Sectoral employment structure in central and eastern European countries compared to highly developed countries in the European Union

Bianka Godlewska-Dzioboń[1]

Abstract

The aim of the article is to present the spatial diversity of the sectoral transformation of the employment structure in the countries of Central and Eastern Europe (CEE) in the period 2010–2018. The current level of development of the service sector in the EU is primarily a consequence of the political and economic conditions that have existed in these countries in recent decades. With today's changes in the global economy, related to the transition from industrial to post-industrial to informational phase of civilization, the adaptation processes of various economic structures are an important research issue. The result is a redevelopment of a sectoral economic structure in which industrial activity, a fundamental economic base in the industrial phase, gives way to service activities, especially related to the digital economy. Understanding the rules governing the evolution of the three-sectoral structure of employment in the countries of Central and Eastern Europe is an important problem both theoretically and practically. The author presents the mechanisms for changing the three-sector employment structure over time in the different countries of Central and Eastern Europe, finding not only the intensity of change but also their consistency. This approach shows one of the most crucial elements of the competitiveness of regional and national spatial systems.

Keywords*: employment, European countries, regional disparities, European Union, structural change*

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1. Introduction

An inherent feature of a market economy is the continued competition between entities. The complexity of the structural economy and the non-linearity of its processes are of great practical importance in building the competitiveness of economies. These elements need continuous monitoring of structural change and further modernization of the economic structure to update socio-economic development strategies. Cross-sectoral links also play an important role in this process. The need for liquidity and uniformity of development processes in the economy is the coordination between the evolution of old sectors and the emergence of new ones. It is necessary to ensure the best degree and pace of the reallocation of resources between individual sectors. Currently, all economies depend on global economic processes that have recently entered a phase of transformation in various domains of social and economic activity, continuing at a previously unknown pace. This transformation also strongly affects the labor market by changing the rules of its functioning and deepening its internal polarization. Such a labor market is subject to constant changes and tensions, also affecting public institutions, conducting their mission and adapting measures and methods of action to the ever-increasing changes in the digitization of the economy. Traditionally, the structural characteristics of the economy are considered important in terms of its performance, unemployment, and earnings, as well as productivity and convergence (e.g., Diewert, 2015). The role of each sector is assessed, based on its impact on economic phenomena and, therefore, the best type of specialization is asked (e.g., McCann & Ortega-Argilés, 2011). Despite these efforts, little attention has been paid to examining the impact of employment structures on socio-economic cohesion and its various aspects.

The purpose of this article is to present the phenomenon of structural changes in the countries of Central and Eastern Europe. Changes in the subjective system will be analyzed to recognize the regularities of development in the three sectors and identify the factors. An essential element of the development of the sectoral employment structure is its analysis over time. One way, it shows the chronology of changes, while on the other, it allows them to link significant economic events, implement reforms or economic fluctuations. Analyzing the transformation in the sectoral employment structure for the countries of Central and Eastern Europe will find the most important moments of the increase in structural change in the labor market. Furthermore, it will show if the current processes related to economic integration and globalization have an impact on accelerating the pace of these changes and the similarity of the employment structures of ESVs with selected EU-15 countries.

2. Literature background

The phenomenon of structural changes and attempts to examine them is not a new problem in the literature. Research on the structures of the economy supplies a picture of the division of the economy into the main elements. Therefore, reflecting its state and trends in the division of production and labor. In this sense, the economy is a complex socio-economic system that can be considered multidisciplinary. For this work, the analysis of structural changes has been narrowed down to changes in the labor market and the sectoral employment structure. Due to the complexity, multifaceted nature and breadth of the problems of employment structures and their transformations, the literature on the subject contains works covering its various elements.

In studies of economic structures and labor market structures, a special role is assigned to sectoral analysis. Many studies use a three-elemental system, which is based on the classic theory of three sectors of the economy, formulated by Clark, Fisher, and Fourastié. This approach makes it possible to distinguish the three sectors in the economic structure: sector I (agricultural), sector II (industrial), and sector III (services). The works of Casella and Coleman (2001), Timmer (2009), and Alvarez-Cuadrado and Poschke (2011) are part of the research on structural changes in the various sectors of the economy and the focus on agriculture. The works on industrialization, i.e. the industrial sector, include the works of Kallioras and Petrakos (2010), and Šipilov (2013). In contrast, the work related to the services sector was analyzed by Langen (2001), Beyers (2005), Jensen (2008), Uppenberg and Strauss (2010), Costa, Palma, and Costa (2013) and Falk and Peng (2013).

The end of the twentieth and early twenty-first century has been a technological breakthrough, as a result of which it led to a paradigm of development towards a knowledge-based economy. The consequence is an increase in the importance of research on the redevelopment of structures including employment to the rank of the most important phenomena in the modern world economy. This transformation is expressed as the displacement of industrial civilization by post-industrial civilization. This is linked to economic evolution and the need to modernize a change that improves the efficiency of actions and benefits society (Kleer, 2012). S. Kuznets, a winner of the Nobel Prize in Economics, and H. Chenery, contributed to the development of structural change. Both authors saw changes in the structure of the economy as part of its steady growth. The construction of structural changes, then focusing on phenomena such as globalization and decentralization, is linked to Stiglitz (2004). The pragmatic tone of systemic transformation is also proposed by Sadowski (2005). He argues that the recognized objective of these changes is to bring the regime closer to the economically developed countries of the world

by introducing a market economy based on a democratic political system, the fundamental determinant of which is far-reaching institutional transformation. To this end, comparative studies are carried out on the employment structures of one country compared to other countries (regions), but these are mainly surveys in three sectors (agriculture, industry, services) due to the availability and comparability of statistics.

One of the many aspects describing employment structures is also sector or industrial relations. The contemporary phase of structural changes in developed countries is characterized by the service and knowledge-based models. It also can be described through deindustrialization, tertiarization, and sterilization of the economy (De Backer, 2015). According to the analysis carried out by Markowska and Sokołowski (2019), the literature also includes works on the interpenetration of sectors: sterilization of industry (Gebauer, 2007; Francois & Woerz, 2008; Bryson & Daniels, 2010; Lodefalk, 2010), of business services as a factor of production (Drejer, 2002), and the importance of services in the manufacturing industry (Miles, 2005; Neely, 2008; Lay, Copani, Jäger, & Biege, 2010). Structural modernization can also be understood as the development of high-tech and knowledge-based industries. This pattern of change is seen in the EU, since employment in services, mainly in knowledge-intensive services, systematically increases its participation. Although agriculture and industry remain important sectors of the economy, the value of production growth is thanks to knowledge. A special feature of these changes is the high employment, production, and productivity dynamics of industries that involve human capital, use modern technologies (mainly information and communication technologies – ICT), participate in innovation networks, and invest in intangible resources. As Henning points out (2020), empirical evidence also highlights the integration of resources between high-skill manufacturing HI-M and knowledge-intensive business services KIBS. The results of these studies show the need to conceptualize and measure regional structural changes, as there is no clear transition of workers from production to services. This exchange suggests a cross-skill relationship, especially between high-tech production and KIBS, but in specific regions. This is particularly true for concentrated regions, as changes in employment in business services are more significant for metropolitan centers than in peripheral ones. This entails the need to compensate not only for the decline in production employment but also for the migration of experienced and skilled workers from production to the business services sector and from the outermost regions to the centers. It is also the focus of active regional politics. Indeed, stakeholders from emigrated regions are actively looking to reduce external mobility at the local and regional level, and stakeholders from areas using external professionals promote jobs in their area for all skilled workers.

To reconcile the different, often contradictory interests of the different regions; it is necessary to carry out and coordinate actions to address the negative effects of brain drain, e.g., supporting citizens in improving skills or strengthening two-sided partnerships between regions. Lavopaa and Szirmai (2020) equivalently assess this way. Their analysis shows that the expansion of the size of the modern service sector without the process of technology absorption is not enough to ensure stable growth. Conversely, reducing the technology gap in just a few sectors will lead to an enclave economy that is predestined to stagnation. It should be emphasized, however, that in studies on the assessment of structural changes, a deep disaggregation of collective data describing the economies of countries is important. The beginnings of new phenomena and tendencies announcing fundamental structural changes appear, not only at the lowest level and at the aggregation level, but above all, they occur initially on a small scale, only to change the target structure relatively quickly.

The literature review shows that research on structural changes in the labor market includes various elements. This is due to the specificities of sectoral mechanisms and the search for recommendations for an economic strategy to accelerate the transition of modern advanced economies to knowledge-based economies. Besides, preparing the economy for the needs of the future requires a deep analysis of its construction to look for branches on which future problems arising from the next phases of scientific and technical progress will depend.

3. Methodological approach

Quantitative testing methods were used to achieve the article's goal. The research was based on advanced statistical analysis, the essence of which is a comparison of the sectoral structure of employment in time and spatial terms, the identification of the dynamics of structural transformations, as well as the assessment of the direction of their transformation. To assess the similarity of structures in time and spatial terms, measures of the structural similarity of objects were used, as well as measures allowing the analysis of the intensity of structural changes within employment in the studied countries. The assessment of the direction of change in the sectoral employment structure is the first important research phase. The basis for comparative studies of this structure over a specified period is *n* observation matrix $x_{i,j}^{t}$:

$$X = \left[x_{i,j}^{t}\right] = \left\{ \begin{bmatrix} x_{1,1}^{1} & x_{1,2}^{1} & \cdots & x_{1,r}^{1} \\ x_{2,1}^{1} & x_{2,2}^{1} & \cdots & x_{2,r}^{1} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m,1}^{1} & x_{m,2}^{1} & \cdots & x_{m,r}^{1} \end{bmatrix}, \begin{bmatrix} x_{1,1}^{2} & x_{1,2}^{2} & \cdots & x_{1,r}^{2} \\ x_{2,1}^{2} & x_{2,2}^{2} & \cdots & x_{2,r}^{2} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m,1}^{2} & x_{m,2}^{2} & \cdots & x_{m,r}^{2} \end{bmatrix}, ..., \begin{bmatrix} x_{1,1}^{n} & x_{1,2}^{n} & \cdots & x_{1,r}^{n} \\ x_{2,1}^{n} & x_{2,2}^{n} & \cdots & x_{2,r}^{n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m,1}^{n} & x_{m,2}^{n} & \cdots & x_{m,r}^{n} \end{bmatrix} \right\}$$

$$\begin{pmatrix} i = 1, 2, ..., m \\ j = 1, 2, ..., r \\ t = 1, 2, ..., n \end{pmatrix} \tag{1}$$

where:
m – number of objects,
r – number of elements of the structure,
n – the number of units of time.

Assuming that the data in the matrix (1) are expressed in absolute values, the comparative analysis of the structures required a correct normalization procedure for the examined variables to ensure their comparability (Malina, 2004). The normalization was performed according to the following formula:

$$u_{i,j}^{t} = \frac{x_{i,j}^{t}}{\sum_{j=1}^{r} x_{i,j}^{t}} \tag{2}$$

where:
$u_{i,j}^{t}$ - value of j - structure element for i - object and t - time, assuming that the following conditions are met (Wydymus, 1998):

$$u_{i,j}^{t} \in \langle 0,1 \rangle, \tag{3}$$

$$\sum_{j=1}^{r} u_{i,j}^{t} = 1, \tag{4}$$

$$\sum_{i=1}^{m} \sum_{j=1}^{r} u_{ij} = N. \tag{5}$$

where: $N = m*r$

The analyses use economic structures whose components are equity indicators and add up to unity, therefore, they become self-standardized and standardized indicators that measure the relative intensity of a particular characteristic in structure elements (Strahl, 2014). As a result, the values of standardized matrix variables (1) for a sectoral employment structure composed of *r* sub-components for *m* countries and *n* years can be presented in the form of a matrix *U*, as expressed by the following formula:

$$U = \left[u_{i,j}^{t}\right] = \left\{ \begin{bmatrix} u_{1,1}^{1} & u_{1,2}^{1} & \cdots & u_{1,r}^{1} \\ u_{2,1}^{1} & u_{2,2}^{1} & \cdots & u_{2,r}^{1} \\ \vdots & \vdots & \ddots & \vdots \\ u_{m,1}^{1} & u_{m,2}^{1} & \cdots & u_{m,r}^{1} \end{bmatrix}, \begin{bmatrix} u_{1,1}^{2} & u_{1,2}^{2} & \cdots & u_{1,r}^{2} \\ u_{2,1}^{2} & u_{2,2}^{2} & \cdots & u_{2,r}^{2} \\ \vdots & \vdots & \ddots & \vdots \\ u_{m,1}^{2} & u_{m,2}^{2} & \cdots & u_{m,r}^{2} \end{bmatrix}, \ldots, \begin{bmatrix} u_{1,1}^{n} & u_{1,2}^{n} & \cdots & u_{1,r}^{n} \\ u_{2,1}^{n} & u_{2,2}^{n} & \cdots & u_{2,r}^{n} \\ \vdots & \vdots & \ddots & \vdots \\ u_{m,1}^{n} & u_{m,2}^{n} & \cdots & u_{m,r}^{n} \end{bmatrix} \right\}. \quad (6)$$

The matrix (6) can be the basis for further analyses on the quantification of distance and similarity with other standardized economic structures, both in terms of time and spatial terms.

To assess the similarity of structures between the *i* - these *k* - this object ($i, k = 1, 2, \ldots, m$) during *t*, the Hamming metric (urban distance) (Grabiński, 1984) was used, marked with the formula:

$$s_{ik}^{t} = \frac{1}{r}\sum_{j=1}^{r}\left|u_{j}^{t} - u_{k}^{t}\right|, \quad (7)$$

The structure similarity measure s_{ik}^{t}, calculated by formula (7) should be considered as a method of synthetic expression of distances of the sectoral employment structures compared between the *i* - these and *k* - this country. The values of these measures mean that the higher (lower) the value of these measures, the closer (farther) the analyzed country is to the reference object. The following measure was used to assess the intensity of changes in the sectoral employment structure between the *t* - this and *n* - this period for *m* objects (Grabiński, 1984):

$$D_{t} = \frac{1}{(m-1)}\sum_{i=1}^{m}\left(\frac{1}{n-1}\sum_{t-1}^{n-1}\frac{\left|S_{i,k}^{t+w} - S_{i,k}^{t}\right|}{S_{i,k}^{t}}\right), \quad (8)$$

where:

$i, k = 1, 2, \ldots, m$, $t, w = 1, 2, \ldots, n$,

$D_{t,}$ - index of intensity of changes in the sectoral structure of employment between the t – this and ($t + w$) – this period; the higher (lower) its value, the stronger (weaker) the structural changes over time.

3.1 Research area

The subject of the research is the sectoral structure of employment in the following economies, which is one of the most important economic structures and labor market. It concerns mainly changes in employment occurring in the three aggregating arrangements of the departments (sections) of the national economy, called sector I (agricultural), sector II (industrial – industry and construction), and sector III (service). Research entities are the economies of the selected Member States of the European Union, i.e., Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Slovenia, and Hungary. The choice of central and eastern European countries is due to their regional, historical, and economic similarity. Data on the employment structure in the European Union countries are derived from the reporting data collected by Eurostat and the OCED between 2010 and 2018. Based on these data, it can be concluded that over the past ten years (2010–2018), employment in selected countries increased by 2671.07 thousand people from 30040.66 thousand in 2010 to 32743.5 in 2018, up 7%. Hungary saw the largest increase of 16% and the smallest increase was in Slovenia at around 1.5%. The increase in total employment is accompanied by a decrease in employment in agriculture, while in services and industry there was an increase. In 2010, 2,706 people were employed in the agricultural sector and in 2018, 2,239 were employed. It was different in the other two sectors. In the industrial sector in 2010, employment reached 951,352 and in 2018 there was an increase of approx. 12% and amounted to 10,661.25 thousand. A comparable situation took place in services where 17,820.77 thousand people worked in total in 2010, and 19,483.28 thousand in 2018. When analyzing employment in the EU, it is worth mentioning the most developed countries. The largest number of employees was in Germany that had 38.5 million in 2010 and 41.7 million in 2018, followed by Great Britain (29.5 and 32.2 million respectively), France (26.5 and 27.1 million respectively) and Italy (23.0 and 23.1 million).

4. Results and discussion

4.1. Directions of the change of sectoral employment structure in the countries of Central and Eastern Europe studied

The development of economies is determined primarily by the ability to use emerging opportunities and search for innovative solutions, not only technological or production. The processes taking place globally in the economy, as well as the situation on the labor market, often determine the direction of development. The breakthrough structural changes in the economies of Central and Eastern Europe resulted from the socio-economic transformation. This process has affected the economic development of the various countries of the Central and Eastern Europe region in diverse ways, thereby taking a different view on the state and quality of the basic economic structures. Then details are shown in Table 1.4.

Table 1.4. Changes in the sectoral structure of employment in the studied countries of Central and Eastern Europe in 1993–2003 (percentage points)

Countries	Economic sectors				
	Agricultural sector	Industry sector	Services sector	Market services sector	Non-market services sector
Czech Republic	–3.2	–3.1	6.3	5.1	1.1
Estonia	–9.8	–2.6	12.3	8.1	4.2
Lithuania	–7.1	–0.3	7.3	4.7	2.6
Latvia	–3.6	1.8	1.8	6.0	–4.2
Poland	–7.5	–2.9	10.4	7.8	2.6
Slovakia	–4.7	–1.7	6.4	5.7	0.7
Slovenia	–2.3	–7.3	9.5	6.5	3.0
Hungary	–3.7	–0.4	4.1	4.8	–0.6
Central and Eastern Europe	–5.2	–3.2	8.2	6.3	1.8

Source: Own study based on Eurostat data.

These data show that the share of the service sector increased in all countries of Central and Eastern Europe and amounted to 1.8 percentage points in Latvia to 12.3 percentage points in Estonia. In 2003, the percentage of people working in services was, on average higher than in 1993 by 8.2 percentage points. If we take into account the situation in Poland, the role of market services has become much more pronounced, the share of which in total employment increased by 10.4 percentage points, which is approx. 2 percentage points more than the

CEE countries average. The reverse trend, compared to the services sector, was observed in the participation of workers in the agricultural and industrial sectors. Their share in all surveyed countries decreased by 5.2 percentage points, but in some countries, such as the Czech Republic and Estonia, by approx. 10 percentage points, and in Poland and Lithuania by approx. 7 percentage points. In the industrial sector, in the analyzed period, there was also a significant decrease in the percentage of employed persons, which amounted to an average of 3.2 percentage points. In individual countries, these changes ranged from –0.3 percentage points (Lithuania) to -8.5 percentage points (Bulgaria). The only country that increased the share of industry in total employment was Latvia (an increase of 1.8 percentage points). The reason for the differences in the rate of change in the percentage of people working in the industry may be disproportional in the level of the percentage of employees between individual countries. In these sectors, Poland stands out from other CEE countries, recording a faster rate of intensity of changes in the sectoral structure of employment, especially in services (increase by 10.4 percentage points) and agriculture (decrease by 7.5 percentage points). The percentage of people employed in the industrial sector decreased by only 2.9 percentage points, which is due to the industrial policy of our country in this area.

The next phase of transformations in the labor markets of Central and Eastern European countries resulted in a further reduction of employment in agriculture and an increase in the role of the service sector. However, they were not as noticeable as it was in the previous period.

Table 1.5. Sectoral structure of employment in the surveyed countries of Central and Eastern Europe in 2010 and 2018 (%)

Countries	Year 2010			Year 2018		
	Agricultural sector	**Industry sector**	**Services sector**	**Agricultural sector**	**Industry sector**	**Services sector**
CEE	**9.0**	**31.2**	**59.3**	**6.8**	**32.6**	**60.6**
Czech Republic	**3.2**	**37.9**	58.9	2.8	**37.5**	59.7
Estonia	4.2	31	65.1	3.3	29.8	66.9
Hungary	4.5	30.7	64.8	4.9	32.4	62.7
Latvia	8.8	**24.7**	66.4	7.2	25.9	66.9
Lithuania	8.6	19.9	**71.4**	6.9	**21.1**	**71.9**
Poland	**13.0**	30.3	**56.6**	**9.5**	31.6	**58.7**
Slovakia	3.2	37.1	59.6	**2.3**	36.5	61.2
Slovenia	8.7	32.4	58.7	5.4	33.1	61.5

Source: Own study based on Eurostat and OCED data.

Analyzing the data in Table 1.5, it can be seen that in the countries of Central and Eastern Europe in 2010, the average percentage of people working in the agricultural sector was 9.00%, in the industrial sector - 31.2%, and in the services sector - 59.3%. In the agricultural sector, the spread of employment shares was the highest and amounted to 28.3 percentage points. The lowest share of agriculture in total employment was recorded in the Czech and Slovak economies (3.2%), while the highest was in Polish (13%), Latvian (8.8%) and Slovenian (8.7%) economies. However, the last two economies are below the average sectoral employment structure in the analyzed Central and Eastern European countries. The diversity of employment shares in the industry was the lowest, amounting to 18 percentage points. The highest share of industry in total employment was recorded in the Czech (37.9%) and Slovak (37%) economies, while the lowest percentage of people working in the industry was in the Lithuanian economy (19.9%). The highest differentiation of sectoral shares in employment was seen in services.

A similar range of the percentage of the employed was in services between the examined Central and Eastern European countries and amounted to 14.8 percentage points. The Polish economy had the lowest share of services in total employment (56.6), while the highest share was the Lithuanian economy (71.4). The employment structure is similar in the Latvian (66.4%) and Estonian (65.1%) economies.

Not much has changed over the last 10 years. The highest average share of employees in the first of the assessed sectors (agriculture) concerns the Polish economy (9.5%) and the highest in these countries: the Czech Republic (2.8%), Estonia (3.3%), and Slovakia (2.3%). In the second sector (industry), the highest share of the percentage of employees was recorded in the Czech Republic and Slovakia. However, the lowest share was recorded in Latvia (25.9%) and Estonia (29.8%). In the services sector, the situation has not changed at all. The lowest share of services in total employment was recorded in the Polish economy (58.7%), while the highest was in the Lithuanian economy (71.9%).

Although the countries of Central and Eastern Europe cooperate intensively within the European Union, despite more than twenty years of structural changes, there is still a clear difference concerning the most developed EU countries.

Table 1.6. Share of employees in economic sectors in developed EU countries in 2010–2018 (%)

Country	Sector	Year		Change in years1993–2013 (in percentage points)
		2010	2018	
Austria	Agriculture	5.2	3.7	–1.5
	Industry	24.9	25.4	0.5
	Service	69.9	70.9	1.0
Belgium	Agriculture	1.3	0.9	–0.4
	Industry	23.4	21.1	–2.3
	Service	75.3	78.0	2.7
Denmark	Agriculture	2.5	2.1	–0.4
	Industry	20.0	18.8	–1.2
	Service	78.9	74.0	–4.9
Finland	Agriculture	4.4	3.7	–0.7
	Industry	23.2	22.3	–0.9
	Service	72.4	74.0	1.6
France	Agriculture	2.8	2.5	–0.4
	Industry	22.1	20.0	–2.1
	Service	74.9	77.5	2.6
Germany	Agriculture	1.6	1.2	–0.4
	Industry	28.3	27.4	–1.1
	Service	70.0	71.4	1.4
Greece	Agriculture	12.4	12.4	0
	Industry	19.6	15.2	–4.4
	Service	68.0	72.4	4.4
Luxembourg	Agriculture	1.3	0.1	–1.2
	Industry	12.0	9.7	–2.3
	Service	86.7	90.2	4.5
Netherlands	Agriculture	2.7	1.8	–0.9
	Industry	16.1	14.6	–1.5
	Service	81.2	83.6	2.4
Portugal	Agriculture	11.2	6.1	–5.1
	Industry	27.3	24.8	–2.5
	Service	61.5	69.1	7.5
Spain	Agriculture	4.1	4.2	0.1
	Industry	22.9	20.3	–2.6
	Service	72.8	75.4	2.6

Country	Sector	Year		Change in years1993–2013 (in percentage points)
		2010	2018	
Sweden	Agriculture	1.9	1.8	–0.1
	Industry	19.8	18.0	–0.2
	Service	78.0	80.1	2.1
United Kingdom	Agriculture	1.0	1.0	0
	Industry	19.0	18.0	–1.0
	Service	79.7	80.9	1.2

Source: Own study based on OCED data.

In the period 2010–2018, all EU-15 countries experienced further changes in the sectoral structure of employment and they were characterized by similar paths of economic development. As shown by the data in Table 1.6, in selected most-developed EU countries, the share of employment in sectors I and II decreased, while it increased in sector III. This tendency is the result of increasing the level of services, and the development of sector III as the most efficient. It should also be emphasized that there was a slight weakening of the role of sectors I and II, as they were both less effective than sector III. When discussing the shaping of the sectoral employment structure between the EU-15 economies in 2010–2018, it should be emphasized that these countries show greater similarities with each other. However, much stronger and relatively stable structural changes in employment occurred in 1993–2003.

The studies that consider the CEE countries show that EU membership had a positive impact on economic growth for these economies. It should be emphasized that the European integration practically cannot be separated from the systemic transformation, therefore, it is difficult to clearly distinguish the effects of this initial process, i.e. to assess the difference between the actual parameters of the CEE economies and the hypothetical scenario in which these countries would not join the European Union. A key role, apart from trade, was played by EU funds, whose economies have been the greatest beneficiaries for many years. The European Union is the most effective mechanism in the world for raising the standard of living of the population of less developed countries to the level of developed countries. World Bank economist Intermit Gill, who created the famous concept of the "middle-income trap," called this mechanism "the European convergence machine." It is a process by which economic and institutional integration leads to the rapid flow of technical knowledge and legal standards to help lower-productivity countries achieve higher-than-average labor productivity dynamics. The understanding of the mechanisms for changing the three-sector employment structure over time in the different countries of Central and Eastern Europe, it also allows us to

find the intensity of change. Figure 1.5 has the values of the measure of the intensity of structural change in the various countries of Central and Eastern Europe between 2010 and 2018. The analysis of changes in the three-sector employment structure in the region of Central and Eastern Europe shows that the greatest evolution took place in Estonia (intensity measure value equal to 0.1373), and Hungary (intensity measure value equal to 0.1246). It could have resulted from smaller disproportions and accelerated changes in these labor markets. The lowest rate of intensity of changes in the sectoral structure of employment was characteristic of the Polish economy, where the value of the intensity measure was equal to 0.0505. It should be emphasized, however, that this economy was characterized by a high pace of employment changes in sectors in the earlier analyzed periods (2000–2010). An accelerated pace of changes in this area occurred in two Baltic countries (Lithuania, Latvia) and in Slovakia and Slovenia. In these countries, the intensity of structural changes was remarkably similar and amounted to 0.08 value of the intensity measure.

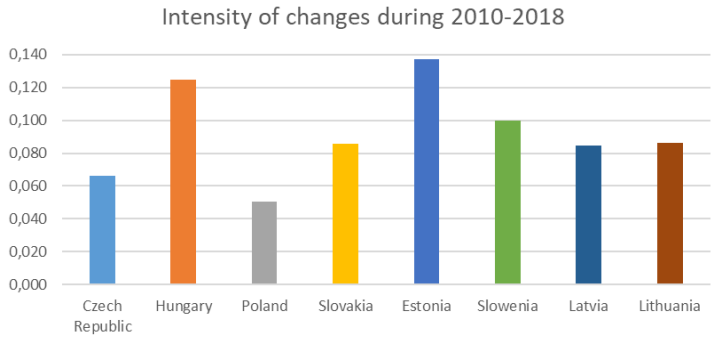

Figure 1.5. Values of the measure of the intensity of structural changes in the studied countries of Central and Eastern Europe in 2010–2018

Source: Own study based on OCED data.

Table 1.7 presents the values of the coefficient of variation of the intensity of changes in the three-sector employment structure in individual countries of Central and Eastern Europe in 2010–2018.

Table 1.7. Uniform intensity of changes in the three-sector employment structure in the studied countries of Central and Eastern Europe in 2010–2018

Countries	Standard deviation of structural change intensity	Average intensity of structural changes	Coefficient of variation of the intensity of structural changes (in %)
CEE	**0.18**	**0.095**	**1.93**
Czech Republic	0.17	0.07	2.48
Estonia	0.36	0.14	2.588
Hungary	0.36	0.13	2.83
Latvia	0.10	0.09	1.10
Lithuania	0.07	0.09	0.85
Poland	0.12	0.05	2.36
Slovakia	0.17	0.09	1.93
Slovenia	0.13	0.10	1.33

Source: Own study based on OCED data.

Based on the data on the dynamics of the intensity of structural changes, it can be concluded that the most diverse pace of structural changes occurred in Hungary. The Czech Republic, Estonia, and Poland constituted another group with an unstable rate of change intensity. The most stable pace of changes in the three-sector employment structure was characteristic of three countries: Lithuania, Latvia, and Slovenia. It is worth emphasizing that in these countries the changes in the three-sector employment structure were the most stable over time, therefore, the structural changes in the labor markets of these countries – compared to other Central and Eastern European countries – were the most predictable.

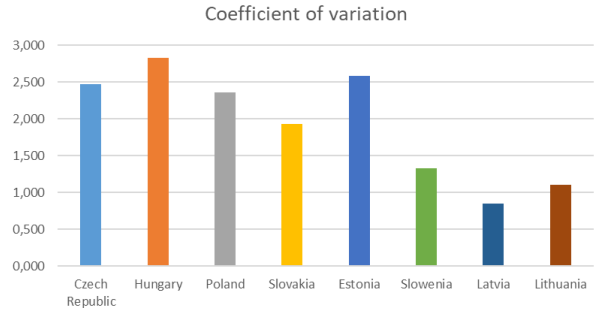

Figure 1.6. Coefficients of variation in the intensity of structural changes between Poland and other countries of Central and Eastern Europe in 2010–2018

Source: Own study based on OCED data.

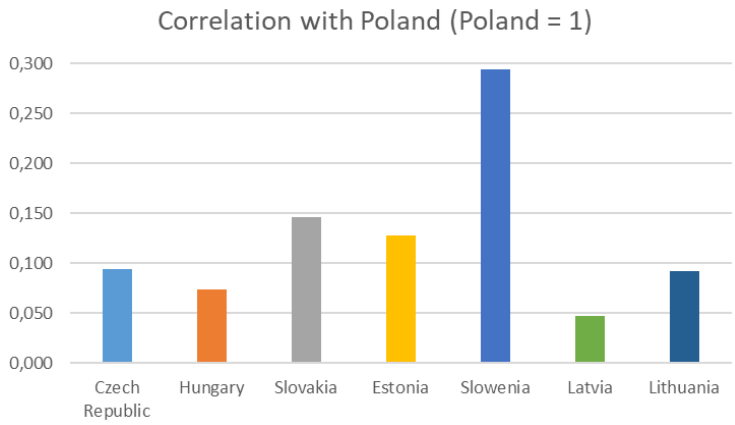

Figure 1.7. Comparison of the intensity of structural changes between Poland and other countries of Central and Eastern Europe in 2010–2018

Source: Own study based on Eurostat data.

By comparing the intensity of changes in the three-sector employment structure in Poland to other Central and Eastern European countries, the correlation coefficients were calculated, which are shown in Figure 1.7. These data confirm that the intensity of structural changes in Poland was most strongly correlated with the intensity of structural changes in Slovenia and Slovakia, and the weakest with the intensity of these changes in Lithuania and Hungary.

5. Conclusions

This study discusses the research findings on the dynamics of the sectoral transformation of employment in Central and Eastern European countries against the advanced countries of the European Union. This research is a continuation of the author's earlier research on this issue (see Godlewska-Dzioboń, 2019; Godlewska-Dzioboń, Klimczyk, & Witoń, 2019; Godlewska-Dzioboń, Klimczyk, & Witoń, 2018). The research covering ten years allowed the identification of key periods for the development of CEE economies, some of which were stimulating, and others were dissimulating. These include:

1) The period 1993–2003 was influenced by transformation, accession to the EU, and the last financial crisis and the period 2010–2018. The first two – transformation and accession to the EU – started the process of reducing the distance between the countries of Central and Eastern Europe and the most developed countries in terms of employment structures. It was the result of the systemic reforms and efforts to improve

economic efficiency, as well as the actions of the European Union aimed at cutting differences in the admission of new member states.

2) On the other hand, the period 2010–2018 shows the slowdown of the previously determined trend. These are partly the effects of the recent financial crisis, which was revealed in the negative synergy of feedback loops between the countries studied, leading to an antinomic, anti-development drift.

The conducted research has also shown that the similarity of economies and their components under similar preferences and technologies occurs much faster at lower stages of development, while it is much slower in more developed economies. This is also overlapped by disproportions that require deeper (often at the level of mentality) social and institutional changes. Currently, we are still seeing a decline in employment in the agricultural sector, but its dynamics are not too high. We also notice the growing importance of services in employment, which is forced by the development of civilization in the modern world. The importance of the industrial sector in CEE countries is also vital. This level of change is also noticeable in advanced countries of the EU. The surveyed countries experience a convergence in the employment structure, but the current divergence in the dynamics of change has weakened. This is due to the cohesion policy pursued, which aims to increase the wealth creation and opportunities for European regions and the people who live in them, as well as paying more attention to areas lagging in economic development. However, the number of activities and financial resources given to this activity should not only bring these countries closer but also significantly exceed their level. CEE countries have trouble in this regard. Therefore, a question arises about the further influence of the processes of globalization and economic integration on the tendency to equalize the levels of development. In addition, these problems highlighted the shortcomings of neoclassical growth models that sought its sources in capital accumulation and technical progress, without reflecting the intricacy and complexity of the dilemma in the economic reality (Kuźma, 2020). So, does this mean the failure of the existing cohesion policy? The answer is no, as all regions and sub-regions have experienced growth (understood as improvement in significant indicators). Nevertheless, these changes are not universal. The CEE countries, despite their geographic, historical, and economic similarity, are an area with large spatial differences, which are still growing in many spheres. Therefore, it contributes to the redefinition of the determinants of economic development, not only quantitative but also qualitative.

The results of the analysis may also form the basis for the assessment of the economic situation in the sectors analyzed, as well as to carry out further analyses aimed at analyzing the causes and trends in employment in selected sectors of the economy. With the aspiration of building a modern, coherent and complete

economy, the European Union will force decision-makers to set the directions for further streams of cohesion policy measures and to set investment priorities in order to implement them in a more flexible, efficient, and effective way.

References

Adamczyk, A., Czekaj, J., & Wydymus, S. (1989). Zmiany struktury gospodarczej w krajach RWPG (analiza porównawcza). *Folia Oeconomica Cracoviensia*, *32*, 61-79.

Alvarez-Cuadrado, F., & Poschke, M. (2011). Structural change out of agriculture: Labor push versus labor pull. *American Economic Journal*: *Macroeconomics*, *3*(3), 127-158.

Beyers, W.B. (2005). Services and the changing economic base of regions in the United States. *The Service Industries Journal, 25*(4), 461-476.

Briguglio, L. (2014). *Resilience Building in Vulnerable Small States*. London: Commonwealth Yearbook. Retrieved from https://www.um.edu.mt/library/oar/bitstream/123456789/41930/1/Resilience_building_in_vulnerable_small_states.pdf

Briguglio, L., Cordina, C., Vella, S., & Vigilance, C. (2010). *Profiling Vulnerability and Resilience: A Manual for Small States*. London: Commonwealth Secretariat.

Bryson, J.R., & Daniels, P.W. (2010). Service worlds: The „Services Duality" and the rise of the „Manuservice" economy. In P. Maglio, C. Kieliszewski, & J.C. Spohrer (Eds.), *The Handbook Service Science*. Berlin: Springer.

Burny, P., Gaziński, B., Nieżurawski, L., & Sobków, Cz. (2019). Gospodarka Polski w porównaniu do Unii Europejskiej w świetle wybranych wskaźników rozwoju społeczno-gospodarczego. *Roczniki Kolegium Analiz Ekonomicznych, 54*, 125-142.

Caselli, F., & Coleman, W. (2001). The U.S. structural transformation and regional convergence: A reinterpretation. *Journal of Political Economy*, *109*(3). https://doi.org/10.1086/321015

Chenery H., (1960). Patterns of industrial growth. *American Economic Review*, *50*(4), 624-654.

Costa, E., Palma, P., & Costa, N. (2013). Services of general interest and regional disparities – a perspective from EU Regions. In A. Beauclair, & L. Reynolds (Eds.), *Shape and be Shaped: The Future Dynamics of Regional Development, Regional Studies Association.* Tampere: University of Tampere.

De Backer, K., Desnoyers-James, I., & Moussiegt, L. (2015). manufacturing or services – that is (not) the question: The role of manufacturing and services in OECD economies. OECD Science, Technology and Industry Policy Papers, 19, OECD Publishing.

Diewert, W.E. (2015). Decompositions of productivity growth into sectoral effects. *Journal of Productivity Analysis, 43*(3), 367-387.

Falk, M., & Peng, F. (2013). The increasing service intensity of European manufacturing. *The Service Industries Journal*, *33*(15-16), 1686-1706.

Francois, J., & Woerz, J. (2008). Producer Services, Manufacturing Linkages, and Trade. *Journal of Industry. Competition and Trade*, *8*(3), 199-229.

Gebauer, H. (2007). The logic for increasing service revenue in product manufacturing companies. *International Journal of Services and Operations Management*, *3*(4). https://doi.org/10.1504/IJSOM.2007.013462

Godlewska-Dzioboń, B. (2019). *Tendencje Zmian Sektorowej Struktury Zatrudnienia w Nowych Krajach Członkowskich UE*. Warszawa: Wydawnictwo Naukowe PWN.

Godlewska-Dzioboń, B., Klimczyk, P., & Witoń, A. (2019). Knowledge-intensive services development in the EU: Forecasts for selected countries and implications for Poland. *Entrepreneurial Business and Economics Review*, *7*(2), 101-118.

Godlewska-Dzioboń, B., Klimczyk, P., & Witoń, A. (2018). Determinatives of employment changes in the Polish service sector between 2005 and 2017. In A. Nalepka & A. Ujwary-Gil (Eds.), *Business and Non-profit Organizations Facing Increased Competition and Growing Customers' Demands* (pp. 519-534). Nowy Sącz: Wyższa Szkoła Biznesu – National Louis University.

Henning, M., (2019). Regional labour flows between manufacturing and business services: Reciprocal integration and uneven geography. *European Urban and Regional Studies*, *27*(3). https://doi.org/10.1177/0969776419834065

Kallioras, D., & Petrakos, G. (2010). Industrial growth, economic integration and structural change: Evidence from the EU new member-states regions. *Annals of Regional Science*, *45*, 667-680.

Kleer, J. (2012). Kulturowe uwarunkowania modernizacji. In M.G Woźniak (Ed.), *Gospodarka Polski 1990-2011. Droga do Spójności Społeczno-Ekonomicznej*. Warszawa: Wydawnictwo Naukowe PWN.

Kuznets, S. (1956). Quantitative aspects of the economic growth of nations. Levels and variability of rates of growth. *Economic Development and Cultural Change*, 5(1). https://doi.org/10.1086/449724.

Kuźma, M., (2020). Rola nowej ekonomii instytucjonalnej w wyjaśnianiu procesów wzrostu i rozwoju gospodarczego. *Nierówności Społeczne a Wzrost Gospodarczy*, *1*(1), 55-72.

Jensen, J.B. (2008). Trade in high-tech services. *Journal of Industry, Competition and Trade 8*(3–4), 181-197.

Landesmann, M. (2000). Structural change in the transition economies, 1989–1999. Retrieved from https://www.econstor.eu/handle/10419/204043

Langen, W. (2001). Working Document on the Communication from the Commission "Services of General Interest in Europe". European Parliament: Committee on Economic and Monetary Affairs.

Lavopa A., & Szirmai A. (2018). Structural modernisation and development traps. An empirical approach. *Elsevier World Development*, *112*, 59-73. https://doi.org/10.1016/j.worlddev.2018.07.005

Lay, G., Copani, G., Jäger, A., & Biege, S. (2010). The relevance of service in European manufacturing industries. *Journal of Service Management*, *21*(5), 715-726. https://doi.org/10.1108/09564231011092908.

Lodefalk, M. (2010). Servicification of manufacturing – Evidence from Swedish firm and enterprise group level data. Swedish Business School Working Paper, 3. Örebro University.

Malina, A. (2004). *Wielowymiarowa Analiza Przestrzennego Zróżnicowania Struktury Gospodarki Polski Według Województw*. In Zeszyty Naukowe, Seria specjalna: Monografie, nr 162. Kraków: Wydawnictwo Akademii Ekonomicznej w Krakowie.

Malina, A. (2008). Analiza struktury zatrudnienia w Polsce oraz krajach Unii Europejskiej. In A. Malina (Ed.), *Przestrzenno-Czasowa Analiza Rynku Pracy w Polsce i Krajach Unii Europejskiej*. Kraków: Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie.

Markowska, M., & Sobolewski, M. (2014). Wrażliwość regionalnych rynków pracy Unii Europejskiej na kryzys ekonomiczny. Klasyfikacja metodą Warda z warunkiem spójności. *Acta Univeritatis Lodziencis Sfolia Oeconomica, 6*(308), 79-84.

Markowska, M., & Sokołowski, A. (2019). Sektorowe struktury zatrudnienia w krajach Unii Europejskiej w latach 2008–2017 – nowe podejście w ocenie dynamiki. *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego*, *33*(2), 7-17.

McCann, P., & Ortega-Argilés, R. (2013). Transforming European regional policy: A results-driven agenda and smart specialization. *Oxford Review of Economic Policy*, 29(2), 405–431. https://doi.org/10.1093/oxrep/grt021

Miles, I. (2005). Knowledge intensive business services: prospects and policies. *Foresight*, *7*(6), 39-63. https://doi.org/10.1108/14636680510630939

Neely, A. (2008). Exploring the financial consequences of the servitization of manufacturing.*Operations Management Research*, *1*, 1-3-118.

OECD. (2020). Retrieved from https://data.oecd.org/emp/employment-rate.htm#indicator-chart

OECD (2020). Retrieved from https://data.oecd.org/emp/employment-rate.htm#indicator-chart

Sadowski, Z. (2005). *Transformacja i Rozwój. Wybór Prac*. Warszawa: Wydawnictwo Polskiego Towarzystwa Ekonomicznego.

Stiglitz, J.E. (2004). *Globalizacja*. Warszawa: Wydawnictwo Naukowe PWN.

Strahl, D. (1998). *Taksonomia Struktur w Badaniach Regionalnych*. Wrocław: Wydawnictwo Akademii Ekonomicznej im. O. Langego we Wrocławiu.

Strahl, D., & Sokołowski, A. (2014). Propozycja podejścia metodologicznego do oceny zależności między inteligentnym rozwojem a wrażliwością na kryzys ekonomiczny w wymiarze regionalnym. In E. Sobczak, B. Bal-Domańska, & M. Obrębalski (Eds.), *Problemy Rozwoju Regionalnego i Lokalnego*. Wrocław: Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu nr 331.

Šipilova, V. (2013). Aspect of structural changes in manufacturing: Search of new approaches for classifying the European union member countries. In A. Beauclair & L. Reynolds (Eds.), *Shapeand be Shaped: The Future Dynamics of Regional Development*. University of Tampere: Regional Studies Association.

Urząd Publikacji Unii Europejskiej. (2017). *Światowe Tendencje do 2030 r.: Czy UE jest w Stanie Sprostać Przyszłym Wyzwaniom?* Luksemburg: European Strategy and Policy Analysis System.

Wydymus, S. (1988). Analiza porównawcza struktur gospodarczych. In A. Zeliaś (Ed.), *Metody Statystyki Międzynarodowej*. Warszawa: Państwowe Wydawnictwo Naukowe.

Timmer, C.P. (2009). *A World Without Agriculture: The Structural Transformation in Historical Perspective*. Washington DC: American Enterprise Institute.

Uppenberg, K., & Strauss, H. (2010). Innovation and productivity growth in the EU services sector. European Investment Bank, EIB Paper.

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