# Deployment of creative actors and varieties of their impact on the quaternary sector and regional growth: a case study of NUTS2 regions of the Czech Republic

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**Abstract**

*The current era acknowledges the immense impact of creativity on economic growth and regional development. There is an ongoing debate about the position of creativity and its sources and implications in regional economies when thoroughly examining regional disparities. We contribute to the debate by piloting an investigation of five groups of creative actors whose links and consequences for regional growth and the quaternary sector were explored. As a case study, the NUTS2 regions of the Czech Republic were selected for analysis (2015-2017). Given the nature of selected indicators, the causality results and the substantive importance of our investigation, the selected time period is not a limiting factor for our analyses. The empirical conclusions of the conducted study clearly confirmed the theoretically and logically defined thesis on the diverse importance of creative actors in regional economies.*

**Keywords**: creative actors, creative class, quaternary sector, regional growth, Czech Republic

## Introduction

Creativity represents the ability to create new and valuable ideas and solutions based on thinking outside the framework of established formulas, when something original and at the same time meaningful is created. Creativity manifests itself in all aspects of life, and from an economic point of view, it most affects the innovative approach to solving problems and the generation of innovations as such, pushes the boundaries of self-expression and fixed perspectives, creates space for the generation of alternative solutions, develops critical thinking and allows approaching challenges

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from different ways. As such, creative solutions often lead to more efficient and effective results with a positive impact on society.

Holders of creativity are creative people, or creative actors or the so-called creative class as a whole. The creative class consists of people who add economic value through their creativity (Florida, 2002). The creative class is characterized by its members engaging in work to create meaningful new forms of output (Faggian et al., 2014), consisting of a creative core and creative professionals. The creative core includes scientists and engineers, university professors, poets, artists, designers and architects, as well as the "thought leaders" of modern society, especially non-fiction writers, editors, cultural figures, analysts along with other opinion makers. Their goal is to create new forms or designs that are easily portable and widely applicable. In addition to this core group, the creative class also includes creative professionals, scientists and researchers who work in a wide range of knowledge-intensive industries, such as high-tech industries, information and communication technology, financial services, legal and health professions, and business management, and who apply your knowledge for creative problem solving (Florida, 2002).

Human creativity can be used to benefit society because new ideas can generate economic profit (Florida, 2002; Howkins, 2001; Mundelius, 2008). The creative class gives rise to new ideas, mobilizes creative potential in the form of new products, services, information, technological innovations, non-technological processes and outputs that generate creative capital, which is increasingly important for the further development of economic society and when creativity represents the crucial force of economic growth and prosperity (Batabyal &Nijkamp, 2016; Florida, 2002; 2005). Regions with higher creative potential can create more jobs, local residents achieve higher incomes and the cultural-social area is more developed.

If we follow the logical causality between creativity, or the entities that use it, and its endogenous ability to generate additional added value, then it can be assumed that regions with a higher representation of creative actors will have a higher share of the quaternary sector (and therefore the economic activities it concentrates) in the overall sectoral structure of the region, and at the same time will achieve higher economic performance (and vice versa, this causality is two-sided). We wanted to test this interdependence by conducting pilot research using the NUTS2 regions of the Czech Republic as an example, supporting similar research conducted around the world (e.g. Asheim & Hansen, 2009; Baláž et al., 2022; Borseková et al., 2021; Chapain & Comunian, 2009; Florida et al., 2008; Howkins, 2001; Karlsson et al., 2012; Marlet & van Woerkens, 2007; Marrocu & Paci, 2013; Mellander & Florida, 2007; Romein & Trip, 2010; Yum, 2020a). Due to the unavailability of current data on the geographical distribution of creative actors, we were forced to work with the average of data for the period 2015-2017, and to adjust the values of the other analysed indicators accordingly. By definition, older data does not matter, because

it is a matter of verifying and establishing the causality of static relationships between variables, regardless of any time frame.

The scope of our paper is to present the findings of our pilot research on the relationship between creative actors, regional growth and the share of the quaternary sector in the overall sectoral structure of regions. Our research hypothesis is based on theoretical assumptions based on expert research on similar issues, where we argue that the geographical distribution of creative actors is strongly positively correlated with the economic strength of the region and at the same time they both have a very significant reflection in the representation of activities grouped into economic activities of the quaternary sector. The results also allow to determine interregional differences in the distribution of regional actors in the context of economic output and representation of the quaternary sector in NUTS2 regions of the Czech Republic.

## 1. Theoretical background

Creativity is a multidimensional phenomenon of contemporary research, and it is an important element in the development of social and economic society. It can be seen as an intangible (production) input, another form of the so-called production factor, which combines talent, skills, knowledge, experience, imagination and competence in an internal process to create something completely new (Andersson, 1985) that has its own value (Boden, 1994). Creativity itself is highly problematic to simply define (Bareviciute, 2014), hence the impossibility of enforcing a single, albeit general, definition (Correia & Costa, 2014).

This is due to the fact that creativity has a significant transdisciplinary overlap, where we distinguish, for example, scientific, economic, technological, innovative, entrepreneurial, artistic, cultural creativity (Florida, 2002). The primary bearer of creativity is the human being (Karlsson, 2011), and in an institutionalised form, it is mainly the firm that transforms creativity into economic value in the context of production activities and service delivery (Florida & Tinagli, 2004), through which it then seeks to generate additional economic profit and benefit (Hartley et al., 2013; Howkins, 2001; Mundelius, 2008). Therefore, creativity has now become a highly desired competency (Throsby, 2008) and creativity producers themselves are key bearers of competitive advantage. It is also because creative people are able to respond proactively to new challenges (Nijkamp, 2009). At the same time, creativity has a number of positive externalities that are likely to concentrate and transform into positive development and growth effects of economic, social and environmental nature against the background of synergistic processes (Kloudová, 2009; MacGregor Pelikánová &MacGregor, 2020; Turečková et al., 2023). Creativity is one of the supporting elements for shaping smart and intelligent cities and regions (Angelidou, 2014; Caragliu et al., 2011; Dominici, 2012; Landry, 2005; Romein & Trip, 2010; Turečková & Nevima, 2020).

There is no doubt that the manifestations of creativity have a primarily territorial dimension and, assuming that creativity is desirable, it has an impact on the complex processes that take place within the territory, which are related to positive transformational changes of regions, leading in particular to the growth of socio-economic potential, sustainability and competitiveness taking place within the complex system of a given territorial unit, in a narrower or broader sense (Karlsson et al., 2012; Turečková & Nevima, 2018). In the context of the above, there is a logical assumption that more populated regions have a larger number of creative actors, the so-called bearers of creativity, who generate more favourable conditions for the development of innovative ideas (Borseková et al., 2021). These territorial areas, which possess desirable creativity and innovative capital, are places of natural concentration of scientific and technological professional and entrepreneurial groups (Florida, 2012; Krätke, 2011) and creative industry development (Jancickova &Paksiova, 2021; Pratt, 2008). The geographic distribution of creativity and hence innovative potential becomes a redistributive criterion when deciding on the establishment of new firms producing higher added value, the creation of clusters and industrial parks and the location of foreign direct investment. Creative actors in the region contribute to the creation of patents, licenses, new technology processes and industrial innovations, with the nature of so-called sectoral spillovers (Novotná & Novotný, 2019; Turečková, 2015b). The concentration of economic activities of higher-order services included in the quaternary sector (Turečková, 2014) retroactively stimulates "new, additional" creativity and innovation (Florida, 2002), making the area attractive to other investors, firms and, of course, residents (MacGregor Pelikánová et al., 2021). Such a place has a priority position within the larger local area and is one of the leaders in the growth of the regional economy and the development of the region as a whole (Weinstein & Clower, 2000). This thesis is supported by Florida (2002), who posits that creativity is a driver of economic growth and competitiveness of cities and regions. Therefore, creativity is seen as a crucial factor in territorial development and a key determinant of the quality of life of local residents (Kourtit et al., 2011; Landry, 2008; Stimson et al., 2011). Our pilot research presented in this paper is also focused in this direction.

By its nature, creativity is an important factor for the formation of the quaternary sector and its significant representation in the sectoral structure of the economy the quaternary sector and its share of total sectoral structure of the economy requires a highly skilled and educated labor and ability of the economies to use effectively their human, social and intellectual capital (Turečková & Martinát, 2015). Quaternary sector is a significant source of competitive advantage in all areas of the economy and the economy as a whole because this sector contains knowledge industries represent not only one of the fastest growing sources of new jobs, but also account for an increasing share of gross value added and exports (Melachroinos & Spence, 2014). As mention all services related to the generation, application and sharing of knowledge, technology, innovation and information, education, science

and research are included in the quaternary sector. This group of complementary services and operations is enhanced by consulting, financial services and activities related to health care and medical research and development (Turečková & Martinát, 2015). The connection to the creative class described above in the text is more than obvious.

The share of the quaternary sector on the total sectoral structure of the economy requires a high-level skilled and educated labour and the ability of the economies to use their human and intellectual capital effectively and correctly. That is why we can expect the higher share and more dynamic development of the quaternary sector in advanced regions and countries in the following period of time. Economic activities and operations included in the fourth sector are like an engine of innovations, they create space for emergence of new markets and branches and they are reflected in the original work and management, practices and methods. Therefore, the quaternary sector is important for current and future economic growth and qualitative development of the national economy and society (Turečková, 2014).

Finally, we would like to emphasize the importance of creativity for the development of a society formed into an institution known as Society 4.0. Creativity and the creative class are the factors that essentially enabled the creation of Society 4.0, and at the same time it is Society 4.0 that further deepens their importance. Creativity is therefore the key force of innovation and is necessary for the further development of Society 4.0.

We usually define Society 4.0 as a group of people from advanced economies formed into a modern and cultural society, which are naturally subject to the significant influence of technology and digitization, and which are demonstrably influencing most areas of human life in the sense of changing behaviour, attitudes and ideas (Turečková et al., 2023). In this context, it is expected, or it is already happening, a deeper intertwining of biological and technological aspects of life (including work, education, healthcare, communication etc.), when the significant integration of technology and innovation into most spheres of human existence will in turn enable a greater degree of independence, stimulate individualization and facilitate communication. The simplification of physical work processes will allow further development of creativity, competence and mental work and will contribute to a positive increase in the comfort of life in human society (also Helbing, 2016; Vitálišová et al., 2022).

## 2. Methodology and data

From a methodological point of view, it is necessary to define the chosen indicators that represent the creative class in the first place and then to describe the nature of the regional growth and quaternary sector indicators. The chosen period of years is fully subject to the availability of data of sub-indicators of the creative class for the defined regional level NUTS2 in the Czech Republic (Czechia), for the projection of

the years 2015-2017. These data were taken from Eurostat, specifically from the Labour Force Survey (LFS) and from Regional Science and Technology Statistics. More recent data are not currently available. The remaining two indicators were calculated for the period based on annual regional data from the Czech Statistical Office. The individual input data are available in the data matrix in the Appendix at the end of the paper.

As far as the methods of scientific work are concerned, in the theoretical field it is a professional search of scientific sources concerning creativity and its causality to selected economic variables. The theoretical description of the issue defined the basis for the empirical study, which, based on a correlation analysis of adjusted index data, verified the thesis of a very strong relationship between creative actors and regional growth and the representation of the quaternary sector in each region. We used Pearson's correlation coefficient because we wanted to determine the strength of the linear relationship between the two quantities we determined. This causality was determined on three levels: (1) between creative class and GVA; (2) between creative class and quaternary sector and (3) between GVA and quaternary sector. With reference to the hypothesis established in the previous chapter, 3 research questions are established: (1) there is a strong positive causality between the representation of the creative class and the GVA indicator; (2) is there a strong positive causality between creative class representation and the quaternary sector and (3) is there a strong positive causality between the GVA indicator and the quaternary sector?

The inductive approach to the presentation of the results of the conducted research was complemented by interregional comparison.

The area of the Czech Republic consists of 8 NUTS2 regions. Because the regions Prague and Central Bohemia are merged into a single functional urban area, and data on regional actors are not provided for these two regions separately, we worked with seven regions (CZ00 Prague and Central Bohemia; CZ03 Southwest; CZ04 Northwest; CZ05 Northeast; CZ06 Southeast; CZ07 Central Moravia and CZ08 Moravian-Silesian) (see Figure 1).

**Table 1. Adjusted input data (average for the period 2015-2017)**

| NUTS2 region | creative class (index) | GVA (index) | quaternary sector (% on regional sectoral structure) |
|---|---|---|---|
| Prague and Central Bohemia | 1,471.53 | 2,669.24 | 35.19 |
| Southwest | 893.92 | 687.76 | 18.11 |
| Northwest | 691.17 | 524.09 | 17.67 |
| Northeast | 960.26 | 812.67 | 18.10 |
| Southeast | 1,132.28 | 1,002.64 | 23.19 |
| Central Moravia | 920.28 | 649.85 | 16.94 |
| Moravian-Silesian | 930.56 | 653.73 | 19.34 |

Source: Authors' calculations

In our case, the creative class is made up of five groups of creative actors, or indicators representing them: (1) Core creative class employment as a share of the creative class; (2) Higher education attainment as a share of the population aged 25-64 with higher education; (3) Human resources in science and technology as an amount of persons with higher education and/or employed in field of science and technology as a percentage of labour force; (4) Employment in technology and knowledge-intensive sectors as a percentage of total employment and (5) Knowledge workers as a percentage of total employment. We have expressed economic growth through Gross Value Added at current prices and the quaternary sector represents the percentage of economic activities classified according to NACE (Nomenclature générale des Activités économiques dans les Communautés Européennes) in the categories J, K, M, N, O, P and Q to the total value of production (Kenessey, 1987; Turečková, 2014). The quaternary sector thus represents the economic outputs in the information and communication, financial and insurance activities, professional, scientific and technical activities, administrative and support service activities, education, human health and social work activities (Turečková & Martinát, 2015).
Due to the diversity of the data format and the need to quantify a group of indicators in the creative class, the data were transformed into index form using the Point method, the author of which is the American mathematician M. K. Bennet (this does not apply to the variable quaternary sector, which is presented in the original format). The principle of the point method is that the average value in a given indicator is weighted by 1,000 points, and the values of a given indicator for a given region are weighted according to how many per mile their value is from the average value of the indicator weighted by the full number of points (Tuleja, 2010; Turečková, 2015a). The sub-indicators in the "score" for each region are listed in the following table (Table 1). It applies here that the higher the index value of an indicator, the higher the actual value of the indicator and the better the region is in the given criterion (Tuleja, 2009). The expression of logical and economic causality between the adjusted sub-indicators with reference to the established thesis will be verified by ordinary correlation analysis using Pearson coefficient ($r \in |-1, +1|$). Thus, it applies that the closer the value of the coefficient is to one (+1), the higher the correlation between the two variables - indicators (Meloun, 1994; Nevima, 2014). For our purposes, it is crucial that the value of Pearson Coefficient (r) is $r > 0.70$, which corresponds to a degree of mutual causality of very strong positive relationship.

## 3. Distribution of creative actors in the regions of the Czech Republic in the context of the Economic growth and Quaternary sector

Our pilot study on the mutual influence of the distribution of creative actors in the regions, regional economic growth and the representation of the quaternary sector in the regions of the Czech Republic confirmed a very strong interdependence between all these indicators and confirmed our thesis on the importance of creative actors in

the economic sphere of individual regions. The strength of mutual causality was determined by the Pearson correlation coefficient, which for all three dependencies came out to be r>0.70 (see Table 2). The degree of mutual causality can thus be defined in terms of a very strong positive relationship.

**Table 2. Causality between indicators**

| Indicator | Pearson correlation coefficient |
|---|---|
| Creative class and GVA | 0.930888 |
| Creative class and quaternary sector | 0.930488 |
| GVA and quaternary sector | 0.981051 |

Source: Authors' calculations

**Figure 1. Geographical presentation of the size of relevant indicators within the NUTS 2 regions in the Czech Republic**
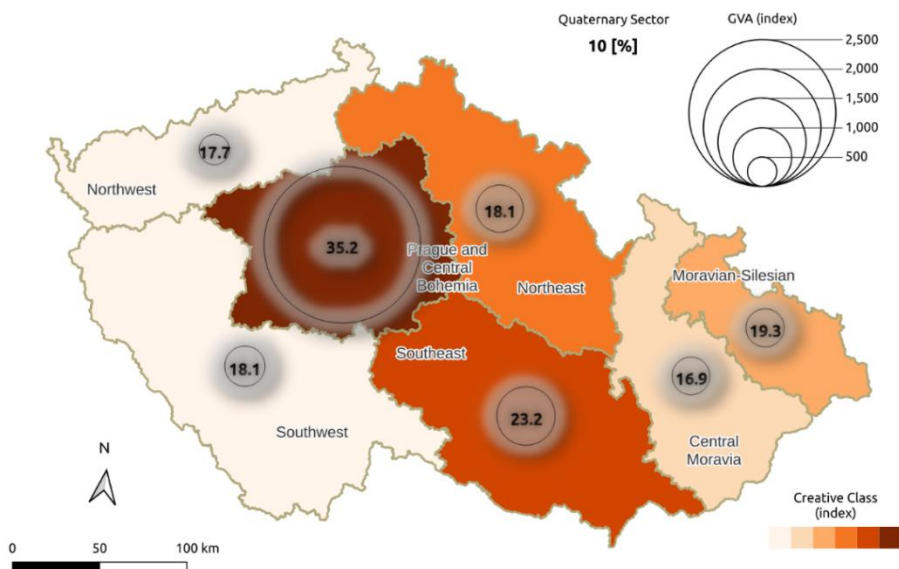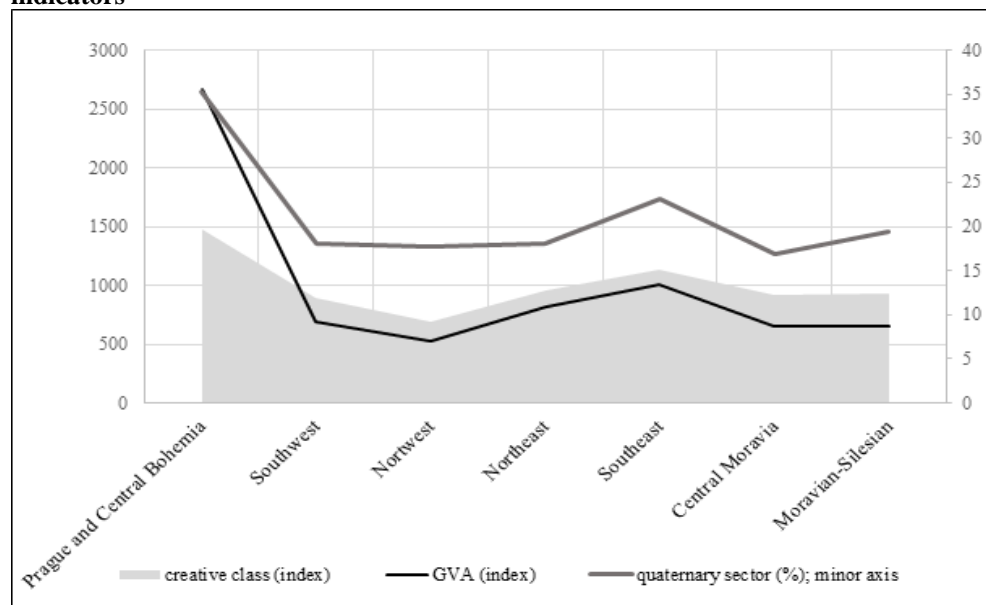


Source: Authors' representation

The calculated results can also be clearly demonstrated through the visual representation of the sub-indicators within the mapping apparatus (see Figure 1): the intensity of colour in the regions reflects the representation of creative actors, the size of the "circle" corresponds to the size of the GVA and the percentage value reflects the representation of the quaternary sector in the region. This clearly confirms the established causality that the greater the representation of creative actors (darker shades), the greater the economic output expressed through the

region's GVA, and at the same time the greater the representation of higher order services included in the quaternary sector in the region.

Our research has confirmed the so-called capital city phenomenon, where 21% of all creative actors in the Czech Republic are concentrated in Prague and Central Bohemia and 38% of all economic output is generated in this region, with 35% of it being in the quaternary sector. These results are not surprising and reflect the typical concentration of economic entities and activities in capital city regions and their metropolitan hinterland. The second most successful region is the Southeast, with 16% of creative actors, 14% of the national output and 23% of activities in the quaternary sector. The worst performing region is the Northwest and Central Moravia, with a share of creative actors of 10% and 13% respectively, output of 7.5% and 9% of GVA and quaternary sector representation of 17.5% and 17% respectively.

The mapping of our research results is also complemented by the presentation of information through the graphical apparatus in Figure 2, in which not only can the mutual positive causality between the distribution of creative actors (class), regional growth and the representation of the quaternary sector be immediately seen, but at the same time significant differences in the distribution of regional actors across NUTS2 regions, in their realised regional output (product) and their representation in economic activities classified in the quaternary sector are also evident.

**Figure 2. Regional differences in graphical visualization of individual values of indicators**



Source: Authors' representation

The most noticeable regional disparity is between the Prague and Central Bohemia region, in which the capital city of Prague is located (capital city phenomenon) and the Northwest region. The Prague and Central Bohemia region has more than 2.2 times more creative actors than the Northwest region and at the same time realizes GVA 5 times larger. The second best region in terms of all indicators is the Southeast region, which is home to the second largest city in the Czech Republic, Brno, which is a major university centre and which focuses on long-term activities related to innovation development and support for technology and engineering firms (for more on this, see e.g. Turečková, 2016; Turečková & Martinát, 2016). Compared to Prague and Central Bohemia, there are only 20% fewer creative actors and even the quaternary sector is significantly over-represented, with economic output at the level of the national average.

**Conclusion**

The intention of the paper presented above was to pilot test the mutual causality between the geographical distribution of creative actors, regional economic growth and the percentage of the quaternary sector in the Czech Republic. Based on the logic and the search of similar studies, the research hypothesis that a very strong correlation between these indicators can be considered was expressed in the introduction. This conclusion was confirmed, the correlation coefficients in the given combinations of indicators were 0.9308, 0.9304 and 0.9810. The research questions defined in the Methodology and Data chapter were answered positively. Thus, our findings correspond with other studies on this topic conducted in other countries, see e.g. Borseková et al., 2021; Boschma and Fritsch, 2009; Hansen and Niedomysl, 2008; Sørensen et al., 2010; Vitálišová et al., 2020 and others mentioned earlier. At the same time, a similar level of regional disparities was confirmed in all three attributes analysed, with regions with a strong representation of creative actors, achieving significant economic growth and having a significant representation of activities classified as higher-order services, i.e. economic activities grouped in the quaternary sector. These regions include Prague and Central Bohemia and possibly Southeast where the second largest city of the Czech Republic is located. The Northwest region and the Central Moravia region can be seen as the counterpoint to these 'successful' regions.

Supporting the development of creativity in territorial space is one of the key elements of the macroeconomic and microeconomic role of the state and public institutions. The absence of creative actors slows down the endogenous processes of regional development and reduces the competitiveness of regions in the long run (Boix at al., 2015; Boix & Soler, 2015; Nevima, 2014; Novotná & Novotný, 2019; Sucháček, 2019; Turečková, 2014). It is therefore essential, with a view to strengthening the qualitative side of regional development, to form territorial socio-economic structures of infrastructure (Yum, 2020b) and partnerships (Rodrigues &

Franco, 2019) in which a responsible and loyal creative class will be formed, creating an active core generating procedural, functional and productive innovations with high added value and personal benefits for all stakeholders. The quality of the creative class is an important driver for economic prosperity in cities and regions (Florida, 2017; Ženka et al., 2021) and therefore it is essential to implement support for creative actors, especially in the form of small and medium-sized enterprises, in regional development strategies and regional support systems at the national and regional level (Borseková et al., 2021). The realized analysis of the importance of the formation of creative actors in the regions and the discussion of the role of creativity should emphasize its irreplaceability in the economic-social system. The results of the conducted research are also relevant for the formation of economic policy towards the all-round support of the formation and generation of creativity in the administered territory.

The added value of the analysis presented in this text and the results resulting from it is on three levels: (1) on the one hand, our results confirmed the general conclusions of other studies mentioned earlier and confirmed the very logic of the matter; (2) an analysis of this type has not yet been carried out for the Czech Republic and finally (3) the search for causality to the Quaternary sector is innovative, respectively its determination in previous studies is completely new.

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## Appendix: Data Matrix

**Table A: Original data of creative actors for the Czech Republic**

| Indicator | Core creative class employment | Higher education attainment | Human resources in science and technology | Employment in technology and knowledge-intensive sectors | Knowledge workers |
|---|---|---|---|---|---|
| | % of population aged 15-64 | population aged 25-64 with higher educational attainment. % of total population of age group | persons with higher education and/or employed in science and technology as of % labour force | as of % total employment | knowledge workers as % out of total employment |
| **Source** | Eurostat, LFS | Eurostat, LFS | Eurostat, Regional Science and Technology Statistics | Eurostat. Regional Science and Technology Statistics | Eurostat, LFS |
| **NUTS 2** | avg 2015-2017 | avg 2015-2017 | avg 2015-2017 | avg 2015-2017 | avg 2015-2017 |
| **CZ00** Prague and Central Bohemia | 12.66 | 32.34 | 47.75 | 6.90 | 46.95 |
| **CZ03** Southwest | 6.94 | 19.27 | 33.30 | 3.68 | 32.56 |
| **CZ04** Nortwest | 5.62 | 13.97 | 28.90 | 1.99 | 29.75 |
| **CZ05** Northeast | 7.28 | 19.13 | 34.43 | 4.52 | 34.87 |
| **CZ06** Southeast | 9.14 | 25.13 | 39.40 | 4.97 | 38.59 |
| **CZ07** Central Moravia | 7.40 | 19.63 | 33.37 | 3.91 | 32.61 |
| **CZ08** Moravian-Silesian | 7.75 | 20.07 | 34.87 | 3.38 | 35.18 |
| **average** | 8.11 | 21.36 | 36.00 | 4.19 | 35.79 |
| **standard deviation** | 2.09 | 5.39 | 5.58 | 1.41 | 5.22 |

Source: Eurostat, LFS; Eurostat, Regional Science and Technology Statistics

**Table B: Original data of GVA (regional growth) and quaternary sector of the Czech Republic as an average of years 2015-2017**

| Indicator/NUTS2 | GVA (in thousands of CZK) | Quaternary sector (in thousands of CZK) | Quaternary sector (as % on regional sectoral structure) |
|---|---|---|---|
| **CZ00** Prague and Central Bohemia | 1661,606 | 584,755 | 35.19 |
| **CZ03** Southwest | 428,133 | 77,549 | 18.11 |
| **CZ04** Nortwest | 326,248 | 57,658 | 17.67 |
| **CZ05** Northeast | 505,890 | 91,541 | 18.10 |
| **CZ06** Southeast | 624,147 | 144,757 | 23.19 |
| **CZ07** Central Moravia | 404,534 | 68,519 | 16.94 |
| **CZ08** Moravian-Silesian | 406,946 | 78,721 | 19.34 |

Source: Authors' representation based on Czech Statistical Office