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Labor Shortage in Seven Central and Eastern European Countries in Transition: Before and During COVID 19

József Poór[1,*], Imrich Antalik[1], Allen D. Engle[2], Timea Juhász[3], Vilmanté Kumpikaitė-Valiūnienė[4], Zivile Stankeviciute[4], Ádám Kovács[1], Péter Karácsony[5], Kinga Kerekes[6], Monica Zaharie[6], Agnes Slavic[7], Nemanja Berber[7], Zsuzsanna Szeiner[1], Zdeněk Caha[8], Barbara Covarrubias Venegas[9], Zsolt Horbulak[10], Andrej Hevesi[1] & Péter Szitás[11]

[1]J. Selye University, Ul. Hradna 21, 94501, Komárno, Slovakia

[2]Eastern Kentucky University, 521 Lancaster Avenue, BTC 108, Business & Technology Center, Richmond, KY 40475, USA

[3]Budapest Business School, Diósy L.u. 22-24, Budapest, Hungary

[4]Kaunas University of Technology, Gedimino 50-211, 44249 Kaunas, Lithuania

[5]ELTE Eötvös Loránd University, Budapest, Hungary

[6]Babeș-Bolyai University, Teodor Mihali 58-40, 400591, Cluj-Napoca, Romania

[7]Faculty of Economics, University of Novi Sad, 24000 Subotica, Segedinski put 9-11, Serbia

[8]Institute of Technology and Business in České Budějovice, Faculty of Corporate Strategy, Okružní 517/10, 37001 Česke Budějovice, Czech Republic

[9]Free-lancer, Austria

[10]University of Economics, Dolnozemská cesta 1, 852 35 Bratislava, Slovak Republic

[11]National University of Public Service, Doctoral School of Military Sciences, Budapest, Hungary

*Corresponding author: J. Selye University, Ul. Hradna 21, 94501, Komárno, Slovakia. Tel: 421-907-742-799. E-mail: poorj@ujs.sk

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Abstract

Based on the responses of the surveyed companies and institutions, we analyzed what government measures help to solve the problems and tensions in the labor market. By our empirical research we aimed to look for the main triggers and the typical means of labor shortage and labor retention. We also examined what efficiency improvement plans and robotization programs are either planned or have already been implemented by the responding organizations. The study reflects the empirical results conducted in 2019 in seven countries in the region. One of the key issues in these countries during the period considered is the dramatic increase in labor shortages, which has been influenced by a variety of factors, namely outbound labor migration after the change of regime, unfavorable demographic factors, national and regional economic downturns as well as persistent wage differences within the EU. Wages and work-life balance are the two important factors that have a significant impact on labor mobility and fluctuation for both skilled and less skilled labor. Responses indicated a variety of reasons for labor shortages, different reasons in different countries. The research also provided an indication that robotization alone is not a solution to address labor shortages.

Keywords: labor market, labor shortage, employee turnover, labor retention, Central and Eastern Europe

1. Introduction

The International Labor Organization (ILO, 2017), has reported a general trend in the field of employment worldwide. A clear trend of increase in employment has been to see over the past nearly two decades worldwide, since the millennium. The number of workforces rose from 2.4 billion in 2000 to nearly 3.4 billion by 2017. This trend was not uniformed, nor completely progressive. Due to the global financial crisis of 2007-2010, the previously indicated growth rate of employment came to a halt and the global unemployment rate, which had fallen to 5.6%, jumped again to 6.3%. In the Western, Northern and Southern parts of Europe. The decline in the average unemployment rate over the period 2007-2010 was actually above the world average. In CEE Europe, "the period 2001-2008, with a difference of one year from that observed in other parts of Europe, brought about a steady increase in the number of employees" (Artner, 2018). Overall, this increase had not been as high as prior to the global financial crisis.

Considering a larger time horizon, the modernization process that began in the late 1940s caused long and complex changes in the field of employment in the focal CEE countries. During this dynamic period the employment dramatically increased, which was clearly caused by the high-volume recruitment of industries. The actual mechanism of this labor process was the mass employment of the rural population and women (Kaposi 2004, 310-312). During the period of socialism, the opening up of the internal economy also brought about a significant change. The appearance of the so-called “second economy” further increased employment (Gábor, 1979; Gábor and Galasi, 1981; Révész, 1985), by way of the extension of working hours. The regime change and opening up of the ex-socialist states to global influences once again brought about a comprehensive labor market transformation. This period was characterized by a significant increase in the number of inactive people, but this was not accompanied by a dramatic increase in unemployment as many people had retired and the length of time spent in higher education increased due to the expansion of higher education opportunities (Spéder, 2000). It is also worth mentioning that more sophisticated sectors of the economy emerged, requiring reorganization of the labor force in response to the demand for a more educated segment of the labor pool (Kőrösi, 2010, Kertesi and Köllő 2002; Kézdi, 2002).

After 2010, significant economic policy measures and reforms took place in Hungary and other CEE countries, which fundamentally changed the employment situation in the country. As a result, between 2010 and 2015, according to Eurostat, employment increased by 9.0 percentage points to 63.9% and the activity rate by 6.7 percentage points to 68.6%. Thus, Hungary partially caught up with the region, and in terms of employment, it has overtaken Slovakia and Poland. In early 2020 that number represented more than 4.5 million employees. (KSH, 2020). However, public employment plays a significant role in this evolution of the data; about 42% of the increase in employment resulted from public employment programs (György and Veress, 2016). However, the countries in the region lag behind the Western half of Europe, by around 9-12 percentage points in average.

The accession of the countries of the region to the European Union in 2004 and in a

subsequent wave of enlargement in 2007 was of great importance for the overall labor market in the Central and Eastern European region. This allowed citizens of the new member states to take up employment immediately in some of the old EU states. As free labor migration within the European Union is not recorded, exact figures cannot be stated with certainty, but this phenomenon has affected hundreds of thousands of workers in all CEE countries and millions of workers in the new large member states, like Poland or Romania. Based on various sources (Fourth, 2019), it can be stated that a significant number of workers, estimated at around 7 million, have left the labor markets of the transitioning Central and Eastern European countries, including Hungary. Because of this, and due to deteriorating demographic and other reasons, by 2018, regional labor shortages have developed in a variety of occupations and positions (Ballard, 2019).

The rate of emigration is very high in some of the countries mentioned. In 2017, it affected 11–16% of the working age population in Latvia, Lithuania, Romania and Bulgaria. In the case of Poland, Estonia, Slovakia and Hungary, this proportion was lower, between 5 and 8% of the working age population (Hárs, 2018; Bakó et al., 2019). In absolute numbers, almost 9 million people (Bjelotomic, 2019) of the seven countries was living in other EU countries in 2018, according to Eurostat. In this respect, the labor base of the studied area has benefited from the UK's exit from the European Union. As a result of this step, tens of thousands of people left the islands. EU net migration to the UK has fallen since the vote, but is still positive—more EU citizens are entering than leaving. In the year before the referendum, net migration of citizens of other EU countries was estimated at 189,000. In other words, many more EU citizens immigrated to the UK than emigrated from it. In the year to June 2017, it fell to an estimated 103,000. In the year to June 2018 that fell to 74,000, the lowest estimate since 2012.According to Eurostat (2017), left these countries in 2015 and nearly 200.000 in 2017. In 2018, 151 thousand (Dearden, 2019) moved back to the countries while 199.000 moved out from there (Leary, 2018).

Finding, acquiring and retaining adequate human capital poses a variety of challenges for companies and institutions. In several Central and Eastern European countries, the indicated trend has also contributed to the labor market deficit (Brixiova *et al*., 2009, Petrus, 2019). The value of the labor market tightness indicator (the number of vacant posts) in early 2020 is 2% in the European Union and 1.9% in the euro area; it is the highest is in the Czechia (5.7%), while in Hungary it is 1.9% (Eurostat, 2020).

The following is a brief summary of the rest of our article:

Section 2 of our article presents the theoretical and practical background of our research.

• In the third part, we outline our methodological approach and key characteristics of our sample.

• Section 3 of our article contains a statistical analysis of our empirical data.

• In the fourth section, we present our conclusions based on our statistical analysis.

• In Section 5 of our article, we describe the limitations of our research

2 Theory

2.1 Labor Market - general Characteristics

The labor market is a set of exchanges between two entities with the same formal status (employee and employer), during which the junction of employees to labor is realized and the movement between them takes place. The totality of labor movements is called the allocation and reallocation of labor. In more concise terms, the labor market is the institution of labor allocation and reallocation (Martin and Scarpella, 2011; ireau and Cascio, 2016; Gartenstein, 2018). The labor market is one of the components of the market economy and, as such, an economic institution where the division and distribution of labor takes place; thus the labor market is nothing more than the set of conditions related to the sale and purchase of labor in a given period and under given conditions (Lipták, 2013; Fodor and Glass, 2018).

2.2 Labor Market of Central and Eastern European Countries

The purpose of this section is to analyze the above-described trends at regional level, to highlight key regional data, to summarize the current situation, and to provide an overview of the current and expected economic developments. In the research different countries with different economic guidelines and social cultures, goals and situations are systematically analyzed. However, the performance of economic entities as well as the reports published by national authorities and EU institutions are comparable. This allows for easy orientation in the dataset and enables presenting cautious forecasts for the future.

The issues of economic development, unemployment, labor shortages and robotics are closely related to each other, and the performance indicators and figures behind them speak for themselves.

With one exception, the countries studied in the region are part of the former socialist bloc. Each country was affected by the change of regime in 1989 and by the break-up of the former Soviet Union. These transitions were characterized by political battles, new economic entrants, foreign investors, cross-border businesses, economic policy shifts and constant economic flux.

At the beginning of the change, the labor markets of the Eastern European countries were not able to satisfy the special needs (e.g. market-oriented management skills, new kind of marketing, financial and controlling knowledge, etc.) expected by international companies coming to different countries of the region.

Almost all countries in the region started to develop and have grown into major economic players today. The labor markets of Eastern European countries have significantly changed by now. The shortage in the case of managerial, legal, economic and administrative positions has notably decreased. However, there continues to be a severe shortage of technicians, IT engineers, medical doctors and skilled workers.

The Table 1 below shows the population and its changes in the researched countries. Romania is the most populous country and Lithuania has the lowest number of citizens. There is some level of outbound migration from each post-communist country, but Lithuania

has been hit by outbound migration most notably, as it is indicated in the table below: By 2019, the country had managed to keep only 87% percent of its population in 2008.

Table 1. The Main Labor Market Indicators of the Analyzed Countries (2019)

Country	Population	GDP growth (%)	Unemployment (%)
Austria	8 858 775	1,5	8,5
Czechia	10 649 800	2,5	2,9
Hungary	9 772 756	5,0	3,5
Lithuania	2 794 000	3,6	8,7
Romania	19 401 658	4.1	3.9
Serbia	6 963 764	4,8	9,5
Slovakia	5 450 421	1,3	4,9

Source: National statistical institutes, Tradingeconomics, 2020

2.3 Economic Development in the Region

There was economic growth in each focal country in 2019, according to forecasts. Based on data published by the individual statistical offices, we assert that the most significant GDP growth was in Hungary, amounting to 5%. GDP has grown in the country year on year, with 4.1 and 4.9 percent in 2017 and 2018, respectively. Hungary is followed by Serbia with a 4.8% growth. The Serbian economic performance has fluctuated the last few years. There has also been negative growth since 2010, but Serbia is making extended efforts to meet its targets, in support of its planned EU accession in 2025 (Trends, 2020).

With a 3.7% growth, Lithuania comes in fourth. The country was one of the hardest-hit countries by the 2008 economic downturn, with negative growth of as much as 14-15% in 2009. Yet, it started to develop dramatically from 2010 and has become one of the best-performing nations in the region today (Worldbank, 2020).

Continuing the favorable trend from the previous years, in 2019 Romania's economy expanded by 4.1% and the average gross wage earnings rose by 13%. The main driver of the real GDP growth was the rise of domestic consumption and the rebound in investment, particularly in the area of construction (National Bank of Romania, 2020a). Almost half of the imports of goods come from countries such as Germany, Italy, Hungary, Poland and China, and those approximately 5.8 thousand firms importing from Germany or Italy (3% of total non-financial corporations). hire more than 1 million employees (30% of the staff from non-financial corporations) and generate 37% of gross value added (National Bank of Romania, 2020b).

In the first quarter of 2020 Romania's economy rose by 2.4% as compared with the same year-earlier period (National Bank of Romania, 2020b), but starting with March 2020 the COVID-19 pandemic has affected the Romanian economy significantly. The unemployment

rate during the second quarter of 2020 was 5.4%, increasing by 1.1 percentage points as compared with the one recorded for the previous quarter (National Institute of Statistics of Romania, 2020). The EU estimated up to 6% contraction of the Romanian economy for 2020, followed by the return of the annual GDP dynamics to positive territory in 2021 (National Bank of Romania, 2020b). Meanwhile, the National Commission for Strategy and Prognosis (2020) projects for 2020 a 3.8% decrease of the Romanian GDP and a yearly average unemployment rate of 5.1%, Looking on to 2021 a recovery is expected, with a GDP growth rate of 4.9% in and an unemployment rate of 4.8%.

The effects of the COVID-19 pandemic on the Romanian economy could also be exacerbated by the decline of global remittances during 2020 (which in 2019 accounted for 5% of households' disposable income and 3% of GDP), if Romanian migrant workers earned less or repatriated (National Bank of Romania, 2020b).

The next country is Czechia with its 2.5% GDP growth. Its economy is characterized by innovation and efficiency, but like the situation in the previously analyzed countries, it has experienced slower growth than two or three years ago. Austria has shown a slight GDP growth of between 1.5% and 3% in recent years, with recent results showing an interim growth of 1.5%. With a 1.3% growth, Slovakia is the slowest growing country among the analyzed ones (Tradingeconomics, 2020).

2.4 Unemployment in the Region

Serbia, Austria and Lithuania have the highest unemployment rates among the surveyed countries. The Austrian rate has been increasing over the past few months, and interim data from 2019 suggested a slowing economic growth, bringing about higher unemployment. The forecasts proved to be correct, and the number of people out of work went up accordingly. Lithuania also had a rather high unemployment rate. Reports show that employment growth and unemployment increases are caused by conditions in the same sectors in the country. These increases are found in the industry, retail, transportation and warehousing, construction, forestry, fishing, education and healthcare industries (EURES, 2020). With a 9.5% unemployment rate, Serbia is the worst-performing country in the survey regarding the number of jobless. According to a report published by the Serbian monitor, there are a number of reasons for this. Economic analysts claim that the main cause is migration. Providing an alternative perspective, politicians argue that a recent change in the calculation of the unemployment rate must be behind the bad performance (revisions now provide that those job seekers are included in the calculation of some indicators who rejected a job offer voluntarily and thus they are not registered in the system anymore) (Serbian monitor, 2019). Czechia and Hungary are the countries with the lowest jobless rates. Since GDP growth has slowed down in Czechia, and it is soaring in Hungary, the causes of these low rates are subject to further research.

With regards to the latest developments in unemployment in different industries, the COVID-19 pandemic has created new circumstances and, as a result, unemployment has been increasing again. The growth in jobless rates has had a negative impact on industries in all researched countries, and a growing number of redundancies have been announced.

Overall, the highest number of job losses could be observed in the accommodation and catering industry in all seven countries. The pandemic has also significantly hit businesses and people in the arts, entertainment, recreation and tourism. It must be also noted that the automotive industry is a dominant employer in several of the countries focused on in this research, namely in Hungary, Slovakia, Czechia, Austria and Romania. The pandemic has been affecting carmakers as well, and in some countries tens of thousands of jobs are at risk, according to reports from European carmakers in 2020. The number of jobs already lost or currently being threatened in the automotive industry is 45,000 in Czechia, 30,000 in Hungary, 30,000 in Slovakia and Romania, and almost 15,000 in Austria (ACEA, 2020a and 2020b).

Table 2. Unemployment Rates in the Researched Countries on the Turn of the Years 2019-2020

Country	Unemployment (%)
Austria	8.5%:
Czechia	2.9%:
Hungary	3.5%:
Lithuania	8.4%:
Romania	4.0%:
Serbia	9.5%:
Slovakia	4.9%:

Source: Authors' own research based on Tradingeconomics data

2.5 Labor Shortages in the Region

Labor shortages are a challenge for each country, since unfilled positions cannot immediately be substituted with technology, while the lack of value creation generated by such jobs can result in an ongoing gap in production or services. According to an OECD report, 80 million workers in the EU suffer from not having the right kind of qualifications (Euractiv, 2019). Unsuitable qualifications are manifested in the fact that employees are either underqualified or overqualified for critical job categories (Darvas, Raposo, 2018).

The latest surveys show that it is the high-tech industry, construction, hospitality businesses, services, the shipping industry and the IT sector that have been impacted most by labor shortages.

Some 60% of Austrian businesses reported that they had experienced some losses of income due to labor shortages (ibw, 2018). A survey conducted by PricewaterhouseCoopers also shows that approximately a quarter of the 600 businesses surveyed reported an income loss of 5% or higher arising from labor shortages. Czech, Hungarian, Polish, Romanian and Lithuanian businesses were also among the PWC surveyed nations (five countries out of the eight ones analyzed in this research). To demonstrate the volume of the above-mentioned

income loss, we can state that it amounts to the GDP of three Central European countries (including the annual economic performance of Slovakia and Hungary) (PwC, 2019). The number of work permits has increased rapidly over the recent years in Romania, with tens of thousands of foreign workers' permits issued by authorities due to increased demands. This may partly have caused a decrease in unemployment, while the number of unfilled positions has also decreased (Business-review, 2019). In Czechia businesses are forced to import labor from Eastern Europe (Patricolo, 2019), and in Hungary there has been a labor shortage in the retail sector (Business-review, 2019).

2.6 Robotization

One of the biggest challenges of the future will be the incorporation of artificial intelligence into the labor market and organizational activities. The importance of manual dexterity and physical strength in support of many forms of work will decline. In addition to learning about and using new technologies, a critical task for organizations in the future will be to try to avoid making their existing workforce redundant immediately, and to map employees' skills that may still continue to be in demand (Barna, 2017).

Research suggests that the future impact of robots on employment is still difficult to assess. While Graetz and Michaels (2015) found no relationship between robots and general employment in developed countries, De Backer et al. (2018) write about a positive correlation between the adoption of robots and employment within multinational enterprises. Acemoglu and Restrepo (2017) claim that one more robot per thousand workers reduces the employment to population ratio by 0.37 percentage points in the USA. The same figure in the European Union amounts to 0.16–0.20 percentage points (Chiacchio et al., 2018).

The level of automation or robotization has an effect on the number of jobs available in individual countries (Graetz, 2019). The number of robots that replace the human workforce in Central and Eastern European countries has increased to 30,000 positions over the last decade. According to a recent study, robots do not necessarily generate extra profits for companies, even if they are already able to do the job without the help of human labor. There have been various estimates concerning to what extent human workforce can be substituted with robots. For example, according to Lordan (2018), 69% of jobs in Czechia, 61% in Hungary and 58% in Slovakia are at risk due to some form of automation. Quintini (2018) claims that 62% of workers in Slovakia, 52% in Poland and 49% in the Czechia are in danger for the same reasons. In contrast, Arntz et al. (2016) argue that only 11% of workers in Slovakia, 10% in Czechia and 7% in Poland might lose their jobs because of some form of robotics (Tandfonline, 2019, Kafkadest, 2018).

2.7 Labor Retention

Retention is a voluntary series of policies and actions by an organization to create an environment that will keep existing and attract potential new employees in the long run (BasuMallick, 2020). According to Samuel and Chipunza (2009), the primary goal of retention is to find ways to prevent talented employees from leaving the organization, as this can have a negative impact on the productivity and profitability of a firm. Humpreys *et al.*

(2009) also take the view that within retention, the main goal is to achieve organizational benefits; they place the focus of their retention concept on the adequacy of working hours. In a third approach, where the multidimensional concept of retention is addressed, Cascio (2003) characterizes retention as those initiatives that management takes to prevent employees from leaving the organization. According to Cascio, employees are rewarded for doing efficient work, ensuring a harmonious relationship between employees and managers, and maintaining a safe and healthy work environment.

In recent years, the importance of the existing workforce, retention of the workforce and related measures have become increasingly important. Most organizations have recognized the need for action (Mngomezulu *et al*., 2015; Perry, 2000). The importance of retaining the workforce at the management level is becoming increasingly important. This is mainly because of the following macroeconomic phenomena:

- slow growth in the number of jobseekers: the increase in the number of jobseekers in a period of economic activity cannot catch up with the growth rate of vacancies

- economic growth: a well-performing economy creates more and more jobs and opportunities for workers to switch quickly

- low unemployment rate: according to economists, if the unemployment rate falls below 5%, it will be increasingly difficult and expensive for organizations to fill vacancies;

- Lack of people with professional qualifications and special competencies: especially in certain professions there is a large shortage of manpower: health care, informatics, engineering jobs (Phillips and Connell, 2003; Dajnoki and Héder 2017).

According to Thomas (2017), a consulting expert at Select International, companies need to consider the following five aspects if they want to retain their talented employees:

- creating a suitable working environment and workplace safety,

- provide clearly defined goals and expectations, in which organizational communication and job descriptions play a key role,

- an open working environment in which regular feedback plays a role,

- support for training and development, challenging and motivating tasks,

- recognition, appreciation and reward of good work.

Several other HR experts such as Florentine (2019) and Half (2020) have formulated similar perspectives, strategies, and added additional tools to existing strategies that can help with the issue of retaining the workforce.

The issue of labor retention clearly has to do with the levels of turnover in each organization (Carrell, 2007; Saridakis, 2017). Turnover is an important performance index for human resources. Applying appropriate management roles (interpersonal, informational and decisional roles) (Mintzberg, 1989) is also likely to contribute to effective retention of the workforce. Employee turnover can provide a cohesive picture of the job categories in which

employees change most frequently, as well as how satisfied the employees are with the organization and how effectively they deal with this problem (Samal, 2019). An increase in turnover may be interpreted to suggest problems and mistakes that drastically hinder the successful and efficient operation of an organization in the future. Immediate steps and methods are therefore needed in practice to manage turnover (Boudreau, 2010). High levels of turnover often impose significant costs on organizations. These costs associated with turnover include the cost of vacancies, resources devoted to training and, most importantly, the loss of human capital, which involves significant expenditures for organizations (Grissom, Grotty and Keizer, 2016; Goldberg, 2014).

3. Methodology

3.1 Hypotheses

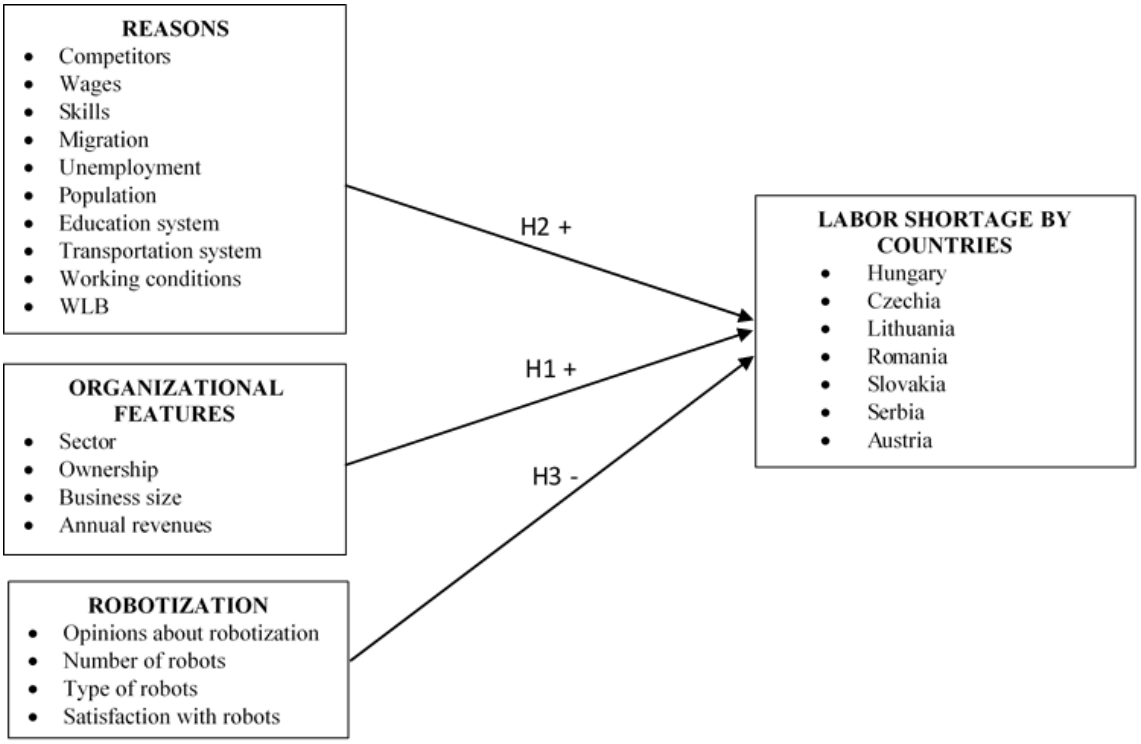
This paper presents the results of an international questionnaire survey conducted in seven Central and Eastern European countries. The research was focused on 1) the levels and 2) reasons of employee turnovers in the region, 3) the difficulties of filling vacancies and on the 4) typical HR techniques and tools used by firms to improve employee retention. Several hypotheses were developed during the research. This paper focuses on the testing of the following ones:

• H1: Organizational features (ownership form, size and annual revenues) have influence the causes of labor shortages within a given firm.

• H2: The seven focal countries have differing, national patterns of labor shortages, such that they can be put into different groups based on the reasons leading to labor shortages.

• H3: Robotization might be an efficient tool to alleviate labor shortages.

Organizational research affecting the workforce can be analyzed with several extant models. Such models are the PESTEL analysis, Scenario planning, SWOT analysis, and The Five Force model. One of the well-known models listed is the PESTEL model. PESTEL is a technique for understanding the various external influences on an organization. In our studies, we used our own research model, in which we took into account the organizational and environmental impacts on the workforce (Sammut-Bonnici & Galea, 2015). The research model and hypotheses are presented in Figure 1.



Source: Authors' own research

Figure 1. Research Model

3.2 Procedure and Sample

Data collection took place in an online form in 2019. There were several thematic question groups in the questionnaire(note 1). The structure is presented in Table 2. The survey consisted of closed questions based on nominal and metric (scale) variables. Both univariate and multivariate statistical methods were used in the analysis: frequency, mean, crosstabulation, ANOVA as well as factor and cluster analyses were undertaken for the data set.

Table 3. Structure of the Questionnaire

Organizational features	Characteristics of turnover and labor shortages	Robotization
1. Sector	1. Degree of turnover	1. Opinions about robotization
2. Ownership	2. Causes of turnover	2. Number of robots
3. Business size	3. Causes of labor shortages	3. Type of robots
4. Annual revenues	4. Solutions for labor shortages	4. Satisfaction with robots

Source: Authors' own research

For practical reasons, data collection took place in the form of snowball sampling (Noy, 2008; Ghaljaie et al, 2017)). Although the sample cannot be considered representative, the authors of the paper believe that this sample also provides a realistic insight into the practices and problems of organizations. The questionnaires were completed voluntarily and anonymously. Responses from 872 organizations were included in the sample. The responding organizations are based in Austria, Hungary, Czechia, Slovakia, Serbia, Romania and Lithuania. The peculiarities of the research sample are presented below.

The number of responses from individual countries were as follows:

Hungary 277, Czechia 249, Lithuania 75, Romania 77, Slovakia 53, Serbia 76 and Austria 65.

Ownership form was also analyzed. The categories available were domestic private ownership, public ownership, foreign ownership and mixed ownership. Table 4 shows the ownership form of the surveyed businesses in individual countries.

Table 4. Ownership form in the Surveyed Businesses

		Ownership form				Total
		Domestic private	Public sector	Foreign	Mixed ownership	
Hungary	N	109	44	91	8	252
	%	43.3%:	17.5%:	36.1%:	3.2%:	100.0%:
Czechia	N	91	29	46	15	181
	%	50.3%:	16.0%:	25.4%:	8.3%:	100.0%:
Lithuania	N	33	8	21	4	66
	%	50.0%:	12.1%:	31.8%:	6.1%:	100.0%:
Romania	N	64	4	4	3	75
	%	85.3%:	5.3%:	5.3%:	4.0%:	100.0%:
Slovakia	N	28	6	13	3	50
	%	56.0%:	12.0%:	26.0%:	6.0%:	100.0%:
Serbia	N	19	4	28	5	56
	%	33.9%:	7.1%:	50.0%:	8.9%:	100.0%:
Austria	N	42	8	2	6	58
	%	72.4%:	13.8%:	3.4%:	10.3%:	100.0%:
Total	N	386	103	205	44	738
	%	52.3%:	14.0%:	27.8%:	6.0%:	100.0%:

Source: Authors' own research

Businesses in domestic private ownership make up most firms in the sample in each country except for Serbia. They are followed by foreign owned firms.

The research also focused on business size. The available categories were micro, small,

medium-sized and large businesses. Businesses with 1-9 employees were described as micro businesses, organizations employing 10-50 people were categorized as small ones, 51-250 employees made respondents to be considered as medium-sized ones and those employing more than 250 people were considered large ones.

Table 5. Business Size in the Sample

		Number of employees							
		0-1 person	2-9 people	10-50 people	51-100 people	101-250 people	251-500 people	501-1000 people	more than 1000 people
Hungary	N	0	32	45	24	38	23	21	69
	%	0.0%:	12.7%:	17.9%:	9.5%:	15.1%:	9.1%:	8.3%:	27.4%:
Czechia	N	4	29	50	23	24	22	10	19
	%	2.2%:	16.0%:	27.6%:	12.7%:	13.3%:	12.2%:	5.5%:	10.5%:
Lithuania	N	0	5	9	8	16	8	12	7
	%	0.0%:	7.7%:	13.8%:	12.3%:	24.6%:	12.3%:	18.5%:	10.8%:
Romania	N	6	20	15	13	8	3	3	8
	%	7.9%:	26.3%:	19.7%:	17.1%:	10.5%:	3.9%:	3.9%:	10.5%:
Slovakia	N	9	13	10	3	6	2	1	7
	%	17.6%:	25.5%:	19.6%:	5.9%:	11.8%:	3.9%:	2.0%:	13.7%:
Serbia	N	0	7	8	1	9	4	2	25
	%	0.0%:	12.5%:	14.3%:	1.8%:	16.1%:	7.1%:	3.6%:	44.6%:
Austria	N	0	3	6	7	6	10	6	17
	%	0.0%:	5.5%:	10.9%:	12.7%:	10.9%:	18.2%:	10.9%:	30.9%:
Total	N	19	109	143	79	107	72	55	152
	%	2.6%:	14.8%:	19.4%:	10.7%:	14.5%:	9.8%:	7.5%:	20.7%:

Source: Authors' own research

The highest proportion of respondents self-classified as large organizations, followed by medium-sized and small businesses.

Categories were made up also on the basis of annual revenues. The distribution of respondents based on annual revenues is shown in Table 6.

Businesses with annual revenues higher than €3m were in the highest proportion in the sample, while those with annual revenues lower than €30,000 were represented the least.

Table 6. Respondents in Individual Countries according to Annual Revenues

		Annual revenues (budget)					
		Less than 30,000 EUR	30,001-300,000 EUR	300,001-3,00,000 EUR	3,000,001-30,000,000 EUR	30,000,00-300,000,000	More than 300,000,000 EUR
Hungary	N	13	41	42	63	33	48
	%	5.4%:	17.1%:	17.5%:	26.3%:	13.8%:	20.0%:
Czechia	N	25	51	48	25	17	12
	%	14.0%:	28.7%:	27.0%:	14.0%:	9.6%:	6.7%:
Lithuania	N	1	8	16	22	12	3
	%	1.6%:	12.9%:	25.8%:	35.5%:	19.4%:	4.8%:
Romania	N	13	22	17	12	3	4
	%	18.3%:	31.0%:	23.9%:	16.9%:	4.2%:	5.6%:
Slovakia	N	7	19	9	5	7	3
	%	14.0%:	38.0%:	18.0%:	10.0%:	14.0%:	6.0%:
Serbia	N	0	5	12	12	6	16
	%	0.0%:	9.8%:	23.5%:	23.5%:	11.8%:	31.4%:
Austria	N	0	5	9	14	14	7
	%	0.0%:	10.2%:	18.4%:	28.6%:	28.6%:	14.3%:
Total	N	59	151	153	153	92	93
	%	8.4%:	21.5%:	21.8%:	21.8%:	13.1%:	13.3%:

Source: Authors' own research

4. Analysis

The research team analyzed several hypotheses. This paper presents the testing of three hypotheses:

H1: *Organizational features (ownership form, business size and annual revenues) do not influence the causes of labor shortages within a firm.*

Several causes of labor shortages were listed in the questionnaire, and respondents had to indicate to what extent they are typical for their organization on a five-point Likert scale. 1 indicated not typical at all and 5 meant very typical. The causes were analyzed in two categories: higher-educated staff and blue-collar staff. Table 7 presents the mean and standard deviation values.

Table 7 indicates that in the case of higher educated staff the primary causes of labor shortages are opportunities provided by competitors, the lack of skilled workforce, low wages and problems in the system of education. The typical causes related to blue-collar staff are low wages, opportunities offered by competitors, the lack of skilled workers and outbound migration. In order to conduct further analysis, the variables were grouped into factors both in the case of white-collar and blue-collar staff.

Table 7. Causes of Labor Shortages

Causes	Higher-educated staff			Blue-collar workers		
	N Valid	Mean	Standard deviation	N Valid	Mean	Standard deviation
Competitors	511	3.19	1.400	461	3.15	1.463
Low wages	504	2.81	1.338	472	3.16	1.416
Lack of skilled labor	504	3.05	1.349	470	3.01	1.482
Outbound migration	497	2.45	1.386	464	2.66	1.489
Lower unemployment due to economic growth	489	2.34	1.295	455	2.57	1.392
Fewer working people available due to population decreases	491	2.06	1.178	460	2.35	1.270
Problems in the system of education	489	2.53	1.313	460	2.43	1.363
Bad working conditions	490	1.73	1.054	460	2.27	1.267
Underdeveloped transport infrastructure (difficulties in getting/commuting to work)	491	1.82	1.121	457	2.17	1.320
Work-life balance problems	499	2.34	1.278	455	2.47	1.363

Source: Authors' own research

In the case of higher educated staff the *bad working conditions* variable was not suitable for factor creation; thus, it was not used in the factor analysis. Three factors were created. KMO Barlett's test: .780 Approx. Chi Square: 577.829 df: .36 sign: .000, % of Variance: 54.995%:

The rotated factor matrix in the case of higher educated staff was the following.

Table 8. Causes of Labor Shortages in the Case of Higher Educated Staff - factor Matrix

	Component		
	1	2	3
Fewer working people available due to population decreases	0.721		
Lower unemployment due to economic growth	0.691		
Problems in the system of education	0.689		
Outbound migration	0.580		
Lack of skilled labor	0.539		
Work-life balance problems		0.757	
Underdeveloped transport infrastructure (difficulties in getting/commuting to work)		0.746	
Competitors			0.786
Low wages			0.690

Source: Authors' own research

Three factors were created as follows:

1. Macroeconomic causes Cronbach's alpha: .684

2. Work-life balance problems Cronbach's alpha: .486

3. Benefits, competitors' offers, wages and salaries

In the case of blue-collar staff all variables were suitable for factor retention. Three factors were created. KMO Barlett's test: .776 Approx. Chi Square: 1017.897 df: .45 sign: .000, % of Variance: 58.232%:

Table 9. Causes of Labor Shortages in the Case of Blue Collar Staff - Factor Matrix

	Component		
	1	2	3
Fewer working people available due to population decreases	0.750		
Lower unemployment due to economic growth	0.726		
Lack of skilled labor	0.694		
Problems in the system of education	0.687		
Outbound migration	0.527		
Difficulties in getting/commuting to work		0.790	
Work-life balance problems		0.716	
Bad working conditions		0.659	
Low wages			0.841
Competitors			0.625

Source: Authors' own research

Three factors were created as follows:

1. Macroeconomic causes Cronbach's alpha: .752

2. Work-life balance problems and bad working conditions Cronbach's alpha: .661

3. Wages and salaries and competitors' offers Cronbach's alpha: .509=

Next, analysis was done as to how the factors of ownership form, annual revenues and business size influence the presence of the specific factors of interest. As for ownership form, the following categories were used: domestic private, domestic public, foreign and mixed ownership.

Based on business size: 1-9 employees micro business, 10-50 people small business, 51-250 medium-sized business, more than 250 employees large business.

In terms of annual revenues three categories were distinguished: those with annual revenues lower than €30,000, annual revenues between €30,000 and €3m and those with annual

revenues higher than €3m.

The category variable means were compared with factor means (ANOVA). Significant differences have been highlighted with grey.

Table 10. Group Mean Differences between Labor Shortages and Ownership form/Business Size/annual Revenues - ANOVA (p=.005)

			Sum of Squares	df	Mean Square	F	Sig.
Ownership form	Macroeconomic causes - higher educated staff	Between Groups	5.573	3	1.858	1.878	0.132
		Within Groups	452.072	457	0.989		
		Total	457.645	460			
	Work-life balance - higher educated staff	Between Groups	4.961	3	1.654	1.656	0.176
		Within Groups	456.249	457	0.998		
		Total	461.210	460			
	Salaries - higher educated staff	Between Groups	6.575	3	2.192	2.203	0.087
		Within Groups	454.721	457	0.995		
		Total	461.296	460			
	Macroeconomic causes - blue-collar staff	Between Groups	0.786	3	0.262	0.260	0.854
		Within Groups	427.431	424	1.008		
		Total	428.217	427			
	Work-life balance - blue-collar staff	Between Groups	8.758	3	2.919	2.985	0.031
		Within Groups	414.605	424	0.978		
		Total	423.363	427			
	Wages and salaries - blue-collar staff	Between Groups	8.723	3	2.908	2.934	0.033
		Within Groups	420.209	424	0.991		
		Total	428.932	427			
Business size	Macroeconomic causes - higher educated staff	Between Groups	6.265	3	2.088	2.103	0.099
		Within Groups	456.735	460	0.993		
		Total	463.000	463			
	Work-life balance - higher educated staff	Between Groups	2.439	3	0.813	0.812	0.488
		Within Groups	460.561	460	1.001		
		Total	463.000	463			
	Salaries - higher	Between	5.677	3	1.892	1.904	0.128

	educated staff	Groups					
		Within Groups	457.323	460	0.994		
		Total	463.000	463			
	Macroeconomic causes - blue-collar staff	Between Groups	0.911	3	0.304	0.302	0.824
		Within Groups	428.089	426	1.005		
		Total	429.000	429			
	Work-life balance - blue-collar staff	Between Groups	3.470	3	1.157	1.158	0.325
		Within Groups	425.530	426	0.999		
		Total	429.000	429			
	Wages and salaries - blue-collar staff	Between Groups	10.770	3	3.590	3.657	0.013
		Within Groups	418.230	426	0.982		
		Total	429.000	429			
	Macroeconomic causes - higher educated staff	Between Groups	4.134	2	2.067	2.101	0.123
		Within Groups	440.664	448	0.984		
		Total	444.798	450			
	Work-life balance - higher educated staff	Between Groups	2.070	2	1.035	1.039	0.355
		Within Groups	446.509	448	0.997		
		Total	448.579	450			
	Salaries - higher educated staff	Between Groups	0.899	2	0.449	0.446	0.640
		Within Groups	451.358	448	1.007		
Annual revenues		Total	452.257	450			
	Macroeconomic causes - blue-collar staff	Between Groups	0.583	2	0.292	0.290	0.748
		Within Groups	419.951	418	1.005		
		Total	420.534	420			
	Work-life balance - blue-collar staff	Between Groups	0.412	2	0.206	0.205	0.815
		Within Groups	419.980	418	1.005		
		Total	420.392	420			
	Wages and salaries - blue-collar staff	Between Groups	6.390	2	3.195	3.225	0.041
		Within Groups	414.160	418	0.991		
		Total	420.549	420			

Source: Authors' own research

The results show that firms of different sizes, annual revenues and ownership form do not differ in terms of the reasons for labor shortages for the higher educated staff. With regard to blue-collar staff, wage problems proved to be significant in the case of domestic publicly owned organizations, while they were perceived to cause less tension in foreign-owned businesses. At the same time, work-life balance problems proved to be more significant in foreign-owned businesses than in domestic organizations.

Business size also influences the degree of wage and salary problems. In case of blue-collar staff, micro and small businesses are not really able to compete with medium-sized and large organizations in terms of wages and salaries.

The situation is the same concerning annual revenues. The higher a business's annual revenues are, the more it can successfully respond to the salary expectations of employees.

Thus, the results show that there are groups of employees where annual revenues, ownership form, and business size influence the causes of labor shortages. Consequently, the first hypothesis was rejected.

H2: The six focal countries have differing, national patterns of labor shortages, such that they can be put into different groups based on the reasons leading to labor shortages.

The same factor groupings were used in the testing of H2 as in the testing of H1.

In the case of those with higher education, clusters were created through K-means clustering using the three factors. The cluster centers were as follows:

Table 11. Final Cluster Centers based on the Factors related to Labor Shortages of Higher Educated Staff

	Cluster		
	1	2	3
Macroeconomic cause in case of higher educated staff	-0.43351	0.19158	0.18262
Work-life balance - higher educated staff	-0.38439	-0.69388	1.11541
Salaries - higher educated staff	-1.03993	0.69864	0.17416

Source: Authors' own research

Based on the cluster centers, the following clusters were created:

1. Cluster 1: This group can be characterized by the fact that the three factors are less problematic for them.

2. Cluster 2: In these businesses, salaries are the most common causes of labor shortages among higher educated staff. Macroeconomic reasons are also taken into account in their case.

3. Cluster 3: These businesses are mostly unable to be partners in reconciling work-life

balance problems, but macroeconomic factors and wages also cause problems for them.

The same method was used to create clusters in order to examine homogeneous groups in the case of factors causing blue-collar staff shortages:

Table 12. Final Cluster Centers based on Factors related to Labor Shortages of Blue-collar Staff

	Cluster		
	1	2	3
Macroeconomic cause in case of blue-collar staff	0.85937	-0.85953	0.39686
Work-life balance - blue-collar staff	-0.77840	-0.30493	1.14074
Wages and salaries - blue-collar staff	0.41176	-0.17605	-0.13632

Source: Authors' own research

The clusters were the following:

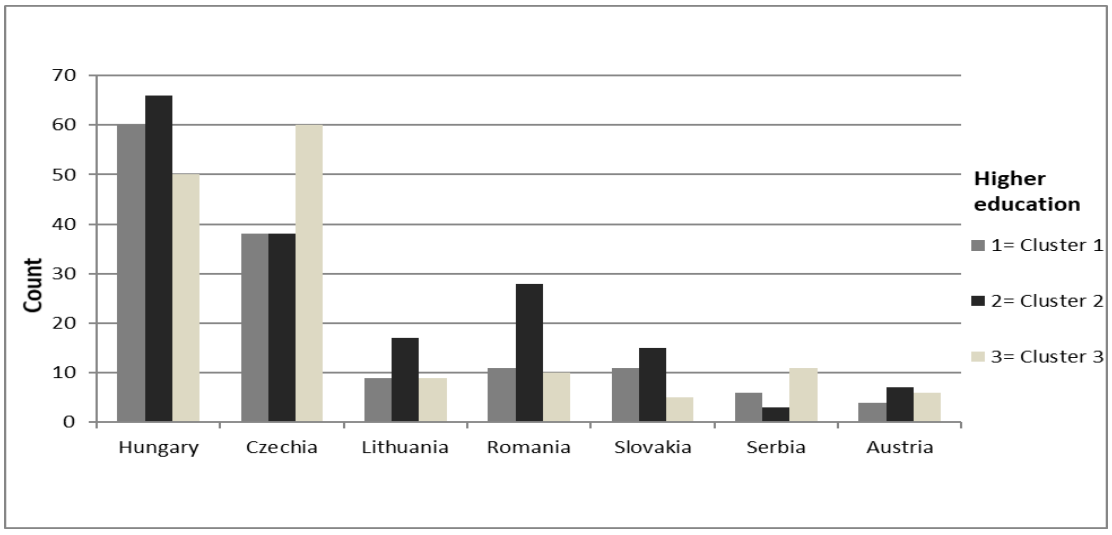
1. Cluster 1: Those who mostly explain labor shortages with macroeconomic and wage factors.

2. Cluster 2: Macroeconomic causes are the least typical for them.

3. Cluster 3: Work-life balance problems are one of the causes of labor shortages for them

Next, the authors examined which cluster respondents from different countries belong to, and whether there is any relation between clusters and countries.

In the case of higher educated staff, the individual countries were grouped in clusters (see Figure 2).



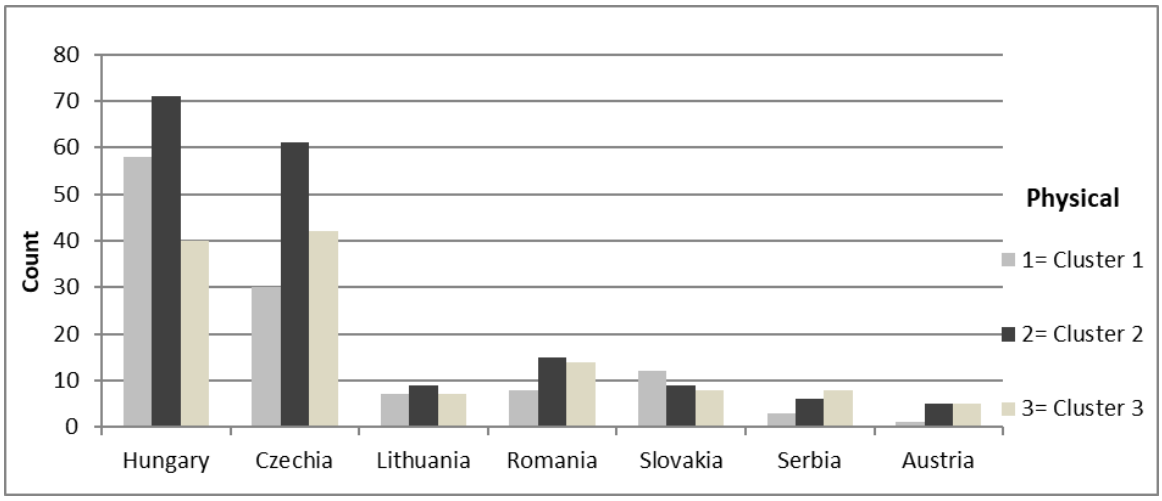
Source: Authors' own research

Figure 2. Distribution of Clusters Showing Labor Shortages in Case of Higher Educated Staff by Country

It can be seen that the majority of respondents belong to the second cluster in Hungary, Romania, Lithuania Slovakia and Austria. In Czechia and Serbia the three factors together cause shortages in a more balanced proportion.

Chi-square test showed a significant difference between the clustering and countries. Chi-square test: 29,509 df: 12 sign.: .003 p< .05.

In the category of blue-collar staff, the distribution was as presented in Figure 3.



Source: Authors' own research

Figure 3. Distribution of Clusters Showing Labor Shortages in Case of Blue-collar Staff by Country

No significant difference could be identified between the countries and clustering in this case. Chi-square test: 15.421 df: 12 sign.: .219 p< .05.

Hungarian, Czech, Lithuanian and Romanian respondents think that macroeconomic causes are the least significant, while in Slovakia they are considered to be the most notable cause. In Austria and Serbia work-life balance problems are seen to be a primary cause of shortages.

Based on the responses it can be asserted that the reasons for labor shortages differ across individual countries in the regional sample. However, the opinions of Hungarian, Lithuanian, Romanian and Slovak organizations did not differ significantly from each other.

In view of the above results, H2 was supported for the sample.

Hypothesis H3: *Robotization might be an efficient tool to alleviate labor shortages.*

Respondents had to indicate what role they think the use of robots can play in the alleviation of labor shortages. First, they had to indicate on a five-point Likert scale what they think regarding how efficient robotic devices can be – 1 on the scale meant very efficient and 5 meant the least efficient. Table 13 presents the mean and standard deviation values.

The data presented in Table 13 show that respondents believe that a lot of workflow tasks can

be performed more reliably with the help of robots. Nevertheless, the statement that the use of robots solves the problem of employee turnover was accepted by respondents only moderately. The above result supports the contention that humans may not be able to work together with robots in a balanced way, even if robots are endowed with increasingly human characteristics. It can be concluded from these results that robots can typically only serve as additional, supplemental labor force, and they cannot replace human staff, who generate the cohesive force in organizations. Correlation analysis has shown that certain workflow tasks are performed more reliably by robots, especially monotonous tasks (r: .688 sig.:0.01). Furthermore, robots can perform monotonous tasks with health risks instead of humans (r: .630 sign.: 0.01). However, robots are not necessarily efficient in completely replacing human workforce, but rather when they perform tasks in cooperation with humans (r: .518 sign.: 0.01).The authors also examined whether there is a relationship between 1) university graduate labor shortages 2) macroeconomic characteristics and 3) robotization. ANOVA analyzes showed significant correlations, so robotization can be an important guide in this regard.

Table 13. Efficiency of Robotization in Alleviating Labor Shortages

Statements	Mean	Standard deviation
Robots can perform certain workflow tasks more reliably than humans.	2.96	1.410
Robots can replace humans in performing tasks with health risks.	3.05	1.480
Robotization might solve the problem of employee turnover.	3.07	1.132
Robots can replace humans in the performance of monotonous workflow tasks (e.g., human work on production lines).	3.09	1.566
Robots and people are able to work together.	3.22	1.304
Robotization is costly, and provides a return on investment only in the long term.	3.25	1.231
Robotized technologies and people will work together as fellow workers in the future.	3.36	1.253

Source: authors' own research

Some 68.3% of the surveyed organizations do not use any robots, while 8.4% of them have them and use more than 20. The survey also revealed if there are any differences between countries in terms of whether businesses use robots or not (Chi-square 16.825 df: 7 sign: 0.019 p <0.05). 64.7% of Hungarian, 63.4% of Czech, 60.6% of Lithuanian, 78.9% of Romanian, 72.5% of Slovakian, 95.5% of Serbian and 81.3% of Austrian businesses do not use robots at all.

As for all statements presented in Table 12, the analyses also revealed that there were no differences of opinion between organizations using robots and of those not using them.

Consequently, it can be stated that neither of the two groups doubted that robots provide useful and important help in performing tasks at work. Employers that use robots in their operations were satisfied with them: with a mean value of 3.77 on a scale of 1 to 5 their experience on average is positive. At the same time, about 50% of companies that are currently not using robots do not intend to procure them at all in the future either. The authors analyzed whether there are differences between the opinions of those who plan to use robots and those who do not regarding the role of robotization in alleviating labor shortages. The independent samples t test showed that there is a statistically significant difference between their opinions regarding whether robots can replace humans in performing monotonous tasks. Interestingly, businesses that want to use robots in the near future are more skeptical in this regard, and probably are planning to use robots for non-monotonous operations.

Based on the results presented above, the third hypothesis was rejected, since robots cannot fundamentally alleviate labor shortages; they can rather increase workflow efficiency in cooperation with humans.

4. Discussion

Over the last 10 years the labor market in Europe (including Central and Eastern Europe) has gone through a number of significant changes. Just as decision makers have managed to get rid of high unemployment that had been a burden for long, labor mobility, the European wage gap and the rapid pace of technological development have led to labor shortages in many industries. Prior to the emergence of COVID-19, both unemployment and labor shortages had been seen as major challenges to Central and Eastern European businesses. These firms elaborated their long-term strategies in view of the changes brought about by digitalization. The pandemic COVID-19, however, is fundamentally changing market conditions and is expected to be a barrier to both European and global growth over the next several years.

This paper presents some of the results of a research project implemented in 2019. *Hypothesis H1 stating that organizational features (ownership form, size and annual revenues) do not influence the causes of labor shortages within a firm has been rejected.* The causes of labor shortages were analyzed in three dimensions.

• It can be concluded that in many cases, business size, ownership form and annual revenues may have an impact on the development of labor shortages within organizations. Regarding the first hypothesis, no evidence has been found that organizational features would not influence the causes of labor shortages. Data analysis based on ownership form showed that the biggest problem causing shortages of higher educated staff is wages, followed by macroeconomic factors and work-life balance problems. The same analysis also showed that wages are the primary cause of shortages among blue-collar staff followed by work-life balance problems and macroeconomic factors. Wages and salaries also proved to be the primary cause of shortages among both employee groups when data were analyzed based on business size. In the case of analysis based on annual revenues it was work-life balance problems that caused most shortages of higher educated staff and of blue-collar workers

alike.

• The research, however, also showed that the responding organizations are aware of the causes and are also trying to elaborate policies and tools to alleviate problems.

• Even if these tools do not solve the problem of shortages immediately and fully, they help organizations to deal with the problem temporarily or even in the long run.

Hypothesis H2: *The six focal countries have differing, national patterns of labor shortages, such that they can be put into different groups based on the reasons leading to labor shortages.*

The results of data analyses in this regard were the following:

• The second hypothesis according to which the researched countries can be put into different groups based on the reasons leading to labor shortages was proven correct. Hungarian, Lithuanian, Romanian, Slovak and Austrian respondents indicated that labor shortages of higher educated staff were caused by macroeconomic reasons to the lowest extent. Work-life balance problems were thought to be significant both by Czech and Serbian respondents: they were indicated to be much less severe by respondents from other countries.

• In the case of blue-collar workers, Hungarian, Czech, Lithuanian and Romanian respondents indicated that shortages of blue-collar staff are caused by macroeconomic reasons to the lowest extent. Slovakian organizations see the reasons in inadequate economic policies and low wages. In Austria and Serbia work-life balance problems seem to cause shortages the most. Serbians see it problematic not just in the case of higher educated staff but also among blue-collar workers. The Austrian responses were surprising, since it is well known that the problem has been dealt with in the country a lot.

Hypothesis H3: *Robotization might be an efficient tool to alleviate labor shortages.*

The correlation between labor shortages and robotization was examined from several perspectives. It has been found that the majority of respondents believe that robots make work easier; however, they do not think that robots can solve the problem of labor shortages on their own.

The sample consisted of 872 responding organizations from seven Central and Eastern European countries, and it provides an overview of those challenges that domestic and foreign businesses face in the labor market. In a labor market context, the biggest challenge that businesses faced last year in the countries surveyed was the retention of workforce and the finding and employing of new talents. Retention has proved to be a problem not only among higher educated staff or among those with special, expert knowledge but also in all other job classifications. Responses reinforce the idea that competitive wages and salaries are the key, most important retention tool. However, the basic salaries on their own do not provide enough retention force in the current competitive environment. The majority of respondents also see equitable and accurate performance evaluation and the introduction of performance-based bonus systems as necessary and appropriate tools to address these challenges. Of course, a number of other tools and circumstances also contribute to

businesses' abilities to generate loyalty among their existing and new employees. Based on the answers, it can be claimed that a pleasant and safe working environment, a friendly atmosphere and working from home are all factors that have become essential conditions for the smooth operation of businesses. Prior to 2020, labor shortages already emerged as a barrier to business growth in some industries. However, the near future will undoubtedly create new challenges and conditions in both global and European markets.

5. Limitations

As it has been stated above, various forms of labor shortages have become common in the region, even before the outbreak of the pandemic. Such a complex set of issues can be researched and explored from many different perspectives. Consequently, there are several limiting factors that should be mentioned here:

• The time and financial resources available in the current research have made it possible to examine primarily the economic and management aspect of the research topic.

• Data collection conducted in several countries is also a rather complex task. This paper presented research results based on data from seven countries.

• Since the research was basically conducted in the form of benchmarking (Evans, 1977), the responses are not representative of the individual countries or of the region as a whole.

• At the time of drafting our study the pandemic is still raging around the world, so we can only make assumptions from today's forecasts and outline the already visible effects and the expected economic consequences. The whole phenomenon is unfolding at such a rapid pace that it is highly possible that outcomes, which are considered as likely today, may change fundamentally in the coming weeks, months or even years. At the same time, there is no doubt that the current situation will shake the entire world economy and will pose enormous challenges to both employees and employers, in a manner similar to the post-2008 global financial and economic crisis.

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Note

Note 1. Access to our questionnaire is as follows: :http://limesurvey.szie.hu/index.php/952441?lang=en

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