



## ORIGINAL ARTICLE


**Citation:** Kudełko, J., Żmija, K., & Żmija, D. (2022). Regional smart specialisations in the light of dynamic changes in the employment structure: the case of a region in Poland. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 17(1), 133–171. doi: 10.24136/eq.2022.006

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Article history: Received: 3.04.2021; Accepted: 24.01.2022; Published online: 25.03.2022


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## Regional smart specialisations in the light of dynamic changes in the employment structure: the case of a region in Poland

**JEL Classification:** J21

**Keywords:** *employment structure; employment dynamics; regional specialisations; smart specialisations*

### Abstract

**Research background:** Among the determinants of the socio-economic development of the region, an important role is played by its endogenous potential. It is reflected in the industry structure of the region, formed in the process of its historical development. The industry structure is the basis for the development of regional specialisations. One of the criteria for defining specialisations is the employment structure by sections and divisions of the national economy. The definition of regional specialisations is indispensable for planning the development policy and for formulating regional strategies.

**Purpose of the article:** The main objective of the paper is the analysis and evaluation of employment structure as a criterion for the delimitation of industries identified as smart specialisations in the region. The study covers the case of selected regions in Poland at NUTS-2 level — the voivodeship of Małopolska.

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**Methods:** The study is based on GUS unpublished data (Statistics Poland) for 2009 and 2018. It makes use of descriptive statistical analysis methods and structure and dynamics ratios, as well as Florence's specialisation coefficient.

**Findings & value added:** The research has shown that the employment structure indicating the presence of the region's specialisation in given industries is an important, but not sufficient criterion for the evaluation, whether the delimitation of industries recognized as smart specialisations was appropriate. In the light of the conducted research, it seems fully justified to grant the status of smart specialisation in Małopolska to Information and Communication Technologies as well as to Creative and Leisure Industries. In the context of changes to employment dynamics and structures, the possible development-oriented smart specialisations are as follows: Manufacture of metals and metal products, Electronics and machine industry, and Chemistry. On the other hand, the identified specialisations: Life science and Sustainable energy are not in line with changes in the region's employment structure. The paper proposes one of the possible ways of precise identification of distinctive regional industries with high development potential. The structure of employment and changes occurring in this area make it possible to determine the main forces of the region's endogenous potential, and thus may form the basis for the determination, and in the longer term, assessment of the relevance of identified regional smart specialisations. The added value of the study is, therefore, an attempt to assess, on the example of a selected region, to what extent changes in regional specialisations reflected in the existing employment structure confirm the accuracy of the selection of industries identified as regional smart specialisations. The presented case is an exemplification of the proposed method, which can also be successfully applied to other European regions.

## Introduction

In the recent years, smart specialisation has been at the centre of socio-economic development programmes and development policies in EU countries and regions. This concept is regarded by the European Commission as the main pillar of the Europe 2020 strategy, aimed to make the EU a smart and sustainable economy, which supports the idea of social inclusion (European Commission, 2010a, p. 2). Its great significance is stressed, among others, in “Europe 2020 Flagship Initiative. Innovation Union” (European Commission, 2010b, p. 8). In particular, this concept is the foundation of European reformed cohesion policies implemented after the year 2013, which lay greater emphasis on a place-based policy and stakeholders' engagement in the process of its creation (Barca, 2009, p. 7). The way in which a smart specialisation strategy is to become a guiding principle of the EU reformed cohesion policy is explained in *Regional Policy contributing to smart growth in Europe 2020* (European Commission, 2010c, pp. 6–7). The document states that regions should identify sectors, technologies and main areas in which it is possible to gain competitive advantage and to prioritise regional policies in the way which guarantees promoting innovation (McCann & Ortega-Argilés, 2015, pp. 1291–1302). Therefore, integrated smart specialisation strategies should meet complex development challenges by adapting policies to the national or regional context. This approach is

of key significance for all countries and regions, especially those that do not play a leading role in particular areas of science and technology. It allows for combining the development of the most innovative economic sectors with the interests of less developed regions, which can catch up with other areas as a result of a more effective use of financial means earmarked for sectors characterised by relative competitive advantage, reliance on endogenous regional resources, high levels of value added creation, and a significant share in the employment structure (Wojnicka-Sycz, 2020, pp. 33–55).

Due to the experimental character of policies based on smart specialisations, there are not any theories, methodological guidelines or recommendations and criteria for selecting priority activities, which results in the adoption of various approaches in this field (Szávics & Benedek, 2020, pp. 22–36). This means that none of the methods used in practice to determine smart specialisations are mandatory for universal application. Quantitative analyses only recommend that the estimation of a regional economy's level of specialisation be based on economic activity concentration, reflected, for example, in employment rates and the performance of particular sectors (Foray *et al.*, 2012, pp. 29–30). Most empirical analyses are based on data related to the structure of employment (Sobczak, 2012, pp. 219–232; Foray & Goenaga, 2013, p. 10), the number of businesses, employment dynamics or investment activities (Bal-Domańska *et al.*, 2020, pp. 785–810; Danilova *et al.*, 2019, pp. 2376–2390). Information about employment and its dynamics points to regional key resources reflected in labour force concentration in selected industries. Employment rates translate to the volumes of goods and services and regional value added. In light of the above, an analysis and assessment of employment in particular economic sectors is a significant, but not the only criterion for identifying smart regional specialisations.

A review of the literature by Lopes *et al.* (2019, pp. 38–68) shows that the most frequently discussed topics in the literature concern the links between smart specialisation and innovation, specialisation, entrepreneurial development, and the links between policies to stimulate smart specialisation and comprehensive regional development policies. Few studies analyse the ways and methods of selecting regional specialisations and priorities identified by regions and countries in their RIS3. As noted by Gianelle *et al.* (2020a, pp.1377–1388), existing work does not discuss criteria for assessing industries that could form the basis for delimiting smart specialisations.

The lack of unambiguous universally accepted practices in terms of methods for the determination of regional smart specialisations, using veri-

fiable and comparable statistical methods, indicates the need to undertake original research in this area. The paper proposes one of the possible ways of precise identification of distinctive regional industries with high development potential. The presented case of Polish region is an exemplification of the proposed method, which can also be successfully applied to other European regions.

The main objective of the paper is the analysis and evaluation of employment structure as a criterion for the delimitation of industries identified as smart specialisations in the region. The presented research study undertakes an attempt to verify a research hypothesis which states that specialisation of the region in a given industry expressed by the Florence's specialisation coefficient based on employment structure is a criterion confirming the accuracy of selecting an industry as a smart specialisation, indicated in the regional innovation strategy.

The presented study covers the case of selected region in Poland at NUTS-2 level — the voivodeship of Małopolska. It is based on GUS unpublished data (Statistics Poland) for 2009 and 2018. It makes use of descriptive statistical analysis methods and structure and dynamics ratios, as well as Florence's specialisation coefficient. The rest of the paper is structured as follows: Section 2 describes the background theory related to smart specialisation; Section 3 explains materials and methodology; Section 4 presents the results of research of changes in Małopolska's employment structure in particular sectors of the national economy, which allows for identifying regional leading specialisations; Section 5 presents a discussion based on a comparison between the results of empirical research and guidelines for Małopolska's regional smart specialisations selected by local self-governments. The last section presents conclusions.

## **Literature review**

The concept of smart specialisation originates from literatures analysing differences in productivity between the USA and Europe, which became visible after the year 1995 (van Ark *et al.*, 2008, pp. 25–44). It was presented for the first time by Dominique Foray and Bart van Ark, who developed it together with other members of the Knowledge for Growth expert group, called into being by the European Commission in 2005 (Foray *et al.*, 2007, pp. 5–9; Foray & van Ark, 2007, pp. 24–27). Originally, the concept was sectoral in character, but in the course of time it was also applied at the regional level (Foray *et al.*, 2015, pp. 458–480). In the latter approach, it serves as a tool for implementing a policy aimed to support development,

competitiveness and creation of innovation strategies in EU countries and regions (OECD, 2013, p. 19; Capello & Kroll, 2018; Murzyn, 2018, pp. 8–20).

The development of a Smart Specialisation Strategy (RIS3) was a prerequisite for the eligibility of ERDF funding under the European Cohesion Policy for the period 2014–2020 (European Union, 2013). Smart Specialisation Strategies were formally included in the mandatory strategic documents in the European regions as operational documents from 2014. Thus, the concept of smart specialisation was integrated into European cohesion policy and became the frame of reference for innovation policy in European regions and countries.

The concept of developing smart specializations is an ambitious pre-concept that is still in the formative stage (Kuznetsov & Sabel, 2017, pp. 51–72). The concept is still relevant and is the subject of interest of many scientists. Emerging scientific studies cover various aspects related to: smart specialisation policy, the construction of RIS3, their practical implementation in the regions, ways of delimiting regional smart specialisations and, within them, determining economic sectors receiving support under the available financial instruments.

According to the idea of smart specialisation, public intervention within the policy supporting smart specialisation must be selective, i.e. focused on a specific economic activity (Radosevic, 2017, pp. 1–36). Kalle *et al.* (2017, pp. 289–300) state that it is widely accepted that public interventions should be preceded by the identification of a region's strengths and weaknesses. Lopes *et al.* (2019, pp. 38–68) also confirm that the starting point for constructing RIS3 is to identify the characteristics and specific strengths of each region. They note, however, that there is no consensus on whether projects that have been or are successful in other regions should be planned and new innovative sectors developed (good imitation), or whether deepening specialisation in industries already existing in the region should be promoted.

Another aspect undertaken in the research is the positioning of smart specialisations in the implemented regional policy. Gianelle *et al.* (2020a, 1377–1388) investigate how and to what extent smart specialisations are translated into strategic decisions and policy interventions. They analyse how policy priorities are identified and described in regional and national smart specialisation strategies. McCann and Ortega-Argilés (2016, pp. 1407–1427) undertook similar research to assess the extent to which new EU cohesion policy regulations and guidelines relating to smart growth have actually been translated into actual changes in policy measures.

The researchers also draw attention to the existing conditions and barriers that limit the effectiveness of policies promoting the development of smart specialisations. Marques and Morgan (2018, pp. 275–293) study the determinants of policy making in peripheral European regions. They conclude that the hindering factor is the low institutional capacity in the least developed regions that need the most help. Kroll (2017, pp. 99–123) and Sotarauta (2018, pp. 190–203) agree that much depends on institutional structures and the quality of governance in the region, as well as the knowledge and preparation of regional authorities and administrative staff.

In response to the changes in the determinants of regional economies, that occurred as a result of the Covid-19 pandemic, Gianelle *et al.* (2020b, 1323–1327) identify challenges for smart specialisation policies to effectively contribute to sustainable post-pandemic recovery. In particular, the authors recommend: strengthening political capacity and institutional infrastructure capabilities; selectively supporting those activities that are able to generate added value; supporting private entrepreneurs in their efforts to meet new challenges; and strengthening the analytical base that serves the design of smart specialisation policies.

In addition, the need to move the economy towards environmental sustainability is mentioned among the current challenges of regional economies. Smart specialisation provides an appropriate framework for coordinating investments in key enabling technologies to achieve this goal (McCann & Soete, 2020). Smart specialisation policies can influence the environmental sustainability of regions by supporting the development of environmentally friendly production system technologies (Montresor & Quatraro, 2020, pp. 1354–1365).

The rationale for developing innovation policies based on smart specialisations is described by two significant statements (Kogut-Jaworska & Ociepa-Kicińska, 2020, pp. 1–21):

1. regions (countries) are not capable of achieving satisfactory results in all areas of science, technology and innovation;
2. they must promote those spheres in which they may create unique knowledge bases and gain competitive advantage.

In light of the above, smart specialisations should reflect a unique character and originality of regions and countries.

According to the basic assumption of this concept, development should be based on an endogenous potential, which implies that all regions and countries should identify their individual and unique resources (key success factors), characterised by the greatest development potential and creating conditions for innovativeness, and then select a small number of key areas for possible specialisation based on the previously identified potential

(Bański & Mazurek, 2018, pp. 5–30). This approach will enable countries and regions to identify their appropriate and unique position based on local resources in a knowledge based economy. Consideration given to a region's endogenous potential, its key competences and competitive advantages in the course of identifying priority areas is likely to increase competitiveness and ensure dynamic and sustainable development, eliminating the thoughtless imitation of educational or investment programmes. From the perspective of regional policies, an approach based on smart specialisation provides opportunities for understanding the evolutionary character of regional economies, as well as for developing appropriate policies (McCann & Ortega-Argilés, 2015, pp. 1291–1302).

Regions' key challenge is to identify those actions and areas in which new R&D and innovation projects are likely to create future potential and inter-regional comparative advantage. According to the analysed concept, the identification of smart specialisation is not based on top-down selection of priorities, but on stimulating entrepreneurial discovery processes, understood as a grassroots interactive process in which market forces along with the private sector identify new areas of specialisation which may be productive when supported by the public sector for the purpose of enhancing smart and sustainable growth (Foray, 2013, pp. 55–82; Hermosa *et al.*, 2014, pp. 5–22). Entrepreneurs are assigned a key role in identifying key areas for future regional specialisation — they are best acquainted with the existing competitive potential thanks to the innovative use of all local resources. Such an approach places entrepreneurship and its role in stimulating innovation at the centre of economic development regional programmes (Foray *et al.*, 2015, pp. 458–480).

Empirical studies indicate that despite similar production factors, countries and regions, thanks to the self-discovery process — e.g. through adapting the same technology to local conditions — may specialise in very different activities, which results in a strategy of diversifying within a specialisation. The key to effective diversification is the use of related variety, which means that a regional economy should build its competitive advantage by diversifying its unique local know-how and adopting various related solutions and innovations. New solutions must be realistic and available in the context of existing resources, allowing for the use of experience gained by regional stakeholders (Foray *et al.*, 2012, p. 15). The principle of relatedness (Hidalgo *et al.*, 2018; Vicente *et al.*, 2018, pp. 1013–1041) suggests that the advantages of proximity may also apply to interacting activities that are similar in aspects other than spatial. Such interactions support the development of complex activities that rely on specialized

combinations of complementary knowledge and skills (Balland *et al.*, 2020, pp. 248–254).

There are at least two reasons why relatedness and complexity may contribute to employment growth. First, the clusters of related activities promote innovation. Competitive forces stimulate increased employment in those clusters in order to use their potential in creating knowledge and spillovers (Delgado *et al.*, 2014, pp. 1785–1799). Secondly, areas characterised by related and complex activities are more resilient to labour market shocks because if demand for employees in one activity falls, then redundant workers can quickly regain employment in another activity requiring similar knowledge and skills (Davies & Maré, 2021, pp. 479–494; Morkutė *et al.*, 2017, pp. 958–971; Neffke & Henning, 2013, pp. 297–316). It implies that correctly selected smart specialisations should translate to employment growth and greater labour market specialisation in industries belonging to priority areas. Thus, an increase in employment specialisation in industries identified as regional smart specialisations should be a confirmation of the accuracy of their selection. This aspect is the subject of research in the presented publication.

## **Research method**

The spatial scope of the analysis covers selected region in Poland at NUTS-2 level — the voivodeship of Małopolska. The empirical study is based on unpublished statistical data provided by Statistics Poland for 2009–2018, related to the number of employees in the particular divisions of the national economy. Public statistics does not provide data concerning employees in national economy by divisions and by regions — it presents information at a higher level of aggregation, i.e. the sections of the national economy. The original data related to the number of employees originates from a GUS survey concerning demand for labour, based on representative data covering entities with one or more employees. Synthetic conclusions resulting from this survey are published cyclically each year by the Statistical Office in Bydgoszcz, Centre for Labour Market Surveys and Analyses in the form of the study Statistical Information: The demand for labour. As mentioned, detailed data on the number of employed persons in the region in particular divisions of the national economy are not made available to the public. For the purposes of this study, they were purchased from the Statistical Office in Bydgoszcz. On their basis a set of detailed statistical data was prepared for a selected research sample (the voivodeship of Małopolska). The analysis was carried out and detailed conclusions were formu-



lated at the level of divisions of the national economy. The Polish Classification of Activities (PKD-2007), on which the results were based, was elaborated on the basis of statistical classification of economic activities of the European Union NACE Rev.2.

The empirical study presented in the paper is based on statistical analysis dynamic methods using structure and dynamics indicators. The analysis of Małopolska's regional specialisation based on the employment structure makes use of Florence's location quotient (Bronisz, 2018, pp. 173–181; Billings & Johnson, 2012, pp. 642–647; Guimaraes *et al.*, 2009, pp. 360–364):

$$LQ_i = \frac{\frac{Z_{iR}}{Z_R}}{\frac{Z_{iK}}{Z_K}} \quad (1)$$

where:

- $LQ_i$  specialisation coefficient in  $i$ -th division/section of region's economy,
- $Z_{iR}$  value of analysed characteristic in  $i$ -th division/section of region's economy,
- $Z_{iK}$  value of analysed characteristic in  $i$ -th division/section of national economy,
- $Z_R$  value of analysed characteristic in all divisions/sections of region's economy,
- $Z_K$  value of analysed characteristic in all divisions/sections of national economy.

Employment-based LQ is a measure of the concentration of the workforce employed in a particular industry across the nation. It can reveal what makes a specific region “unique” in comparison to the national average (Delgado *et al.*, 2016, pp. 1–38). The value of the quotient above 1 indicates that with regard to the analysed characteristic (here: the share of employees in a given sector in the total number of employees in the national economy), the voivodeship is characterised by a greater concentration than the national average. For the purpose of this work, the sections of the national economy, referred to as specialisations in the region of Małopolska, include those for which the value of the quotient is equal to or greater than 1.3.

At a later stage of the analysis, the results of the empirical study concerning Małopolska's specialisations, determined on the basis of employment structures in the particular sectors of the national economy, are referred to smart specialisations identified by regional self-government — Marshal Office of Małopolska Region (Małopolska Smart Specialisations, 2018). It allows for assessing the degree to which Małopolska's delimited smart specialisations correspond to the ongoing concentration of the labour

force in selected sectors of the national economy, representing one of a region's key resources. The conducted analysis covers the years 2009 and 2018. The selection of the analysed period results from the intention to present a relatively long period of time (allowing for describing changes over a period of 9 years), as well as from the availability of GUS statistical data.

## Results

The process of identifying Małopolska's smart specialisations complies with the recommendations of RIS3 methodology (Foray *et al.*, 2012, p. 17) and is based on a region's long-standing principles and practices concerning cooperation among the key stakeholders of regional innovation policies (Małopolska's economic and scientific entities, supporting institutions and public authorities) (Małopolska Smart Specialisations, 2018, p. 4). This multi-stage process, commenced as early as in 2009, includes a verification analysis of Małopolska's regional specialisation areas, based on the system of indicators covering three analytical fields: general economic data, industrial data, and data concerning science and public support. Therefore, the verification of a region's key specialisation areas is based on the following three criteria (Cholewa *et al.*, 2016, p. 12):

- Małopolska's comparative advantage in the following areas: employment, compensation systems, corporate demography (the number of enterprises), and the ways in which it is reflected in the region's export specialisation (criterion 1).
- Dynamics of marketed production and industry's innovativeness (criterion 2).
- Scientific and technological potential (measured by R&D expenditure and companies' activities aimed to gain public support for innovation activities (criterion 3).

In 2014, Małopolska's authorities approved the final list of smart specialisations. Seven specialisations were identified:

1. life science,
2. sustainable energy,
3. information and communication technologies,
4. chemistry,
5. manufacture of metals and metal products and non-metallic mineral products,
6. electrotechnics and machine industry,
7. creative and leisure industry.

The analysis of changes on Małopolska's labour market with regard to the employment structure in 2009 and 2018 allows for presenting the sectoral concentration of labour force and determining whether the highest concentration rates are recorded in smart specialisation industries. The analysis was conducted at the level of sections and divisions of the national economy as indicated in the Polish Classification of Activities (PKD) (*Regulation...*, 2007).

In the analysed 9-year period, Małopolska has strengthened its specialisations in economic service sectors. Simultaneously, the position of industrial sectors becomes weaker (Table 1, Table 2). The process of changes in 2018 leads to creating the region's dominant specialisations. In the service economic sectors Małopolska is distinguished on a national scale by the following sections: Information and Communication, and Professional, Scientific and Technical Activities.

Under the section Information and Communication, the most spectacular progress has been made in *Services related to information*. This area includes data processing, internet website management, internet portal activities and other information-related services. In 2009-2018, the number of employees in this section increased by 241.9% (the number of employees in Poland in this period increased by 109.3%)<sup>1</sup>. In 2018, this industry represented 0.7% of employees in the voivodeship (an average for Poland — 0.3%). Małopolska accounted for 22.8% of employees representing this section in Poland (fig.1). These great employment dynamics contributed to the region's specialisation in the area of information-related services. At the end of 2018, the specialisation coefficient reached a very high level of 2.7 (in 2009 — 1.6) (fig. 2). Other information and communication activities developed in this section include *Activities related to software and information-related advisory services and related activities*. In the entire analysed period this area represented a much higher labour concentration in Małopolska than in other voivodeships (in 2018 — 2.0% as compared with 1.2% in Poland). In 2018, as many as 13.7% of Poland's employees in this section were employed in Małopolska, while the specialisation coefficient in the region stood at 1.6 (as compared with 1.5 in 2009). Another specialisation of the region are *Activities related to the production of films, video recordings, tv programmes and sound and music recordings*. The specialisation coefficient in this area reached the level of 1.5 in 2018 (in 2009 — 1.3). The region's share in Poland's total employment rose steadily, ac-

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<sup>1</sup> The cited data concerning Poland's entire territory, similarly to the case of Małopolska, is based on GUS unpublished information (Poland Statistics). Due to the limitations of this work, individual data for Poland is not presented.

counting for 13.1% of all employees in this section in 2018 (as compared with 11.2 in 2009).

Małopolska is also marked by a very large number of employees who represent Professional, scientific and technical activities. Under this section, the region specialises in *Other professional, scientific and technical activities and Legal, accounting and tax advisory activities*. *Other professional, scientific and technical activities* include specialised design services, photography, translation services and other professional activities not included under other classifications. In 2009–2018, the number of the region's employees in this section rose by 502.1% (an average increase in Poland – 38.5%), which resulted in a very high share of the region in Poland's total employment in this area — 18.8% in 2018, while the region's specialisation coefficient was at the level of 2.2 (rising from 0.5 in 2009). A very high level of the specialisation coefficient is also recorded in *Legal, accounting and tax advisory activities* (1.8 in 2018, and 1.3 in 2009). This sector was also marked by high employment dynamics — an increase by 171.2% (average value for Poland — 94.8%). In 2018, it represented 2.5% of the region's employees (an average for Poland — 1.3%), and 15.8% of Poland's total number of employees in this section.

A relatively lower, but still high, specialisation is recorded in the selected areas of the following sections: Arts, Entertainment and Recreation; Accommodation and Food Service Activities, and Administrative and Support Service Activities.

With regard to Arts, Entertainment and Recreation, Małopolska specialises in two areas: *Activities related to libraries, archives, museums and other cultural activities*, and *Creative activities related to culture and entertainment*. The specialisation coefficient for these areas in 2018 was 1.4 and 1.3, respectively (in 2009 — 1.3 and 1.1). In both cases, specialisation was expanded. Małopolska represented 11.9% and 11.0% of Poland's employees in these areas, and the number of employees in the analysed years increased by 31.8% and 24.0%, respectively.

Accommodation and Food Service Activities include two areas of economic activity: *Accommodation* and *Food service activities*. Both areas can be regarded as Małopolska's specialisations. *Food service activities* achieved the region's specialisation coefficient of 1.2 (2009) and 1.3 (2018). Its share in Poland's employment in this sector was at a similar level (2018 — 11.0%). In the analysed period the number of employees increased by 55.2%. The specialisation level in *Accommodation* decreased in 2018 as compared with the previous years (the respective coefficient — 1.2). It should be noted that specialisation in the previous years was more

visible (from 1.2 to 1.9). Also, the share in the national economy decreased, but in 2018 it was still considerable — 10.6%.

Under the section Administrative and Support Service Activities, Małopolska specialises only in one of six economic areas — *Office administrative activities and other business support activities*, for which the specialisation coefficient reached the level of 1.5 in 2018, but it should be noted that the region's specialisation in this area started as late as in 2016.

Apart from services, Małopolska specialises in Construction, especially in such areas as *Construction works related to erecting buildings* and *Specialised construction works*. In both construction areas, the specialisation coefficient in 2018 had the value of 1.3. It should be noted that this value remained stable throughout the analysed period. As compared with 2009, the number of employees increased in 2018 by 21.1% and 37.9%, respectively (the respective values for Poland — 7.1% and 26.1%). In the last year of the analysis the two areas represented 11.4% and 11.1% of Poland's employees.

As already mentioned, Małopolska's position in the sector of industrial activities became weaker. The economic activities under Manufacturing, in which the region still specialises but on a limited scale, include *Manufacture of leather and leather products*, *Manufacture of tobacco products*, *Manufacture of metals*, *Printing and reproduction of recorded media*. It should be noted that despite a decreased share of these areas in the region's economy, they still represent strong significant specialisations, concentrating a large proportion of the regional and national labour force.

With regard to *Manufacture of leathers and leather products*, the specialisation coefficient in 2018 remained at a very high level of 2.2, although slightly lower as compared with the previous years, when its value was as high as 3.2. In 2018, the sector accounted for 0.4% of the region's labour force (twice as high as Poland's average level — 0.2%). Małopolska represented as many as 18.9% of Poland's employees in this sector, but it was well below the level of 2009 — 27.8%. An even larger decline in the number of employees was recorded in *Manufacture of tobacco products*. In 2018, the voivodeship accounted for 16.6% of the industry's labour force in Poland, as compared with 51.8% in 2009. In the analogous period, the specialisation coefficient decreased from 6.1 to 1.9. An equally high specialisation coefficient is recorded in *Manufacture of metals* — 1.8. In this case, the value of the coefficient decreased slightly from 2.0 in 2009. In 2018, Małopolska represented a large proportion of Poland's employees (15.6%), but this level was considerably lower as compared with the best period of 2013-2014 when the coefficient exceeded 19.0%. The value of the specialisation coefficient in *Printing and reproduction of recorded media* varied

from year to year (reaching the level of 1.6 at the end of 2018, as compared with 1.3 in 2009). The region's share in Poland's total employment increased from 11.3% in 2009 to 14.0% in 2018.

Among the areas belonging to Manufacturing, a special case is represented by *Manufacture of computers, electronic and optical equipment*. Unlike the above industrial economic sectors, this area is on the rise in the region of Małopolska. Its share in the country's labour force increased from merely 7.9% in 2009 to 11.7% in 2018. The number of employees increased in this period by 51.0% (Poland's average — 2.7%). As a result of these positive changes, the region's specialisation coefficient in this sector increased from 0.9 to 1.4.

An assessment of an appropriate manner of identifying regional smart specialisations should give consideration to a region's labour market specificity, developed in the course of its development and reflected in the employment dynamics and structures of particular economic sections and areas.

In view of the above, granting the status of smart specialisation to Małopolska in the area of *Information and communication technologies* seems to be fully justified. Its employment dynamics and structure testifies to the region's specialisation in services related to information, including data processing and online resource management, as well as information-related and advisory services. Simultaneously, rapid development is recorded in the manufacture of computers and reproduction of recorded media.

Another specialisation which does not raise any doubts is represented by *creative and leisure industries*. In terms of employment, Małopolska distinguishes itself in creative activities related to culture and entertainment, especially activities carried out by libraries, archives, museums and other culture-related entities. Also, the region specialises in the production of films, video recordings, tv programmes, sound and music recordings, as well as photography and specialised design services. It is actively engaged in tourism activities, which is reflected in above average employment rates in accommodation and food service activities.

The choice of the smart specialisation — *production of metals, metal products and non-metal mineral products* — is confirmed by a relatively high level of employment in the production of metals. With regard to the production of non-metal mineral products, the region's employment and competitive advantage have decreased in the recent years. Designating this sector as the region's specialisation may be an attempt to regain its former position.

The smart specialisation *Electronics and machine industry* is designed to include the manufacture and development of electronic, optical, electric

and mechanical products as well as the manufacture of vehicles and other transport equipment. Małopolska is already characterised by high specialisation in the manufacture of electronic and optical products, which is reflected in employment and its dynamics. The manufacture of machines and electric devices is on the rise, which is a positive trend, but it requires support in increasing its dynamics and further development. The area of the manufacture of vehicles and other transport equipment is characterised by a dynamic increase in the number of employees in the last decade. However, this sector cannot be referred to as the region's specialisation, but a potential development opportunity if employment dynamics is maintained in the years to come.

Also, the smart specialisation *Chemistry* is an area for potential development, considering employment rates in the sector. The region records an increasing trend in the manufacture of chemical products. However, it has lost its relative advantage in the manufacture of gum products and plastics as well as mineral products. The region's development opportunity lies in regaining its former position in this sector.

The smart specialisation *Life science* is a broad category, and it can hardly be related to specific economic sectors. Małopolska's programme documents assume that it is related to biotechnology and products and technologies used in prevention, diagnostics and the medical treatment of people and animals. Employment dynamics and structure does not confirm the region's competitive advantage in this sector. A relatively declining trend is recorded in the section Scientific research and development work (including scientific research and development work in biotechnology). The region's specialisation — in terms of the number of employees — does not include the manufacture of basic pharmaceutical substances and medications. Therefore, there is a need in these areas for undertaking intensified pro-development activities.

Also, the data related to sectoral employment rates does not fully justify the choice of *Sustainable energy* as a smart specialisation. It can only be stated that Małopolska does not specialise — in terms of employment rates — in the generation and supply of electricity, earth gas and water.

When identifying Małopolska's smart specialisations, the authors of strategic documents did not consider a visibly emerging specialisation in legal, accounting and tax advisory services, and administrative and support services. Given the significance of modern professional corporate services in legal, financial and accounting areas in the rapidly developing competitive global economy, this sector could be recognised as a significant business sector in the region of Małopolska.

The identified smart specialisations do not consider the region's well-established and long-standing position in the business sector related to construction, including specialised construction works. It may be due to the fact that construction is mistakenly classified as a traditional sector. In the era of the rapid development of technologies, this sector must be innovative to survive on a competitive market. Also, demand for high quality construction works is not likely to decrease. It should be noted that construction was considered as a key specialisation area, but it was not granted this status.

## **Discussion**

The issue of regional smart specialisations is undertaken by many authors. Much of the research published in recent years has focused on finding links between the effectiveness of RIS3 implementation and the level of development of regions or on issues how to increase the effectiveness of smart specialisation policies. Morgan (2017, pp. 569–583), examining the effects of smart specialisation policies, noted the benefits associated with new institutional arrangements introduced in the Basque Country region. The involvement of multiple actors and institutions has brought positive effects, enabling private and public partners to work together to develop joint projects.

Other studies point out that not all territories have the same capacity to attract innovative projects. Research on Polish regions has showed that in the aspect of the location of projects implemented in the framework of Polish Smart Specialisation, their geographical concentration around major cities and equally limited opportunities to attract and implement smart specialisation strategies in rural areas and smaller towns were observed (Mieszkowski & Barbero, 2021, pp. 390–401).

Due to the novelty of the policy, neither the theory nor the methodological guidance provides detailed advice or a set of criteria to be used in selecting priorities. The lack of selection criteria leads regions to take different approaches when defining smart specialisations. Studies covering different EU Member States and regions show that there is no homogeneity among them regarding the delimitation patterns of thematic and sectoral specialisations (McCann & Ortega-Argilés, 2016, pp. 1407–1427). Moreover, regional strategies lack guidance on the policies applied and tools implemented. Authors also note that RIS3 do not sufficiently take into account the specificities of regions.

Gianelle *et al.* (2020a, pp. 1377–1388), on the basis of study covering 39 smart specialisation strategies developed in Italian and Polish regions,



analysed the priorities indicated in RIS3 of each region. The authors noticed some shortcomings. They noted that a common feature of the analysed strategies is a multi-level structure of priorities, in which higher levels consist of a large number of priorities, defined at a lower level. As a result, the priority trees are excessive. Setting too many priorities goes against the concept of smart specialisation, which promotes the principle of selective intervention and concentration of public resources on a limited number of priorities. The authors also observed that there are no differentiated policy instruments, categories of beneficiaries, funding principles for projects belonging to different priorities. In addition, some projects financed under RIS3 are not innovative and do not fit in with the smart specialisation priorities. Other studies confirm that many regions lack the ability to choose smart specialisation policy priorities, as too many very broad priorities are set (Tripl *et al.*, 2020, pp. 1328–1340). Hassink and Gong (2019, pp. 2049–2065) argue that more rigorous measurements of smart specialisation are still needed.

The majority of scientific publications aimed to delimit territorial specialisations present certain general conclusions. For example, Markowska *et al.* (2016, pp. 31–65) use statistical methods and identify four EU classes of regions specialising in agriculture, services, multi-function and industrial activities. Brańka (2016, pp. 245–261), in her analysis of Małopolska's specialisations based on employment structure, delimits the region's areas, pointing to the dominance of the tourism sector in the Tatra powiat and the mining sector in the powiat of Olkusz (powiat is an administrative entity, translator's note).

There are two basic approaches to identifying smart specialisations in Polish regions, reflecting regional policy styles: reference can be made to specific sectors or to different levels simultaneously. In this case the strongest sectors are identified in terms of their economic potential. The identification is based on an analysis of statistical data related to available resources (e.g. employment levels) or value added contributed by different PKD Divisions by which the Polish economy is categorised. The second approach is more comprehensive in character and requires identifying sectors with a large potential in terms of innovation, human resources and knowledge, using simulations as part of an active entrepreneurial bottom-up discovery process with the participation of key partners, research centres, universities, companies and regional authorities (Markowska *et al.* 2016, pp. 31–65; Bański & Mazurek, 2018, pp. 5–30; Sobczak & Bal-Domańska, 2013, pp. 349–360). In this approach, identified specialisations can comprise various areas of life, science and economy. In light of the presented research it seems that Małopolska combined both approaches

because the identified smart specialisations include industries with a considerable number of employees as compared with other Polish regions as well as those with lower than average employment rates, but allowing for the use of other endogenous regional resources.

Kalle *et al.* (2017, pp. 289–300) conducted research in the regions of East Anglia in the UK, North-West Germany, Southern Denmark and Møre in Norway, whose economies are based on the development of the offshore wind industry. The authors argue that smart regional specialization should build on existing resources, both tangible and intangible, which should be strengthened and developed within a network of functioning businesses. The role of policy is to provide the right framework conditions for their development.

Gianelle *et al.* (2018, p. 5; 2019, pp. 1377–1388) in their analysis of regional and national strategies identified four dimensions used in different combination in order to define smart specialisations. They should cover: (1) sectors or value chains that reflect economic activities, (2) key enabling or general purpose technologies that activate transformation, (3) societal challenges that need to be overcome at European or the specific territorial level, (4) specific resources that can be exploited (i.e. natural or cultural resources). In the light of the above results the substantial stock of human capital provided by the employees in the region can be considered as a good measure for the validation of regional smart specialisations.

The review of the literature leads to the conclusion that the practice of constructing RIS3 lacks coherent and more detailed criteria for the delimitation of smart specialisations of regions. In the light of the above observations, it seems that there is a need for further in-depth research on the methods and measures enabling the recognition of regional smart specialisations, as well as verification of their validity. In this respect, this study fills the existing research gap. The paper proposes one of the possible ways of precise identification of distinctive regional industries with high development potential. The structure of employees and changes occurring in this area make it possible to determine the main strengths of the region's endogenous potential and thus can form the basis for the determination, in the longer term, assessing the relevance of the identified regional smart specialisations.

The paper's valuable contribution to scientific research lies in its attempt to present a very detailed identification of Małopolska's specialisations, based on data related to the divisions of the national economy, which was facilitated by the use of statistical data not available in public statistics (which presents information at a higher level of aggregation, i.e. economic sections). The paper's value added is also an attempt to assess the degree to

which changes in regional specialisations reflected in the existing employment structure confirm the accuracy of selecting industries identified as regional smart specialisations. The example of the Małopolskie Voivodeship is an exemplification of the proposed method, which can also be successfully applied to other European regions. Its advantage is also the possibility of conducting comparative research between different territorial units.

## **Conclusions**

The conducted research study allowed to assess the validity of the selection of Małopolska's smart specialisations based on changes in the dynamics and structure of employment in the particular economic sections of the voivodeship in 2009–2018. In the analysed period the region strengthened its specialisations in the service sectors of the economy. Simultaneously, the significance of industrial sectors decreased. Małopolska's dominant specialisations include activities related to the section Information and Communication (services related to information, software, advisory services, production of films, video recordings, tv programmes, and sound and music recordings), and the section Professional, Scientific and Technical Activities (legal and accounting activities, tax advisory services, and other professional, scientific and technical activities). Slightly lower, but higher than average, employment levels are recorded in the following sections: Arts, Entertainment and Recreation (libraries, archives and museums, and activities related to culture and entertainment), Accommodation and Food Service Activities, Administrative and Support Service Activities (administrative office services and economic activity support services). Apart from services, the voivodeship specialises in the activities belonging to the section Construction (construction works related to the erection of buildings, and specialised construction works).

Despite the fact that the region's specialisation in industrial activities has deteriorated, it still distinguishes itself in selected areas belonging to this section: Manufacturing, i.e. manufacture of leather and leather products, tobacco products, metals, printing and reproduction of recorded media. Unlike the above mentioned activities, the region is characterised by a dynamic development of the division Manufacture of computers, electronic and optical products, which is reflected in the growing significance of these activities in the regional and national employment structure.

In light of the conducted research, it seems fully justified to grant the status of smart specialisation to Information and Communication Technologies as well as to Creative and Leisure Industries. In the context of chang-

es to employment dynamics and structures, the possible development-oriented smart specialisations are as follows: Manufacture of metals and metal products, Electronics and machine industry, and Chemistry. On the other hand, the identified specialisations: Life science and Sustainable energy are not in line with changes in the region's employment structure. The presented research indicates that the scientific hypothesis adopted at the beginning of the paper that "specialisation of the region in a given industry expressed by the Florence's specialisation coefficient based on employment structure is a criterion confirming the relevance of selecting an industry as a regional smart specialisation" was positively verified, but only in part. Małopolska does not specialise — in terms of employment rates in some industries, identified as smart specialisations, in others, it shows specialisation, but in dynamic terms it is decreasing in relation to rates indicated in the country.

In summary, it can be concluded that the concentration of labour resources in the particular divisions of the national economy is a significant indicator to be considered in assessing regions' endogenous potential. It reflects a historical process of the development of the population's qualifications and professional experience. Also, a large number of employees in a given sector translates to the effects of its functioning — production output, sales or value added. However, it should be noted that the employment dynamics and structure is one of many criteria that can be used to identify regional smart specialisations.

The authors are aware of certain deficiencies of the conducted research. The paper focuses on one criterion of identifying a region's smart specialisations – the workforce potential reflected in the dynamics and structure of employment. This criterion should be regarded as an extremely significant element of the delimitation of regional smart specialisations, allowing for assessing the critical mass of a given sector, but certainly not the only element. Developing specialisation strategies at the regional level requires the use of data to diagnose strengths and weaknesses in technological, economic, innovative and scientific capabilities of the region. The proposed indicator refers to an important element of endogenous potential in the region but it focuses mainly on the past and present, without being able to capture emerging opportunities for the future.

Conclusions from this study indicate directions for further research. There is a need for further in-depth research on the search for methods and measures to identify regional specialisations, especially these emerging, as well as verification of the rationale for selecting regional smart specialisations. The delimitation process involves taking into account many different

issues. The identification and exploration of delimitation factors covering these issues is a significant area of further research.

Future studies could be extended to the search for other determinants of regional smart specialisations, apart from the structure of employment, which can be identified using the proposed statistical method based on the specialisation coefficient. Other aspects analysed could include e.g. the number and structure of businesses operating in the regions, the size and structure of production and sales of goods, or the value of investments in relation to different divisions of the national economy.

An important direction for future research would also be the empirical application of the proposed research method in other European regions. It would be interesting to carry out comparative studies between different regions of the European Union in terms of the specialisation of regions measured on the basis of various proposed characteristics. Another aspect of future research could be the verification of the validity of the priorities adopted in RIS3 in European regions on the basis of statistical analysis based on the specialisation coefficient in relation to different features of regional economies.

## References

- Bal-Domańska, B., Sobczak, E., & Stańczyk, E. (2020). A multivariate approach to the identification of initial smart specialisations of Polish voivodeships. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 15(4), 785–810. doi: 10.24136/eq.2020.034.
- Balland, P. A., Jara-Figueroa, C., Petralia, S., Steijn, M., Rigby, D., & Hidalgo, C. A. (2020). Complex economic activities concentrate in large cities. *Nature Human Behaviour*, 4(3), 248–254. doi: 10.1038/s41562-019-0803-3.
- Bański, J., & Mazurek, D. (2018). Smart specialisation and the internal potential of regions in Poland. *Folia Geographica*, 60(1), 5–30.
- Barca, F. (2009). An agenda for a reformed cohesion policy. A place-based approach to meeting European Union challenges and expectations (Independent report prepared at the request of Danuta Hübner, European Commissioner for Regional Policy, April). Retrieved from [https://ec.europa.eu/regional\\_policy/archive/policy/future/pdf/report\\_barca\\_v0306.pdf](https://ec.europa.eu/regional_policy/archive/policy/future/pdf/report_barca_v0306.pdf) (20.03.2021).
- Billings, S. B., & Johnson, E. B. (2012). The location quotient as an estimator of industrial concentration. *Regional Science and Urban Economics*, 42(4), 642–647. doi: 10.1016/j.regsciurbeco.2012.03.003.
- Brańka, P. (2016). Identification of regional specializations possibilities on the basis of information on the sources of inhabitants' income on the example of Małopolskie voivodeship. *Studia KPZK PAN*, 170, Warszawa: KPZK PAN, 245–261.

- Bronisz, U. (2018). Local specialization of cities of the Lubelskie voivodship, *Barometr Regionalny*, 16(2), 173–181.
- Capello, R., & Kröll, H. (2018). *Regional innovation strategies 3 (RIS3)*. London: Routledge.
- Cholewa, M., Geodecki, T., Kulczycka, J., Nowaczek, A., Mamica, Ł., Możdżeń, M., & Zawicki, M. (2016). *Impact of regional smart specialisations on the economic development of Małopolska region*. Kraków: Małopolska Szkoła Administracji Publicznej, Uniwersytet Ekonomiczny w Krakowie, 14–15.
- Danilova, I., Pravdina, N., Dzenzeliuk, N., & Kochegarova, L. (2019). Sector specializations of regions: criteria of localization and efficiency. In K. S. Soliman (Ed.). *Vision 2025: education excellence and management of innovations through sustainable economic competitive advantage*. Madrid: International Business Information Management Association, 2376–2390.
- Davies, B., & Maré, D. C. (2021). Relatedness, complexity and local growth. *Regional Studies*, 55(3), 479–494. doi: 10.1080/00343404.2020.1802418.
- Delgado, M., Porter, M. E., & Stern, S. (2014). Clusters, convergence and economic performance. *Research Policy*, 43(10), 1785–1799. doi: 10.1016/j.respol.2014.05.007.
- Delgado, M., Porter, M. E., & Stern, S. (2016). Defining clusters of related industries. *Journal of Economic Geography*, 16(1), 1–38. doi: 10.1093/jeg/lbv017.
- European Commission (2010a). Europe 2020 – a strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC2020&from=en> (16.03.2021).
- European Commission (2010b). Europe 2020 flagship initiative. Innovation union, COM(2010) 546 final. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0546&from=EN> (16.03.2021).
- European Commission (2010c). Regional policy contributing to smart growth in Europe 2020, COM(2010)553 final. Retrieved from [https://ec.europa.eu/regional\\_policy/sources/docoffic/official/commnic/smart\\_growth/comm2010\\_553\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docoffic/official/commnic/smart_growth/comm2010_553_en.pdf) (20.03.2021)
- European Union (2013). *Regulation (EU) No. 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No. 1083/2006*. Brussels: European Union.
- Foray, D. (2013). The economic fundamentals of smart specialization. *Ekonomiaz*, 83(02), 55–82.
- Foray, D., David, P., & Hall, B. (2007). Smart specialisation: the concept. *Knowledge Economists Policy Brief*, 9, 5–9.

- Foray, D., Goddard, J., Goenaga Beldarrain X., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C., & Ortega-Argilés, R. (2012). *Guide to research and innovation strategies for smart specialisations (RIS 3)*. Luxembourg: Publications Office of the European Union. Retrieved from <https://s3plaf orm.jrc.ec.europa.eu/documents/20182/84453/RIS3+Guide.pdf/fceb8c58-73a9-4863-8107-752aef77e7b4> (20.03.2021).
- Foray, D., & Goenaga, X. (2013). *The goals of smart specialization. S3. Policy Brief Series*, 1, Luxembourg: Publications Office of the European Union.
- Foray, D., McCann, P., & Ortega-Argilés, R. (2015). Smart specialization and European regional development policy. In D. B. Audretsch, A. Link & M. Walshok (Eds.). *Oxford handbook of local competitiveness*. Oxford: Oxford University Press, 458–480.
- Foray, D., & van Ark, B. (2007). Smart specialization in a truly integrated research area is the key to attracting more R&D to Europe. *Knowledge Economists Policy Brief*, 1, 24–27.
- Gianelle, C., Guzzo, F., & Mieszkowski, K. (2018). *Smart specialisation at work: assessing investment priorities. JRC Technical Reports, JRC113433*. Seville: European Commission.
- Gianelle, C., Guzzo, F., & Mieszkowski, K. (2019). Smart specialisation: what gets lost in translation from concept to practice? *Regional Studies*, 54(10), 1377–1388. doi: 10.1080/00343404.2019.1607970.
- Gianelle, C., Guzzo, F., & Mieszkowski, K. (2020a). Smart specialisation: what gets lost in translation from concept to practice. *Regional Studies*, 54(10): 1377–1388. doi: 10.1080/00343404.2019.1607970.
- Gianelle, C., Kyriakou, D., McCann, P., & Morgan, K. (2020b) Smart specialisation on the move: reflections on six years of implementation and prospects for the future. *Regional Studies*, 54(10), 1323–1327. doi: 10.1080/00343404.2020.1817364.
- Guimaraes, P., Figueiredo, O., & Woodward, D. (2009). Dartboard tests for the location quotient. *Regional Science and Urban Economics*, 39(3), 360–364. doi: 10.1016/j.regsciurbeco.2008.12.003.
- Hassink, R., & Gong, H. (2019). Six critical questions about smart specialization. *European Planning Studies*, 27(10), 2049–2065. doi: 10.1080/09654313.2019.1650898.
- Hermosa, J. C., Elorduy, J. P., & Eguia, B. (2014). Smart specialization and entrepreneurial discovery: Theory and reality. *Revista Portuguesa de Estudos Regionais*, 39, 5–22.
- Hidalgo, C. A., Balland, P.A., Boschma, R., Delgado, M., Feldman, M., Glaeser, E., He, C., Kogler, D. F., Morrison, A., Neffke, F., Rigby, D., Stern, S., Zheng, S., & Zhu, S. (2018). The principle of relatedness. In A. J. Morales, C. Gershenson, D. Braha, A. A. Manai & Y. Bar-Yam (Eds.). *Unifying themes in complex systems IX. ICCS 2018. Springer Proceedings in Complexity*. Cham: Springer, 451–457. doi: 10.1007/978-3-319-96661-8\_46.

- Kalle, A. Piirainen, K.A., Nygaard-Tanner, A., & Alkærsg, L. (2017). Regional foresight and dynamics of smart specialization: a typology of regional diversification patterns. *Technological Forecasting and Social Change*, 115, 289–300. doi: 10.1016/j.techfore.2016.06.027.
- Kogut-Jaworska, M., & Ociepa-Kicińska, E. (2020). Smart specialisation as a strategy for implementing the regional innovation development policy – Poland case study. *Sustainability*, 12, 7986, 1–21. doi:10.3390/su12197986.
- Kroll, H. (2017). Smart specialization policy in an economically well-developed, multilevel governance system. In S. Radosevic, A. Curaj, R. Gheorghiu, L. Andreescu & I. Wade (Eds.). *Advances in the theory and practice of smart specialization*. London: Academic Press, 99–123.
- Kuznetsov, Y., & Sabel, C. (2017). Managing self-discovery: diagnostic monitoring of a portfolio of projects and programs. In S. Radosevic, A. Curaj, R. Gheorghiu, L. Andreescu & I. Wade (Eds.). *Advances in the theory and practice of smart specialisation*. London: Academic Press, 51–72.
- Lopes, J., Ferreira, J., & Farinha, L. (2019) Innovation strategies for smart specialisation (RIS3): past, present and future research. *Growth and Change*, 50, 38–68. doi: 10.1111/grow.12268.
- Małopolska Smart Specialisations, 2018. Retrieved from [https://businessinmalopolska.pl/files/Malopolska\\_smart\\_specialisations-guide.pdf](https://businessinmalopolska.pl/files/Malopolska_smart_specialisations-guide.pdf) (23.03.2021)
- Markowska, M., Kusterka-Jefmańska, M., & Jefmański, B. (2016). Analysis of smart specialisation in European regions using fuzzy classification. *Argumenta Oeconomica*, 2(37), 31–65. doi: 10.15611/aoe.2016.2.02.
- Marques P., & Morgan K. (2018). The heroic assumptions of smart specialisation: a sympathetic critique of regional innovation policy. In A. Isaksen, R. Martin & M. Trippel (Eds.). *New avenues for regional innovation systems - theoretical advances, empirical cases and policy lessons*. Cham: Springer, 275–293. doi: 10.1007/978-3-319-71661-9\_14.
- McCann, P., & Ortega-Argilés, R. (2015). Smart specialization, regional growth and applications to European Union cohesion policy. *Regional Studies*, 49(8), 1291–1302. doi: 10.1080/00343404.2013.799769.
- McCann, P., & Ortega-Argilés, R. (2016). The early experience of smart specialization implementation in EU cohesion policy. *European Planning Studies*, 24(8), 1407–1427. doi: 10.1080/09654313.2016.1166177.
- McCann, P., & Soete, L. (2020). Place-based innovation for sustainability (Report produced for the European Commission Joint Research Centre, Seville). Retrieved from <https://publications.jrc.ec.europa.eu/repository/handle/JRC121271> (05.03.2022).
- Mieszkowski, K., & Barbero, J. (2021). Territorial patterns of R&D+I grants supporting Smart Specialisation projects funded from the ESIF in Poland. *Regional Studies*, 55(3), 390–401. doi: 10.1080/00343404.2020.1782877.
- Montresor, S., & Quatraro, F. (2020). Green technologies and smart specialisation strategies: a European patent-based analysis of the intertwining of technological relatedness and key enabling technologies. *Regional Studies*, 54(10), 1354–1365. doi: 10.1080/00343404.2019.1648784.



- Morgan, K. (2017). Nurturing novelty: regional innovation policy in the age of smart specialisation. *Environment and Planning C: Government and Policy*, 35(4), 569–583. doi: 10.1177/0263774X16645106.
- Morkutė, G., Koster, S., & Van Dijk, J. (2017). Employment growth and inter-industry job reallocation: spatial patterns and relatedness. *Regional Studies*, 51(6), 958–971. doi: 10.1080/00343404.2016.1153800.
- Murzyn, D. (2018). Financing of smart growth in less developed regions on the example of Poland. *e-Finanse*, 14, 8–20.
- Neffke, F., & Henning, M. (2013). Skill relatedness and firm diversification. *Strategic Management Journal*, 34(3), 297–316. doi: 10.1002/smj.2014.
- OECD (2013). *Innovation-driven growth in regions: the role of smart specialisation*. Paris: OECD.
- Radošević, S. (2017). Assessing EU smart specialisation policy in a comparative perspective. In S. Radošević, A. Curaj, R. Gheorghiu, L. Andreescu & I. Wade (Eds.). *Advances in the theory and practice of smart specialisation*. London: Academic Press, 1–36.
- Sobczak, E. (2012). Smart specialization of workforce structure in the European Union countries – dynamic analysis applying shift-share analysis method. *Comparative Economic Research. Central and Eastern Europe*, 15(4), 219–232. doi: 10.2478/v10103-012-0037-3.
- Sobczak, E., & Bal-Domańska, B. (2013). Smart workforce structures versus regional development in European union countries of new accession (EU12). In P. Jedlicka (Ed.). *The international conference Hradec economic days 2013. Economic development and management of regions. Peer-reviewed conference proceedings, Part III*. Hradec Králové: Gaudeamus, 349–360.
- Sotarauta, M. (2018). Smart specialization and place leadership: dreaming about shared visions, falling into policy traps? *Regional Studies, Regional Science*, 5(1), 190–203. doi: 10.1080/21681376.2018.1480902.
- Szávics, P., & Benedek, J. (2020). Smart specialisation priorities of less developed regions. A critical evaluation. In C. Bevilacqua, F. Calabrò & L. Della Spina (Eds.). *New metropolitan perspectives. NMP 2020. Smart innovation, systems and technologies. vol 177*. Cham: Springer, 22–36. doi: 10.1007/978-3-030-52869-0\_3.
- Trippel, M., Zukauskaitė, E., & Healy, A. (2020). Shaping smart specialization: the role of place-specific factors in advanced, intermediate and less-developed European regions. *Regional Studies*, 54(10), 1328–1340. doi: 10.1080/00343404.2019.1582763
- van Ark, B., O'Mahoney M., & Timmer, M. P. (2008). The productivity gap between Europe and the United States: trends and causes. *Journal of Economic Perspectives*, 22(1), 25–44. doi: 10.1257/jep.22.1.25.
- Vicente, J., Balland, P.A., & Crespo, J. (2018). Les fondements micro du changement structurel régional: Que nous enseignent 25 ans de proximités? *Revue d'Économie Régionale & Urbaine*, 5(6), 1013–1041. doi: 10.3917/rru.185.1013.

Wojnicka-Sycz E. (2020). Smart specializations and regional development in Poland. In A. Ujwary-Gil & M. Gancarczyk (Eds.). *New challenges in economic policy, business, and management*. Warsaw: Institute of Economics, Polish Academy of Sciences, 33–55.

### **Acknowledgments**

Publication financed under the programme of the Minister of Science and Higher Education "DIALOG" carried out in the years 2020-2021, grant No. 0054/DLG/2019/10



## Annex

**Table 1.** Values of Florence's coefficient based on Małopolska's employment structure in 2009 and 2018

PKD section and division number	Sections and divisions of national economy	2009	2018	trend (rising / unchanging / falling)
<b>A</b>	<b>AGRICULTURE, FORESTRY AND FISHING</b>	<b>0.5</b>	<b>0.4</b>	□
<b>B</b>	<b>MINING AND QUARRYING</b>	<b>0.7</b>	<b>0.6</b>	□
<b>C</b>	<b>MANUFACTURING</b>	<b>0.9</b>	<b>0.9</b>	□
10	Manufacture of food products	1.0	1.0	□
11	Manufacture of beverages	0.9	0.3	□
12	Manufacture of tobacco products	6.1	1.9	□
13	Manufacture of textiles	0.3	0.9	↑
14	Manufacture of clothing	0.5	0.6	↑
15	Manufacture of leathers and leather products	2.6	2.2	□
16	Manufacture of wood and cork products excluding furniture; manufacture of straw and woven products	0.7	1.0	↑
17	Manufacture of paper and paper products	0.5	0.6	↑
18	Printing and reproduction of recorded media	1.3	1.6	↑
19	Manufacture and processing of coke and oil refined products	0.2	1.2	↑
20	Manufacture of chemical products	0.9	1.1	↑
21	Manufacture of basic pharmaceutical substances, medications and other pharmaceutical products	0.8	0.7	□
22	Manufacture of rubber products and plastics	1.0	0.7	□
23	Manufacture of other non-metal mineral products	1.8	1.1	□
24	Manufacture of metals	2.0	1.8	□
25	Manufacture of metal finished goods excluding machines and equipment	1.0	1.0	□
26	Manufacture of computers, electronic and optical products	0.9	1.4	↑
27	Manufacture of electric products	0.5	1.1	↑
28	Manufacture of machines and equipment not classified elsewhere	1.1	1.2	↑

**Table 1. Continued**

<b>PKD section and division number</b>	<b>Sections and divisions of national economy</b>	<b>2009</b>	<b>2018</b>	<b>trend (rising / unchanging / falling)</b>
29	Manufacture of vehicles, trailers and semi-trailers excluding motorcycles	0.4	0.7	↑
30	Manufacture of other transport equipment	0.2	0.7	↑
31	Manufacture of furniture	0.4	0.4	□
32	Manufacture of other products	0.6	0.8	↑
33	Repair, maintenance and assembly of machines and equipment	0.8	0.6	□
<b>D</b>	<b>ELECTRICITY, GAS, STEAM AND AIRCONDITIONING SUPPLY</b>	<b>0.9</b>	<b>0.4</b>	□
<b>E</b>	<b>WATER SUPPLY; SEWAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES</b>	<b>1.0</b>	<b>1.0</b>	□
<b>F</b>	<b>CONSTRUCTION</b>	<b>1.2</b>	<b>1.2</b>	□
41	Construction works related to erection of buildings	1.2	1.3	↑
42	Works related to construction of civil and water engineering facilities	1.2	0.8	□
43	Specialised construction works	1.2	1.3	↑
<b>G</b>	<b>WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES</b>	<b>1.1</b>	<b>1.0</b>	□
45	Wholesale and retail trade in motor vehicles, repair of motor vehicles	1.0	0.6	□
46	Wholesale trade excluding trade in motor vehicles	1.0	1.3	↑
47	Retail trade excluding retail trade in motor vehicles	1.3	0.9	□
<b>H</b>	<b>TRANSPORTATION AND STORAGE</b>	<b>0.8</b>	<b>0.7</b>	□
<b>I</b>	<b>ACCOMMODATION AND FOOD SERVICE ACTIVITIES</b>	<b>1.3</b>	<b>1.3</b>	□
55	Accommodation	1.6	1.2	□
56	Food service activities	1.2	1.3	↑
<b>J</b>	<b>INFORMATION AND COMMUNICATION</b>	<b>1.0</b>	<b>1.4</b>	↑
58	Publishing activities	1.0	0.8	□
59	Activities related to manufacture of films, video recordings, tv programmes, and music and sound recordings	1.3	1.5	↑

**Table 1. Continued**

<b>PKD section and division number</b>	<b>Sections and divisions of national economy</b>	<b>2009</b>	<b>2018</b>	<b>trend (rising / unchanging / falling)</b>
60	Broadcasting of public and subscribed programmes	0.4	0.4	□
61	Telecommunication	0.6	0.5	□
62	Activities related to software and information-related advisory services, and related activities	1.5	1.6	↑
63	Information-related services	1.6	2.7	↑
<b>K</b>	<b>FINANCIAL AND INSURANCE ACTIVITIES</b>	<b>0.6</b>	<b>0.5</b>	□
64	Financial services excluding insurance and pension funds	0.7	0.6	□
65	Insurance, reinsurance and pension funds excluding compulsory social insurance	0.4	0.0	□
66	Financial service, insurance and pension fund support activities	0.5	0.7	↑
<b>L</b>	<b>REAL ESTATE ACTIVITIES</b>	<b>0.8</b>	<b>0.8</b>	□
<b>M</b>	<b>PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES</b>	<b>1.3</b>	<b>1.4</b>	↑
69	Legal and accounting activities and tax advisory services	1.3	1.8	↑
70	Head office activities; management advisory services	1.1	1.2	↑
71	Activities related to architecture and engineering; technical research and analyses	1.7	1.1	□
72	R&D	1.2	1.1	□
73	Advertising, market research and public surveys	0.8	0.9	↑
74	Other professional, scientific and technical activities	0.5	2.2	↑
75	Veterinary activities	0.7	1.4	↑
<b>N</b>	<b>ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES</b>	<b>0.9</b>	<b>0.8</b>	□
77	Rental and leasing activities	0.4	0.8	↑
78	Employment activities	0.5	0.4	□
79	Organization of tourism and tourism agents, and other reservation and related activities	1.1	1.1	□
80	Detective and security activities	0.8	0.8	□
81	Maintenance of buildings and management of green spaces	1.3	0.8	□

**Table 1.** Continued

<b>PKD section and division number</b>	<b>Sections and divisions of national economy</b>	<b>2009</b>	<b>2018</b>	<b>trend (rising / unchanging / falling)</b>
82	Administrative office services and other business support activities	1.0	1.5	↑
<b>O</b>	<b>PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY</b>	<b>0.9</b>	<b>0.8</b>	□
<b>P</b>	<b>EDUCATION</b>	<b>1.1</b>	<b>1.2</b>	↑
<b>Q</b>	<b>HUMAN HEALTH AND SOCIAL WORK ACTIVITIES</b>	<b>1.0</b>	<b>1.1</b>	↑
<b>R</b>	<b>ARTS, ENTERTAINMENT AND RECREATION</b>	<b>1.1</b>	<b>1.2</b>	↑
90	Creative activities related to culture and entertainment	1.1	1.3	↑
91	Libraries, archives, museums and other culture-related activities	1.3	1.4	↑
92	Gambling and betting	0.3	0.5	↑
93	Sport, entertainment and recreation activities	1.2	0.8	□
<b>S</b>	<b>OTHER SERVICE ACTIVITIES</b>	<b>1.1</b>	<b>1.3</b>	↑

Source: authors' research based on GUS unpublished data.

**Table 2.** Number, dynamics and structure of employees in the voivodeship of Matopolska in 2009 and 2018

PKD section and division number	Sections and divisions of the national economy		Number of employees (thousands)		Change in the number of employees in 2009-2018 (%)		Share of employees in voivodeship (%)		Share of the region's employees in the number of Poland's employees (%)	
	2009	2018	2009	2018	2009	2018	2009	2018	2009	2018
<b>TOTAL</b>	<b>857.0</b>	<b>1098.3</b>	<b>100.0</b>	<b>28.2</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>8.5</b>	<b>8.6</b>	
<b>A</b>	<b>AGRICULTURE, FORESTRY AND FISHING</b>									
<b>B</b>	<b>MINING AND QUARRYING</b>									
<b>C</b>	<b>MANUFACTURING</b>									
10	33.0	38.5	3.9	16.6	0.3	0.1	7.8	8.2	8.7	
11	2.2	0.8	0.3	-64.9	0.3	0.1	7.8	2.9	2.9	
12	2.3	1.6	0.3	-29.6	0.3	0.1	51.8	16.6	16.6	
13	1.4	5.1	0.2	250.7	0.2	0.5	2.8	7.4	7.4	
14	5.1	3.9	0.6	-23.6	0.6	0.4	4.4	5.1	5.1	
15	5.4	4.7	0.6	-12.3	0.6	0.4	21.7	18.9	18.9	
16	6.6	11.4	0.8	73.3	0.8	1.0	5.6	8.8	8.8	
17	2.5	3.8	0.3	56.1	0.3	0.3	4.4	5.0	5.0	
18	4.4	7.1	0.5	62.0	0.5	0.6	11.3	14.0	14.0	
19	0.2	1.5	0.0	658.5	0.0	0.1	1.3	10.0	10.0	

**Table 2.** Continued

PKD section and division number	Sections and divisions of the national economy	Number of employees (thousands)		Change in the number of employees in 2009-2018 (%)		Share of employees in voivodeship (%)		Share of the region's employees in the number of Poland's employees (%)	
		2009	2018	2009-2018	2009	2018	2009	2018	
		857.0	1098.3	28.2	100.0	100.0	8.5	8.6	
20	Manufacture of chemical products	5.4	7.6	41.5	0.6	0.7	7.8	9.2	
21	Manufacture of basic pharmaceutical substances, medications and other pharmaceutical products	1.5	1.7	12.2	0.2	0.2	6.7	5.9	
22	Manufacture of gum products and plastics	12.7	15.3	19.9	1.5	1.4	8.3	6.2	
23	Manufacture of other non-metal mineral products	19.9	15.4	-22.5	2.3	1.4	14.9	9.7	
24	Manufacture of metals	10.5	11.2	6.5	1.2	1.0	16.9	15.6	
25	Manufacture of metal finished goods excluding machines and equipment	19.8	31.0	56.0	2.3	2.8	8.4	8.5	
26	Manufacture of computers, electronic and optical products	5.5	8.3	51.0	0.6	0.8	7.9	11.7	
27	Manufacture of electric products	4.1	10.5	154.8	0.5	1.0	4.6	9.0	
28	Manufacture of machines and equipment not classified elsewhere	12.7	14.1	10.8	1.5	1.3	8.9	9.9	
29	Manufacture of vehicles, trailers and semi-trailers excluding motorcycles	4.4	12.7	187.0	0.5	1.2	3.4	5.8	
30	Manufacture of other transport equipment	0.9	3.1	257.7	0.1	0.3	2.0	6.2	
31	Manufacture of furniture	5.4	6.7	23.2	0.6	0.6	3.8	3.8	
32	Manufacture of other products	2.1	4.2	103.0	0.2	0.4	5.1	6.7	



**Table 2.** Continued

PKD section and division number	Sections and divisions of the national economy	Number of employees (thousands)		Change in the number of employees in 2009-2018 (%)	Share of employees in voivodeship (%)		Share of the region's employees in the number of Poland's employees (%)	
		2009	2018		2009	2018	2009	2018
	<b>TOTAL</b>	<b>857.0</b>	<b>1098.3</b>	<b>28.2</b>	<b>100.0</b>	<b>100.0</b>	<b>8.5</b>	<b>8.6</b>
33	Repair, maintenance and assembly of machines and equipment	7.2	6.4	-10.7	0.8	0.6	7.2	5.5
<b>D</b>	<b>ELECTRICITY, GAS, STEAM AND AIRCONDITIONING SUPPLY</b>	<b>11.6</b>	<b>3.7</b>	<b>-67.7</b>	<b>1.4</b>	<b>0.3</b>	<b>7.8</b>	<b>3.5</b>
<b>E</b>	<b>WATER SUPPLY; SEWORAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES</b>	<b>10.8</b>	<b>13.1</b>	<b>21.1</b>	<b>1.3</b>	<b>1.2</b>	<b>8.3</b>	<b>8.2</b>
<b>F</b>	<b>CONSTRUCTION</b>	<b>69.5</b>	<b>84.8</b>	<b>21.9</b>	<b>8.1</b>	<b>7.7</b>	<b>10.1</b>	<b>10.1</b>
41	Construction works related to erection of buildings	27.4	33.2	21.1	3.2	3.0	10.1	11.4
42	Works related to construction of civil and water engineering facilities	16.3	16.0	-1.9	1.9	1.5	10.0	7.0
43	Specialised construction works	25.8	35.6	37.9	3.0	3.2	10.2	11.1
<b>G</b>	<b>WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES</b>	<b>176.9</b>	<b>223.0</b>	<b>26.0</b>	<b>20.6</b>	<b>20.3</b>	<b>9.6</b>	<b>8.8</b>
45	Wholesale and retail trade in motor vehicles, repair of motor vehicles	14.2	11.5	-19.4	1.7	1.0	8.6	5.2
46	Wholesale trade excluding trade in motor vehicles	61.8	96.1	55.5	7.2	8.7	8.5	11.0
47	Retail trade excluding retail trade in motor vehicles	100.9	115.4	14.4	11.8	10.5	10.6	8.0

**Table 2.** Continued

PKD section and division number	Sections and divisions of the national economy	Number of employees (thousands)		Change in the number of employees in 2009-2018 (%)	Share of employees in voivodeship (%)		Share of the region's employees in the number of Poland's employees (%)	
		2009	2018		2009	2018	2009	2018
	<b>TOTAL</b>	857.0	1098.3	28.2	100.0	100.0	8.5	8.6
<b>H</b>	<b>TRANSPORTATION AND STORAGE</b>	39.9	52.1	30.6	4.7	4.7	6.9	6.3
<b>I</b>	<b>ACCOMMODATION AND FOOD SERVICE ACTIVITIES</b>	25.6	35.2	37.7	3.0	3.2	11.5	10.9
55	Accommodation	10.1	11.2	11.1	1.2	1.0	13.3	10.6
56	Food service activities	15.4	23.9	55.2	1.8	2.2	10.5	11.0
<b>J</b>	<b>INFORMATION AND COMMUNICATION</b>	16.8	35.2	108.9	2.0	3.2	8.9	11.8
58	Publishing activities	3.6	2.2	-38.5	0.4	0.2	8.4	7.1
59	Activities related to manufacture of films, video recordings, tv programmes, and music and sound recordings	1.0	0.9	-5.5	0.1	0.1	11.2	13.1
60	Broadcasting of public and subscribed programmes	0.5	0.5	-13.9	0.1	0.0	3.3	3.0
61	Telecommunication	2.9	2.3	-18.6	0.3	0.2	5.1	4.3
62	Activities related to software and information-related advisory services, and related activities	6.6	21.5	226.9	0.8	2.0	13.0	13.7
63	Information-related services	2.3	7.7	241.9	0.3	0.7	14.0	22.8
<b>K</b>	<b>FINANCIAL AND INSURANCE ACTIVITIES</b>	18.1	16.1	-11.1	2.1	1.5	5.4	4.7

**Table 2.** Continued

PKD section and division number	Sections and divisions of the national economy	Number of employees (thousands)		Change in the number of employees in 2009-2018 (%)		Share of employees in voivodeship (%)		Share of the region's employees in the number of Poland's employees (%)	
		2009	2018	2009-2018	2018	2009	2018	2009	2018
		857.0	1098.3	28.2	100.0	100.0	8.5	8.6	
64	Financial services excluding insurance and pension funds	15.2	12.2	-20.2	1.8	1.1	5.9	5.2	
65	Insurance, reinsurance and pension funds excluding compulsory social insurance	1.3	0.0	-100.0	0.2	0.0	3.5	0.0	
66	Financial service, insurance and pension fund support activities	1.6	4.0	149.7	0.2	0.4	4.1	5.9	
<b>L</b>	<b>REAL ESTATE ACTIVITIES</b>	<b>9.7</b>	<b>11.2</b>	<b>15.8</b>	<b>1.1</b>	<b>1.0</b>	<b>6.9</b>	<b>6.9</b>	
<b>M</b>	<b>PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES</b>	<b>33.8</b>	<b>62.4</b>	<b>84.5</b>	<b>3.9</b>	<b>5.7</b>	<b>10.7</b>	<b>11.9</b>	
69	Legal and accounting activities and tax advisory services	9.9	27.0	171.2	1.2	2.5	11.4	15.8	
70	Head office activities; management advisory services	4.3	10.3	138.6	0.5	0.9	9.1	10.5	
71	Activities related to architecture and engineering; technical research and analyses	11.5	9.7	-15.5	1.3	0.9	14.2	9.2	
72	R&D	4.7	6.2	31.6	0.5	0.6	9.9	9.7	
73	Advertising, market research and public surveys	2.5	4.0	62.5	0.3	0.4	7.1	7.5	
74	Other professional, scientific and technical activities	0.7	4.3	502.1	0.1	0.4	4.3	18.8	
75	Veterinary activities	0.2	0.9	376.1	0.0	0.1	5.8	11.6	

**Table 2.** Continued

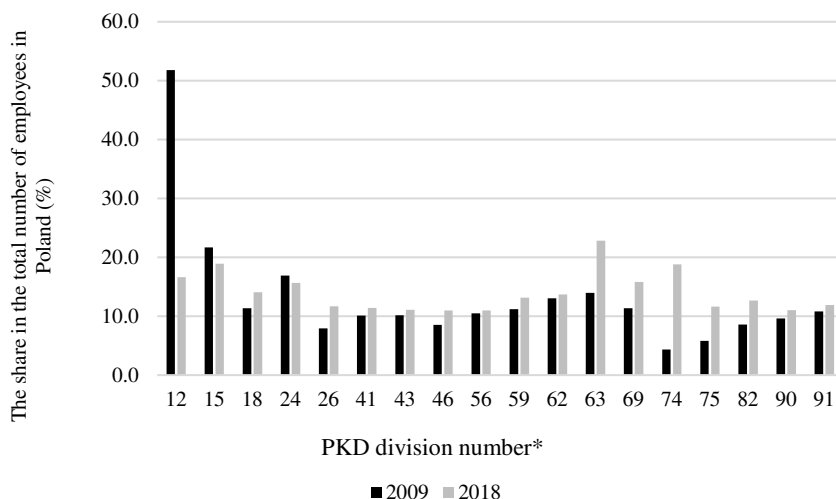
PKD section and division number	Sections and divisions of the national economy	Number of employees (thousands)		Change in the number of employees in 2009-2018 (%)	Share of employees in voivodeship (%)		Share of the region's employees in the number of Poland's employees (%)	
		2009	2018		2009	2018	2009	2018
<b>TOTAL</b>		<b>857.0</b>	<b>1098.3</b>	<b>28.2</b>	<b>100.0</b>	<b>100.0</b>	<b>8.5</b>	<b>8.6</b>
<b>N</b>	<b>ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES</b>	<b>25.0</b>	<b>36.2</b>	<b>44.8</b>	<b>2.9</b>	<b>3.3</b>	<b>7.6</b>	<b>6.8</b>
77	Rental and leasing activities	0.5	2.2	364.7	0.1	0.2	3.2	7.2
78	Employment activities	2.3	5.1	127.0	0.3	0.5	4.6	3.2
79	Organization of tourism and tourism agents, and other reservation and related activities	1.3	2.0	54.8	0.2	0.2	9.2	9.7
80	Detective and security activities	9.0	9.3	3.3	1.1	0.8	6.4	7.0
81	Maintenance of buildings and management of green spaces	10.3	8.2	-20.5	1.2	0.7	11.3	7.3
82	Administrative office services and other business support activities	1.6	9.3	481.4	0.2	0.8	8.6	12.7
<b>O</b>	<b>PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY</b>	<b>33.6</b>	<b>37.1</b>	<b>10.5</b>	<b>3.9</b>	<b>3.4</b>	<b>7.2</b>	<b>7.2</b>
<b>P</b>	<b>EDUCATION</b>	<b>115.1</b>	<b>141.9</b>	<b>23.2</b>	<b>13.4</b>	<b>12.9</b>	<b>9.4</b>	<b>9.9</b>
<b>Q</b>	<b>HUMAN HEALTH AND SOCIAL WORK ACTIVITIES</b>	<b>61.1</b>	<b>81.0</b>	<b>32.5</b>	<b>7.1</b>	<b>7.4</b>	<b>8.6</b>	<b>9.1</b>
<b>R</b>	<b>ARTS, ENTERTAINMENT AND RECREATION</b>	<b>12.9</b>	<b>15.0</b>	<b>16.4</b>	<b>1.5</b>	<b>1.4</b>	<b>9.7</b>	<b>10.1</b>
90	Creative activities related to culture and entertainment	4.9	6.1	24.0	0.6	0.6	9.6	11.0

**Table 2.** Continued

PKD section and division number	Sections and divisions of the national economy	Number of employees (thousands)		Change in the number of employees in 2009-2018 (%)		Share of employees in voivodeship (%)		Share of the region's employees in the number of Poland's employees (%)	
		2009	2018	2009-2018	(%)	2009	2018	2009	2018
<b>TOTAL</b>		<b>857.0</b>	<b>1098.3</b>		<b>28.2</b>	<b>100.0</b>	<b>100.0</b>	<b>8.5</b>	<b>8.6</b>
90	Creative activities related to culture and entertainment	4.9	6.1		24.0	0.6	0.6	9.6	11.0
91	Libraries, archives, museums and other culture-related activities	4.9	6.4		31.8	0.6	0.6	10.8	11.9
92	Gambling and betting	0.2	0.3		40.3	0.0	0.0	2.3	3.9
93	Sport, entertainment and recreation activities	2.9	2.2		-24.1	0.3	0.2	10.2	6.8
<b>S</b>	<b>OTHER SERVICE ACTIVITIES</b>	<b>7.1</b>	<b>12.8</b>		<b>80.8</b>	<b>0.8</b>	<b>1.2</b>	<b>9.2</b>	<b>11.1</b>

Source: authors' research based on GUS unpublished data.

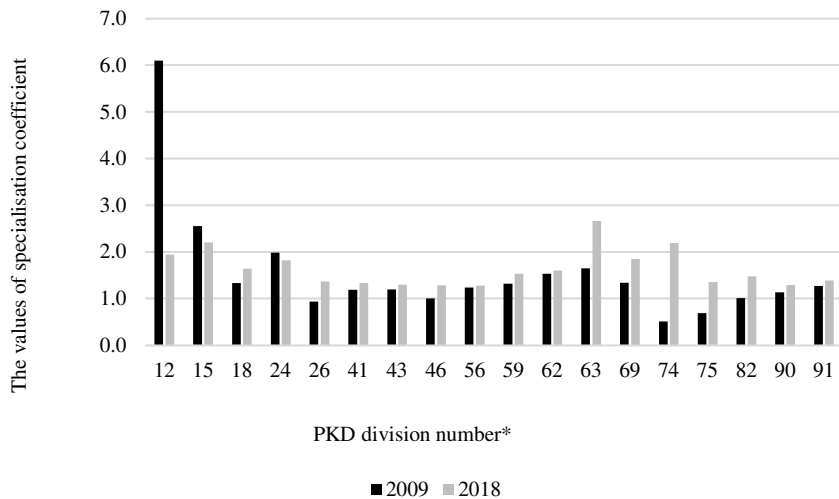
**Figure 1.** The share of the region's employees in the leading divisions of the national economy in the total number of employees in Poland (%)



\* 12 - Manufacture of tobacco products; 15 - Manufacture of leathers and leather products; 18 - Printing and reproduction of recorded media; 24 - Manufacture of metals; 26 - Manufacture of computers, electronic and optical products; 41 - Construction works related to erection of buildings; 43 - Specialised construction works; 46 - Wholesale trade excluding trade in motor vehicles; 56 - Food service activities; 59 - Activities related to manufacture of films, video recordings, tv programmes, and music and sound recordings; 62 - Activities related to software and information-related advisory services, and related activities; 63 - Information-related services; 69 - Legal and accounting activities and tax advisory services; 74 - Other professional, scientific and technical activities; 75 - Veterinary activities; 82 - Administrative office services and other business support activities; 90 - Creative activities related to culture and entertainment; 91 - Libraries, archives, museums and other culture-related activities.

Source: authors' research based on GUS unpublished data.

**Figure 2.** The values of specialization coefficient in the leading divisions of Małopolskie voivodship



\* 12 - Manufacture of tobacco products; 15 - Manufacture of leathers and leather products; 18 - Printing and reproduction of recorded media; 24 - Manufacture of metals; 26 - Manufacture of computers, electronic and optical products; 41 - Construction works related to erection of buildings; 43 - Specialised construction works; 46 - Wholesale trade excluding trade in motor vehicles; 56 - Food service activities; 59 - Activities related to manufacture of films, video recordings, tv programmes, and music and sound recordings; 62 - Activities related to software and information-related advisory services, and related activities; 63 - Information-related services; 69 - Legal and accounting activities and tax advisory services; 74 - Other professional, scientific and technical activities; 75 - Veterinary activities; 82 - Administrative office services and other business support activities; 90 - Creative activities related to culture and entertainment; 91 - Libraries, archives, museums and other culture-related activities.

Source: authors' research based on GUS unpublished data.