POLARIZATION OF THE LABOUR MARKET BY IMPACT OF TECHNOLOGICAL DEVELOPMENT

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Abstract

The term polarization has been most used in the past to refer to income or property polarization, which, in various forms or intensities, has appeared throughout the history of the current population and has been a source of social tensions. There is now increasing interest in the polarization of the labour market due to technological development, which is gaining momentum in scientific research, and expresses the loss of medium-skilled jobs and an increase in both the highest and the lowest-skilled jobs. This represents a breakthrough in the typical thinking of the 20th century, when skills were perceived as dichotomous, so they could only be high or low. Also, more and more scientists are currently refuting previous views that technological progress will have the most serious impact on the lowest-skilled jobs. In this paper we examine the level of research of this scientific problem in the conditions of Slovakia, we supplement the findings with our own analyses and offer recommendations for further research in this field.

Key words:

labour market polarization, technological development, structural unemployment, wage level and structure

JEL Classification: E24, J24, J31

Introduction

Industrial production is not the first sector where technological development has led to a reduction in labour force. A similar situation already occurred in agriculture. Between 1940 and 1950 the share of farm employees in the USA declined by 26%, this decline continued in the next decades and today we can see that the share of the adult population working in agriculture in the USA decreased from the original 50% to the current less than 2% (Frič, 2018; Vojtovič, 2014). And we can go even further into history to the so-called Luddites - English craftsmen and workers who, in the early 19th century, worried about losing their jobs due to technological innovations, were mass-destroying machines (Graetz, Michaels, 2015). Mokyr et al. (2015) even compare current technological advancements to the legend of Prometheus, which is said to be nothing but a warning story of the uncontrollable effects of technology. To a large extent, we can agree with this attitude and concerns, but there are also contradicting views saying that it is a natural and understandable process. If all stakeholders (policy makers, businesses and individuals) do not choose the right attitude to this process and the necessary measures are not taken, the consequences can be far-reaching. Polarization is a relatively new phenomenon, which is related to the impact of technological development on job reduction. This term has been most commonly used in the past in connection with income or property polarization, which in various forms or intensities has appeared throughout the history of the current population and has been a source of social tensions (Pauhofová, 2016). The factors that caused it also changed. Since the 1980s, we have seen stronger growth in inequalities in economically developed countries under the influence of globalization and technological change. Factors directly related to the widening of inequalities include, among others, structural unemployment caused by technological change. Here we come to the concept of polarization of the labour market, which in scientific research, especially abroad Slovakia, has recently become more and more important and expresses the loss of middle-skilled jobs and the increase of jobs of the highest and also the lowest qualifications. This represents a breakthrough in the typical thinking of the 20th century, when skills were perceived as dichotomous, so they could only be high or low. Also, more and more scientists are currently refuting previous views that

technological progress will have the most serious impact on the lowest-skilled jobs. Since the 1990s, it is the medium-skilled jobs that are most at risk of technological change. Weak economic growth and technological change are expected to maintain high-level unemployment in the category of middle-skilled jobs even in developed countries (Palier, 2019). According to Pauhofová (2018), it will not only be a change in the form of job reproduction, but also a change in the structure of labour in individual sectors. The classic form of 'fixed' jobs in the longer term is unlikely, as is unlikely, that one fixed job will be the only source of income. Jobs will change creatively in relation to the overall impact of the industrial revolution. Most of the newly created jobs will be in the form of part-time or short-time jobs, with the majority of the population finding that one job will not ensure the original level of income. Creativity, interdisciplinarity, ability to understand tasks in the context hierarchy and to define future directions of development will be key skills of the future employee in managerial and creative positions. However, this will affect approximately 10% of the total number of people employed, most of the jobs will be related to maintenance-type jobs with a lower level of remuneration. This is already happening also in Slovakia, were jobs requiring qualifications such as engineering or metallurgy are being replaced by jobs with significantly lower qualifications in trade and services (Pauhofová, 2018; Sojka, Svatková, 2015).

Goal and Methodology

The aim of the paper was to describe and summarize the state of polarization of the labour market and the current state of knowledge of this issue abroad and in Slovakia. Considering insufficient elaboration of the phenomenon of polarization in the research of domestic authors, we decided to analyse the possibilities of using the approaches applied by foreign authors in the conditions of Slovakia. We carried out an analysis of the development of average wages in the Slovak economy as a whole and in selected sectors, and an analysis of the development of employment and unemployment structured according to the educational level. As a last method, we have analysed the development of job vacancies in individual sectors of Slovak economy. We chose the time period from 2014 to 2018, which was due to the availability of data, but also because this time period was not analysed in this context in Slovakia. The third reason for choosing this time period is to explore the polarization of the labour market within the same economic cycle.

Current state of knowledge of labour market polarization

The most used method of measuring labour market polarization is through average wages. Wages should be positively correlated with skills based on the assumption that skills that require more education, practice, or intelligence will be less available, more demanded and higher wages offered. Skills are the ability of a worker to perform job-related tasks and can be ranked from high to low. Consequently, it is possible to measure the extent of polarization, i.e. the change in the share of employment for each qualification level (McIntosh, 2017).

Goos et al. (2014) analysed the polarization of the labour market in 16 Western European countries (Slovakia was not included in the research) during the period 1993-2010. The results of the research showed that the employment structure in Western Europe was polarized in the period under review with an increasing share of high-payed specialists and managers as well as low-paid service workers, and a decreasing share of plant and machine operators and clerical support workers with middle wages. Their research also shows that, despite some differences, job polarization was present in all European economies.

Several authors point to the connection of polarization not only with technological development, but also with the economic cycle, e.g. Plunkett and Persoa (2013) examined the period of recession, namely 2008 to 2012 in the UK and the US. In the UK shortly before the onset of the recession, polarization even dropped and subsequently rose sharply, similarly in the US. This implies that it is impossible to attribute responsibility for polarization of the labour market solely to technological progress, and this phenomenon must be seen in a broader context and the impact of other factors such as the business cycle. The OECD Report (2017) also confirms that "over the last two decades, all regions have experienced a process of

polarization from medium to low-skilled and high-skilled jobs".

Oesch and Piccitto (2019) examined the polarization of the labour market in four Western European countries (Germany, Sweden, Spain and the United Kingdom) using four indicators: median occupational income in the profession, level of education, prestige and job satisfaction, based on which they divided jobs into five groups. According to the authors, the evaluation of polarization is often based only on wages, as the only indicator - jobs are either good if they are high paid or poor if they are low paid. The authors find such an approach insufficient to really understand changes in the structure of jobs and assess the polarization of the labour market. The results of their research showed that of the four countries surveyed in only one, namely the United Kingdom, there was indeed job polarization in the period under review (1992-2015), and this was reflected in only three indicators (wage, prestige and satisfaction with a job). However, the "educational level" indicator did not confirm polarization in this country either. The cause should be found in a strongly growing group of personal care workers. Although it is one of the lowest paid professions, it is not the least educated. In all the countries surveyed, the number of private-sector managers and specialists from various fields increased most. Household helpers, dry cleaners and laundries (in Germany and Spain) as well as social workers (in Spain and the United Kingdom) were also shortlisted for the strongest growing occupations. On the other hand, production jobs in the last two decades - production line operators, assembly workers, builders and, on the other hand, clerks and salesmen - have seen a decline.

Høst and Winther (2018) investigated the polarization of the labour market and its geographical distribution in Denmark between 1993 and 2006. They followed the idea of Florida and Mellander (2016), who realized that job polarization has an uneven geographical distribution, as high-skilled jobs are concentrated in urban regions, while low-skilled jobs are more evenly distributed in space, following the natural distribution of the population. Høst and Winther in their research revealed that while the size of the local labour market, the location and specialization of the city affect the geographical distribution of growth and polarization of private sector employment, the population and its structure in individual cities affect the geographical distribution of growth and polarization of public sector employment across all wage levels. They also revealed an association between polarization in the private and public sectors, in particular a positive association between employment developments for low-income private sector jobs and overall employment developments in public administration. However, this relationship did not apply in more remote geographic areas.

Also, Montresor (2019) dealt with labour market polarization, specifically examining the impact of technological development on the polarization of employment in the United Kingdom in 1993-2014. He believes that this is the result of the rapid improvement of education in the 1990s, which has led to the shift of university educated people down the career ladder.

Gagliardi (2019) examined the impact of foreign technological innovations on domestic employment in the United Kingdom. Her analysis shows that in areas specializing in industries where there is strong competition from foreign companies, there has been an overall decline in employment, which was up to 4.5% greater than in areas less exposed to foreign competition, in middle-skilled workforce it was even 6.7% greater. The author explains this by the controversial effect of the high concentration of competing companies in the same industry. On the one hand, more businesses in the area should increase jobs. On the other hand, strong and technologically advanced foreign competition forces businesses to invest in new technologies, which in turn implies the need to employ more highly qualified professionals. On the other hand, medium-skilled jobs disappear.

Bachmann et al. (2019) dealt with the evolution of job polarization in Germany between 1975 and 2014. They found that the structure of jobs had gradually changed throughout the period under review, with no major cyclical fluctuations, and there was a loss of jobs containing a predominance of routine tasks in favour of jobs containing a predominance of non-routine tasks. They also found that routine jobs were at higher risk of losing their jobs than non-routine jobs but compensating for this was a greater chance of re-

employment and a faster shift from unemployment back to employment.

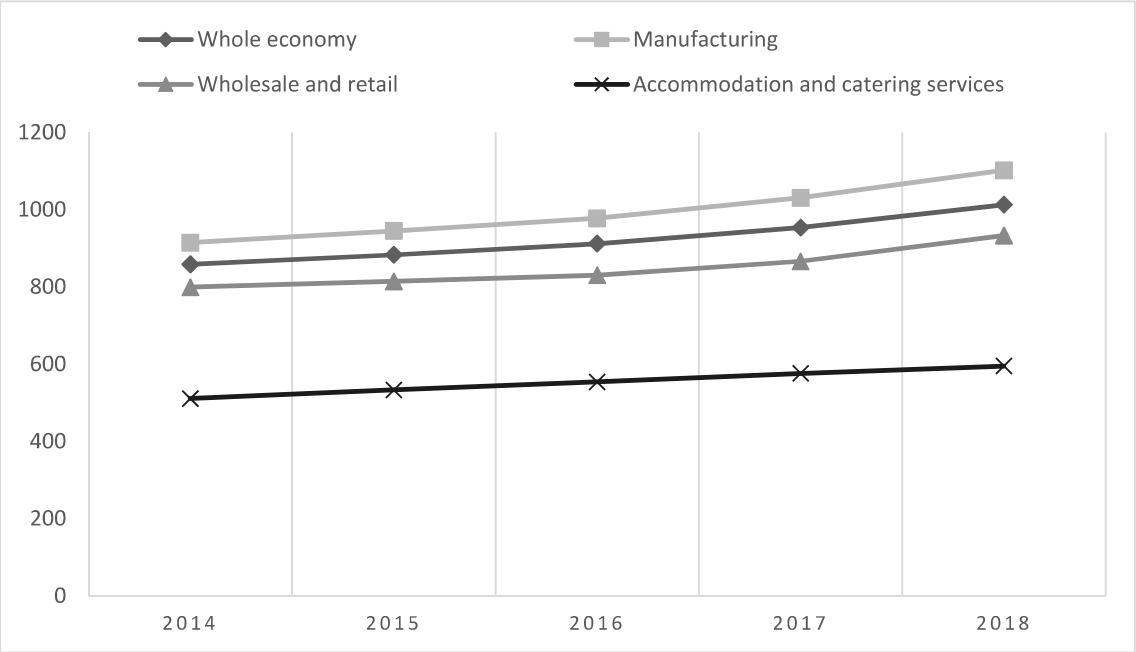
Seltzer (2019) examined the polarization of jobs in the US. Like Bachmann, he concluded that labour market polarization did not respond significantly to the economic cycle, as opposed to unemployment or employment rates. These results are inconsistent with those of Plunkett and Persoa (2013), who in turn pointed to the impact of the business cycle on job polarization.

Also, in the conditions of the Slovak Republic research of Pauhofová et al. (2016), working with the period 2005-2014, pointed out that the crisis has disrupted the job creation process of medium-wage jobs. Most of the high-wage jobs in the period under review originated in the industrial manufacturing sector. While in 2010 wages in this sector were roughly at the level of the average wage in the national economy, they were already on average 7.7% higher in 2014, and this sector had the highest share of employment growth in the category of highest wage evaluation. In the period under review, the number of employees with the lowest wage rating decreased in the industrial production sector, while in other industries this number stagnated. It should be noted that stagnation in the category of low and average wages affects most workers in the national economy. Although the number of above-average and highly above-average wage jobs grew in the whole national economy, it was at a faster pace in the industrial production sector than in other sectors. However, it is necessary to recall that wage levels in the conditions of the Slovak Republic cannot be compared with wage levels in developed EU countries.

Empirical research

In our own research, following the selected methods applied by the above cited authors, we have carried out several analyses. The first was an analysis of average wages in the Slovak economy and individual selected sectors (Graph 1). We have selected the industrial production sector, which we believe is the sector most affected by technological development. It is also the strongest sector of the Slovak economy. For comparison, we chose two other important sectors in the conditions of Slovakia, namely the retail and wholesale sector and the accommodation and catering services sector.

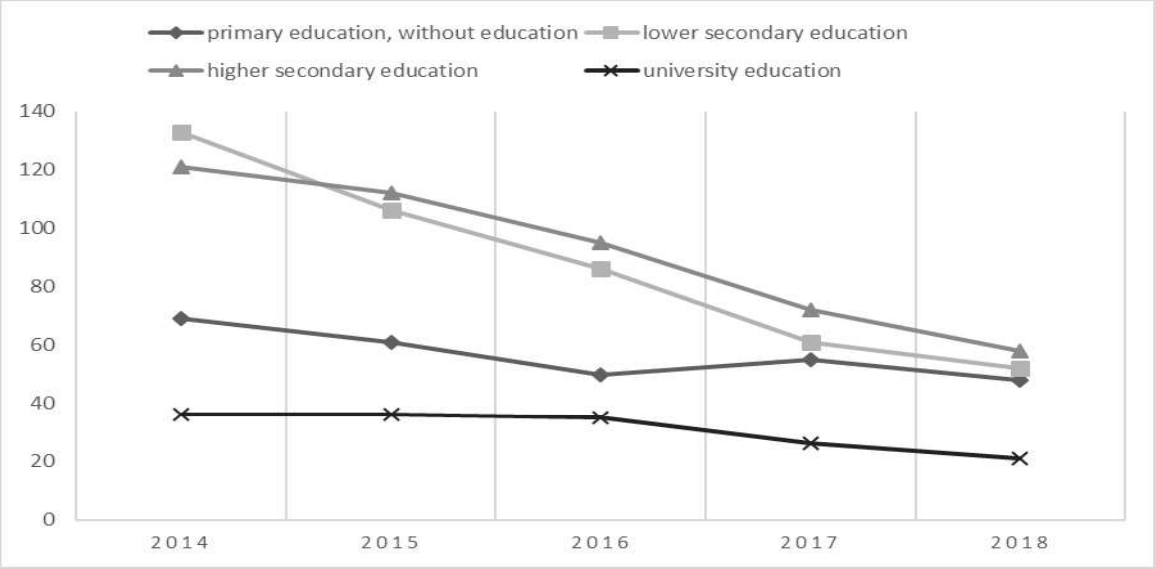
Graph 1. Average wages in selected sectors (in thousands of euro)



Source: own processing based on data from Statistical office of the Slovak Republic

In a relatively short time period of five years from 2014 to 2018 it can be said that both the industrial and wholesale and retail sectors copied overall economic developments. However, this cannot be said for the accommodation and catering sector, where the upward trend in average wages was noticeable, but it was not as significant as in the other sectors examined and in the overall economy. As another method we chose the analysis of unemployment (Graph 2) and employment (Graph 3) structured according to the educational level. Statistical Office of the Slovak Republic offer data structured for four educational levels: - primary education and/ or without education, - lower secondary education, - higher secondary education, - university education. The relevance of the data obtained from these analyses is justified by the assumption that people with the lowest education are likely to perform the tasks with the lowest qualification level and vice versa people with higher education are likely to perform the tasks with the higher qualification required.

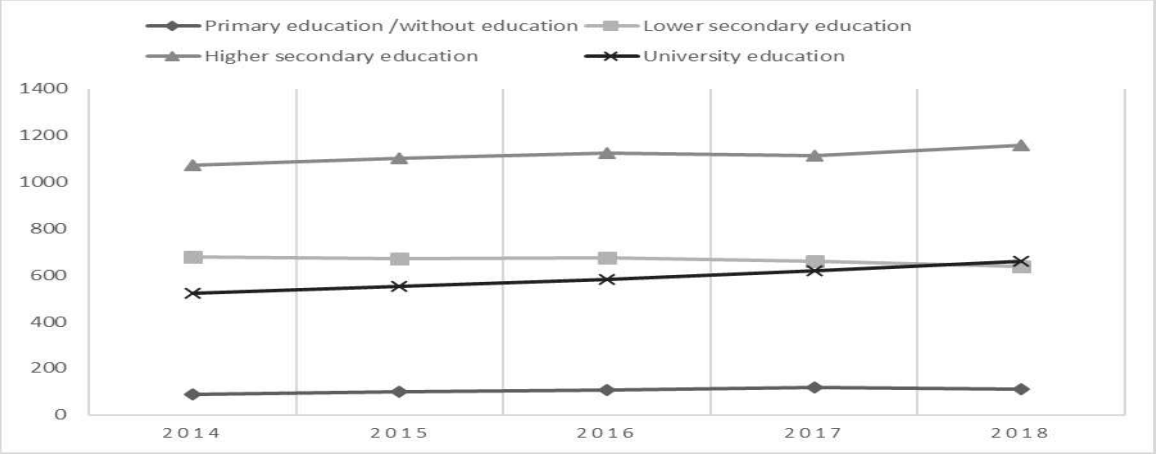
Graph 2. Unemployment in Slovakia structured by education (in thousands)



Source: own processing based on data from Statistical office of the Slovak Republic

As it can be seen from the graph, the polarization of the labour market in terms of job losses in middle qualifications and the increase in jobs at the lowest and the highest qualification level cannot be clearly identified in the selected time period. At all levels of education there can be seen a decrease in unemployment, although it did not run evenly. Unemployment stagnated among people with university education in 2014 and 2016, and a steep year-on-year decline in unemployment occurred only in 2017, when the number of unemployed fell from 35,000 to 26,000, and in the following year 2018 even to 21,000. However, it can be assumed that due to the increasing number of people with tertiary education, these graduates are currently accepting positions that do not correspond to their qualification level. The trend of overeducation is becoming an important phenomenon in Slovakia, which is being addressed by scientists and national policy makers. In people with primary education, or without education there was a sharp drop in unemployment, especially in 2014 to 2016, and subsequently the increase in the number of unemployed can be seen in 2017, followed by another relatively sharp decline. It would be advisable to analyse the results at regional level in order to determine whether this was an overall trend or varied across regions.

Graph 3. Employment in Slovakia structured by education (in thousands)

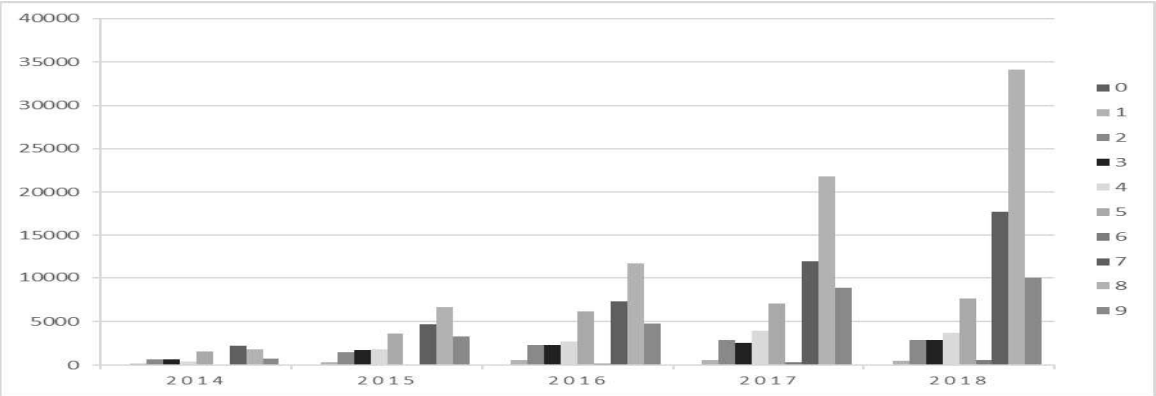


Source: own processing based on data from Statistical office of the Slovak Republic

It is clear from Graph 3 that in the period under review there was a steady increase in employment only in people with university education. Relatively even growth was also recorded in people with higher secondary education, except from 2017, when there was a year-on-year decline in employment from 1,126,000 to 1,113,000 employed persons. In the following year there was an increase to 1,159,000 people, which is about 8 % more than in 2014. In people with lower secondary education there can be seen a decrease in employment in the period under review, which could confirm the loss of middle-skilled jobs. Compared to the beginning of 2014, the number of people working at this level of education decreased by 6%. Overall, the only significant increase in employment in the period under review concerned only the category of university educated, with an increase in the number of employed by around 26% and people with higher secondary education with the 8% increase. In the category of people with primary education, or without education, there can also be seen an increase from the initial 86,000 to 108,000 people employed in 2018, which is approximately 25 percent.

Another way to monitor labour market polarization is through vacant jobs analysis. Data on vacant job positions are provided by the Office of Labour, Social Affairs and Family, structured according to SK ISCO-08, which represents the national classification of occupations based on the international classification ISCO-08. Here, job classifications are divided into 10 classes according to the criteria (tasks and activities) set by the ILO. The following graph (Graph 4) shows how the number of job vacancies reported by enterprises to the Office of Labour, Social Affairs and Family has evolved. We expect that due to the amendment to the Act on Employment Services, which, with effect from 1 January 2019, imposes an obligation for companies to report their vacant job positions, accuracy and value of this method and data will increase.

Graph 4. Vacant job positions in Slovakia.



Source: own processing based on data from Office of Labour, Social Affairs and Family

0 Armed Forces Occupations, 1 Managers, 2 Professionals, 3 Technicians and Associate Professionals, 4 Clerical Support Workers, 5 Services and Sales Workers, 6 Skilled Agricultural, Forestry and Fishery Workers, 7 Craft and Related Trades Workers, 8 Plant and Machine Operators and Assemblers, 9 Elementary Occupations.

In the period under review, the number of vacant job positions of plant and machine operators and assemblers increased the most. Between 2016 and 2017 there was an increase of 85%, the following year a further 57%. Craft and related trades workers, where there was a year-on-year increase of 65% between 2016 and 2017, and another 47% increase between 2017 and 2018, are another category of relatively significant growth. In the group of elementary occupations, where there was a sharp increase of 85% between 2016 and 2017, the growth in the following year 2018 was only a modest 13%. Services and sales workers have seen only slight growth since 2016, and the clerical support workers experienced a 5% year-on-year decline in 2017-2018. We can conclude that the job vacancy data observed for 2014-2018 confirmed the trend of job losses in middle-skilled qualifications, especially in administration and services. The highest growth was in plant and machine operators and assemblers, and in elementary occupations, although in plant operators the growth has been only modest recently. For group 3 (technicians and associate professionals), the increase in job vacancies has been relatively modest in the last 2 years of the reference period, 10% in the 2016-2017 and again 10% in the following year. For group 2 (professionals), where there was a relatively sharp increase of 53% between 2015 and 2016, growth is more moderate in the following periods, 26% in 2016-2017 and even a 3% decline in 2017-2018. Of course, factors that may have a direct or indirect impact on the results should be considered. For example, a significantly higher turnover rate for lower-skilled jobs compared to higher-skilled jobs.

Conclusion

Industry is not the first area where technological development affects or results into reduction of the workforce. A similar situation occurred in the past in agriculture and in the industrial production sector there were also several periods in the past, when new technologies reduced the necessary workforce. Nowadays, this phenomenon again attracts scientists, experts and the general public as technological development has taken on an unprecedented pace and there is concern about its uncontrollable impact on the structure of labour force, which in turn may translate into far-reaching social problems. There are opinions that this is a natural and understandable process, but unless the right attitude is taken by all stakeholders (policy makers, businesses and individuals) and the necessary measures are taken, the consequences can be far-reaching. For such measures to be implemented, it is important to analyse the situation thoroughly. The polarization of the labour market and jobs does not apply equally to all sectors. It is also important to consider regional specificities and the potential impact of the business cycle on job losses. In Slovakia, there is also a perceptible trend of population aging, increasing the educational level of the

population and the problem of insufficient linking of education system with the needs of the labour market, which results in a lack of labour force in certain professions and certain qualifications. This is likely to lead or is already leading and putting pressure on the management of manufacturing companies to address these issues effectively. Such a solution is usually to replace the missing workforce by automation, or to shift production to areas with enough workforce. To comprehensively monitor the polarization of the labour market in Slovakia, we recommend not to rely on a single indicator, but it would be appropriate to create a model combining several indicators and taking into account all factors affecting this phenomenon.

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