discovered the strong direct positive relationship between the representatives of creative people and the strong direct dependence between the creative people and the emergence of SMEs in both creative industries and other industries. The comprehensive methodological approach for measurement of the nexus between creative actors and regional development, as proposed in this paper, helps to depict the impact of creative actors on regional development and might serve as an inspiration for further research or policy implications.

We propose the regions to implement the support for creative actors in integrated strategies of regional development as the potential of creative actors and their contribution to development of regions is still vastly underrated. We also suggest the regions follow the empirical evidence gathered, for example by Rodrigues and Franco [94], that regional strategies should concentrate increasingly on developing the networks and partnerships. Together with the authors of this study we believe that open collaborations between all the regional actors involved might lead to the absorption of the mutual synergies that collaborations provide [95]. In this sense, the performance of collaborations might be maximized and lead to promising results.

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