



Challenges of automation and robotization of Czech economy in the context of state security increasing conditioned by Covid-19 pandemic¹

Výzvy automatizácie a robotizácie českej ekonomiky v kontexte zvyšovania bezpečnosti štátu podmienené pandémiou Covid 19

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Abstract:

The article is focusing on an analysis of the importance of foreign workers at the Czech labor market in the context of current pandemic and economic competitiveness sustainability in the field of features of 4.0 industry's development as current security highlight issue. There are analyzed possibilities and limits of automation a robotization with the emphasis on current trend in replacing lack of home ground working forces by economic foreign migration. The article is based on the theory of labor market segmentation, which is a basis for analyzing of the Czech labor market's structure. The analysis is pursued in two interconnected levels - in the increasing of foreign population in the Czech Republic. Further in the branch structure of labor market with significant rate of foreign workers in context of present needs of industry automation.

Keywords: Pandemic, Foreigners, Robotization, Automatization, Labor Market, Economic Security

Abstrakt:

Príspevok sa zameriava na analýzu významu zahraničných pracovníkov na českom trhu práce v kontexte súčasnej udržateľnosti pandémie a ekonomickej konkurencieschopnosti v oblasti znakov

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rozvoja priemyslu 4.0 ako aktuálneho bezpečnostného bodu. Analyzované sú možnosti a limity automatizácie a robotizácie s dôrazom na súčasný trend nahrádzania nedostatku domácich pracovných síl ekonomickou zahraničnou migráciou. Príspevok vychádza z teórie segmentácie trhu práce, ktorá je základom pre analýzu štruktúry českého trhu práce. Analýza sa sleduje na dvoch vzájomne prepojených úrovniach - pri zvyšovaní zahraničnej populácie v Českej republike. Ďalej v odvetvovej štruktúre trhu práce s výrazným podielom zahraničných pracovníkov v kontexte súčasných potrieb priemyselnej automatizácie.

KLúčové slová: *Pandémia, cudzinci, robotizácia, automatizácia, trh práce, ekonomická bezpečnosť*

Introduction

The covid-19 pandemic hit the Czech economy and economic stability and security unprecedentedly. With the government measures taken during the national quarantine, Czech companies found themselves without thousands of foreign workers, who have long been employed mainly in the manufacturing industry. A period of several months of slowing down or complete cessation of economic migration led to the absence of the necessary seasonal workers, on which the domestic construction industry or agriculture rely.

The fact that the quarantine measures introduced, due to the spread of a new type of coronavirus, caused a significant outflow of foreign employees was also confirmed by a current survey by the Hofmann Personal recruitment agency. Its results show that up to 30% of workers left their positions in the manufacturing sector at the beginning of the pandemic, many of whom now have difficulty returning [1].

According to Radek Špicar, Vice-President of the *Confederation of Industry and Transport*, this situation accelerates the development of the automated sector and contributes to the necessary automation of Czech industry and the advent of new technologies. Some of the main impulses of this dynamic are the situation on the labor market, the effort to prepare for the coming slowdown in economic growth and the ambition of companies to increase their productivity. Companies that have invested in digitalization, automation and robotics in recent years have stronger capacity to deal with the effects of the economic recession. "The epidemic shows us that the so-called Industry 4.0 is closer for Czechia than we think. At the same time, we are slowly getting rid of the label "assembly plant of Europe" [2].

Not only trade unions but also some ministries and experts oppose the "import of cheap labor" with reservations or outright rejection. They recall the trend that afflicts foreign workers, for example, in times of economic recession. During the economic crisis, it is they who are among the first to be made redundant. Lucie Trlifajová from the *Multicultural Center Prague* draws attention to the fact that "foreigners working in low-skilled positions are the first to lose their jobs in times of economic downturn. At the same time, given the ties they form in the country, and often due to the very poor economic situation in the country of origin, they have no incentive to return even if they lose their job (...) If state policies change according to current economic demand, as has been the case so far, there is a risk that we will create new groups of marginalized people in the long run" [3].

However, the question remains how the Czech Republic will cope with demographic trends in the future, especially with the issue of population aging and the loss of people of working age, if it intends to maintain its economic competitiveness and prosperity, so economic security in general. As of now, we can observe a discussion at both professional

and political level, on the strategic direction of the Czech economy to the possible use of automation and robotics in the field of labor deficit in selected sectors.

The position of foreign employees on the labor market is influenced by several elementary factors. These are mainly the dynamics of globalization economic processes, modernization of production procedures and processes and, finally the development of industrial production (automation and robotization), i.e. transition to a post-industrial economy. In today's so often inflected industry 4.0, the demand for experts in information and development technologies and services is growing. However, we still observe a strong demand in the Czech Republic for skilled craftsmen, workers and unskilled workers, which is due to the lack of domestic supply, i.e. low number of domestic employees with the necessary qualifications or low attractiveness of craft and manual professions for the domestic population.

Not only the Czech Republic, but the EU countries in general are preparing labor legislation in relation to foreigners from third countries, who in fact are starting to replace domestic work capacity on a larger scale in various member states. The migration policy of host countries is often influenced by the need for effectiveness of foreign employment in the labor market and the economic dynamics of the national economy related with it.

Čaněk talks about the partial subordination of the migration policy to the economic competitiveness of the state. However, it is often foreign workers who are, during a period of economical recession, first to encounter the negative effects in the labor market, which means the risks of moving foreigners into the system of informal economy, illegal residence and illegal worker-law relations [4].

1. Foreigners and the structure of the labor market

Based on the theory of market segmentation [5], we can distinguish jobs in it into two segments - the primary and secondary labor market, which differ from each other in the quality of jobs and working conditions. In other words, the theory of segmentation describes the persistent inequalities in the position of workers in the labor market, resulting from the characteristically mentioned segments. They differ from each other mainly in wage, job stability, work-procedure options, type of employment relationship or working conditions.

Some experts speak of the so-called tertiary sector, which is associated with an increased number of foreign low-skilled and unskilled workers and the development of foreign employment in general [6]. Jobs in this sector are rejected by the domestic population and filled by foreigners. The reason for the low attractiveness of professions in this sector for domestic employees is mainly low wages, physical demands, unattractive working conditions and low social status. These aspects are so important for domestic workers that some of them remain unemployed on a voluntary basis [7].

In the Czech Republic, business associations in 2019 were looking for over 342 thousand employees, whose positions they were trying to partially compensate with foreign workers [8]. The core question is how to deal with this long-term trend of companies facing domestic labor shortages? Is the right course action the emphasis on the development of industry 4.0 parameters, i.e. increasing the share of automation and robotization of production or permanent use of foreign labor in the future and the development of educational,

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retraining and integration programs for foreigners who are already in the host country and will be therefore more adapted to current needs of the labor market?

For the Czech employment market (especially for some of its sectors), are foreigners an irreplaceable source of labor. The reasons for employers to use foreign workers are mainly driven by the effort to maintain competitiveness in international markets to overcome the imbalance in supply and demand in the labor market. In the context of global competition, we can observe a trend of steady reduction in production costs, especially labor costs. This creates a portfolio of highly unattractive professions unoccupied by domestic populations which are instead being occupied by foreign workers.

In terms of the sectoral structure of the labor market, the greatest demand in 2018 was mainly in manufacturing, construction, wholesale and retail trade, repair of motor vehicles and administrative and support service activities. In terms of job vacancies according to the structure of employment, in 2018 we could observe the largest demand for machinery and equipment operators (assembly workers of mechanical, electrical, energy and electronic equipment and other products, for drivers of trucks, tractors and special vehicles, forklift operators and other).

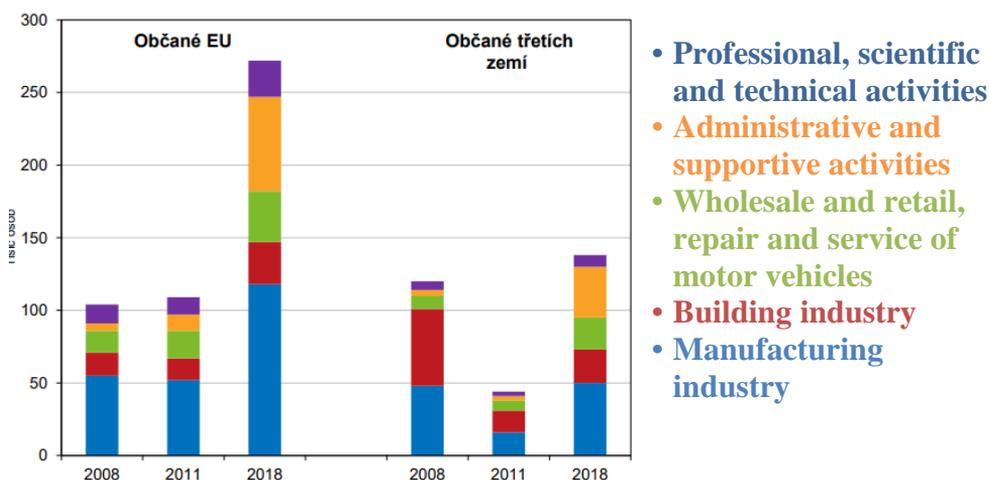


Figure 1: Share of foreigners in economic activity in the Czech Rep. [9]

104 thousand jobs were in demand, which represented a year-on-year increase of 76.6%. The second most sought-after occupational group were auxiliary and unskilled workers. These were mainly jobs for workers in the field of building construction, auxiliary workers in production, cleaners and helpers in hotels, administrative, industrial and other buildings and for auxiliary handling workers. There were 83 thousand jobs, an increase of 61.5% compared to the previous year [10].

However, we can observe a certain segment of the labor market intended for highly qualified foreigners, jobs with specific language and cultural competencies that are difficult for domestic workers to achieve (e.g. in trade with partners from significantly culturally different countries). "The difference between these two areas of the labor market,

which are destined for foreign workers, is mainly in the quality of jobs, wage evaluation, job security and stability, and last but not least in the social status of these jobs" [4].

The latest data from the Czech Statistical Office show that 43% of employees and 60% of the self-employed experienced the negative effects of measures against a pandemic of a new type of coronavirus in the second quarter of this year. The highest number of employees affected by the crisis was in the manufacturing industry and in the trade section. According to the CZSO survey, employees with basic education and secondary education without a secondary school leaving Exam were most affected by the coronavirus pandemic. With increasing levels of education, the proportion of disadvantaged people has decreased [11].

A survey conducted by the Hofmann Personal agency in March 2020 shows that before the pandemic, up to 70% of large manufacturing companies employed foreign workers [12]. At the end of March, employment offices registered 644,914 foreign employees in the Czech Republic. Three fifths of them came from EU countries, the rest from outside the EU [13].

A significant number of foreign workers returned home when companies reduced production. Although the government tried to prevent a massive outflow, for example, by a March regulation, which, among other things, approves the possibility of foreigners to change employers without having to meet the condition of six months of previous employment in the Czech Republic. However, this is not enough and in some fields these people may be significantly missing in the coming months [14].

According to Radovan Hypš, the director of the JenPráce.cz job portal, there are now only a fraction of employees from abroad in the Czech Republic. "They are mostly missing in the construction industry and due to the approaching summer season, they will be significantly absent, especially in agriculture. As of now lack of qualified labor from Slovakia is most noticeable. Furthermore, we observe a large outflow of workers from Eastern countries." [14].

2. Economic migration

In June 2020, the Ministry of the Interior of the Czech Republic (2020) registered 618,131 foreigners with a temporary stay longer than 90 days or with a permanent residence, which represents 5.4% of the total population. This is an increase of 0,5% compared to 2017 [15]. The structure of foreigners residing in the Czech Republic has been stable for a long time in terms of nationality. Ukrainians, Slovaks and Vietnamese are among the three strongest foreign groups. The year-on-year increase in legally residing foreigners was the highest since 2008, by almost 8%. This significant increase in economic migration to the Czech Republic is associated with the enormous demand of Czech employers for foreign workers. As of 31 March 2020, the Labor Office of the Czech Republic registered 644,914 foreign employees [15]. This is a year-on-year increase of 20,4%. The significant increase in economic migration to the Czech labor market is also evidenced by the fact that 60% of applications for long-term residence permits submitted at embassies in the Czech Republic in 2018 were for the purpose of gainful activities. In the year-on-year comparison, there was an increase of two thirds and "gainful activities" is now the most frequently requested purpose when coming to the Czech Republic for the second year in a row [16].

The Czech Republic's migration policy strategy perceives an increased demand for foreign workers and seeks to respond flexibly to the needs of the labor market through

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implemented economic migration projects, which enable selected foreign groups to simplify the process of submitting and processing applications for residence permits. For a long time, these are employees from Ukraine.

The Strategy of Migration Policy of the Czech Republic implies the state's interest in supporting legal economic migration, "which is beneficial for the state and its citizens so that the Czech Republic can respond flexibly to the needs of its labor market and reflect the long-term needs of the state" [17]. At present, we can register more emphasis on the support and expansion of projects in the field of economic migration. These have been created and implemented since 2012 within the framework of inter-ministerial cooperation of central state administration bodies. The aim of economic migration projects is to streamline the migration procedure by simplifying the process of submitting and processing applications from foreigners for residence permits or work permits. Foreigners and domestic entities that are interested in their arrival (employers, business corporations, schools) are included in the project by its manager (central state administration body) or authorized guarantor (business representation) under specified conditions [15].

The strong interest of the state in foreign workers is evidenced by the increasing quotas of work permits. Since September 2019, managed economic migration projects for medium and low-skilled workers have been transformed into the so-called Qualified Employee Program, through which the Czech Chamber of Commerce centralizes the control and classification of employers' applications².

According to a study by the Institute of Planning and Development of the Capital City of Prague, at least one in five workers in Prague is a foreigner [18]. On a national average, this is every tenth employee. Within the total number of working foreigners in the Czech Republic, one in three works in the capital. For Prague, therefore, foreign labor is the main source of the labor market. Current research by the Institute of Sociology of the Academy of Sciences shows that foreigners from countries outside the EU are most concentrated in the metropolis, while border areas are dominated by Slovaks, Poles and Germans. Vietnamese show an even demographic distribution [1].

With the rapid increase in the number of foreign workers in the Czech Republic over the last two years, the state is paying attention to the security aspects of employing foreigners, especially regarding the security situation in the industrial zones of Hradec Králové and Pilsen region, where we were able to register an increased level of illegal activity, especially offenses (against public order, civil cohabitation or property) by foreigners, as well as an increased level of conflicts in the coexistence of local people with foreigners, offenses in the field of transport, prostitution and drugs. The measures implemented in 2017 and 2018 contributed to a significant improvement in the situation in these regions, which contributed to a renewed increase in security and public order [19].

² The Qualified Employee Program includes the following countries (government-set annual quotas):

Belarus (800 applications / year)
Philippines (1,000 applications / year)
India (600 applications / year)
Kazakhstan (300 applications / year)
Moldova (600 applications / year)
Mongolia (1,000 applications / year)
Serbia and Montenegro (2,000 applications / year)
Ukraine (40,000 applications / year) [18].

3. Challenges of economic sustainability - robotization and automation

According to economist Helena Horská, the Czech Republic has found itself in a situation of so-called extensive growth, demanding both in labor and investment. The structure of the Czech economy is significantly limited by cheap labor, on which the economy depends. This may be evident in the structure of jobs offered, where 85% of all vacancies are intended for employees with no or low qualifications. According to the economist, the Czech Republic is one of the so-called cheap economies, dependent on cheap labor. Despite a higher level of foreign investment compared to neighboring countries, low value-added production and labor-intensive production predominate.

The increase in economic production thus requires additional employees. The constant increase in foreign employees is not a long-term solution. According to the economist, the lack of "cheap" labor can be solved by robotics, modern technologies and new types of services in the spirit of the new industrial revolution 4. 0. "Robots will take care of routine and hard work for us. Many activities can be done over time by artificial intelligence. There will be fewer and fewer cheap hands, on the contrary, more experts and specialists etc. will be required. That is why we must invest - not only in transport infrastructure, in machines, robots and modern technologies, but mainly in people. And we are at another problem, i.e. the quality of education, the ability of Czech school system to prepare graduates for the new needs of the future labor market and lifelong learning system" [20].

As we stated in a study on the importance of foreign economic migration in the Czech Republic given the current nature of the Czech economy, dependent on cheap labor, robotics solves the lack of work capacity only partially, although we can observe in Czech industrial enterprises efforts to replace missing jobs with automated and robotized systems [21]. According to Jiří Prášil, the director of the ZKL engineering concern, "greater robotization and digitization would solve the current problem of industrial companies only to a certain extent. Full robotics can only be used in large-scale programs, most often in the automotive industry." The advent of Industry 4.0 will lead to a reduced interest in workers. On the contrary, there will be more need for CNC machine programmers and processors with knowledge of virtual simulation of technological process" [22]. There will still be positions in which it is very difficult to replace a human with a robot. We can observe a trend where the demand of companies is shifting to other groups of employees (CNC machine programmers, engineers organizing production and generally workers with increasing digital literacy).

Václav Hlaváč, Head of the Department of Robotics and Machine Perception at CTU, talks about the current post-pandemic high demand for industrial robots. "Robots are now required for new applications, first for infected environments, and for production or service operations where it is possible to reduce human work, respectively to continue production even in a virus crisis" [23].

Vítězslav Lukáš, CEO of ABB Czech Republic, a leading European robot manufacturer, states that robot intelligence is already at such a level that they can work safely with humans. "They can be used widely not only in healthcare, but also in gastronomy, hospitality and other fields where hygiene is important" [24].

Jiří Holoubek, a member of the Board of Directors of the Confederation of Industry and Transport, expects companies to be interested in the supply of robots of all kinds. He

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thinks that this trend would have come up even without the current crisis. According to him, robots are useful especially in the automotive, engineering and electrotechnical industries. However, he draws attention to legislative issues related to the protection of personal data, especially in health care [23].

Jiří Holoubek, President of the Electrical Engineering Association of the Czech Republic, lists some types of jobs that can be transformed in the future by robotics: “routine and stereotypically performed activities, constantly repeating administrative work or even cleaning work can be performed by robots. Given that the vast majority are jobs that are not of interest to people, the robotization of these activities can be a solution to labor shortages for companies” [22]. Ondřej Velek, director of the Czech Institute of Informatics, Robotics and Cybernetics at the Czech Technical University, sees an effective solution, “if a company invests in production automation, it can, for example, replace ten current manual operators with five cooperative robots. Then only one operator moving between the robots will be enough to achieve the same amount of product” [22].

According to a report by HSB Global Research *World in 2030*, which predicts economic development in 75 countries in the long term, the Czech Republic is rated above the world average in the field of robotics. There are 101 robots per 100,000 employees, while the average is around 70. The study draws attention to the increased need for the Czech Republic to replace the population deficit of the productive segment of the labor market in the future with automation and robotics. The world leader in this trend is South Korea, which has the highest level of automation in the manufacturing sector (631 robots per 100,000 employees) [25].

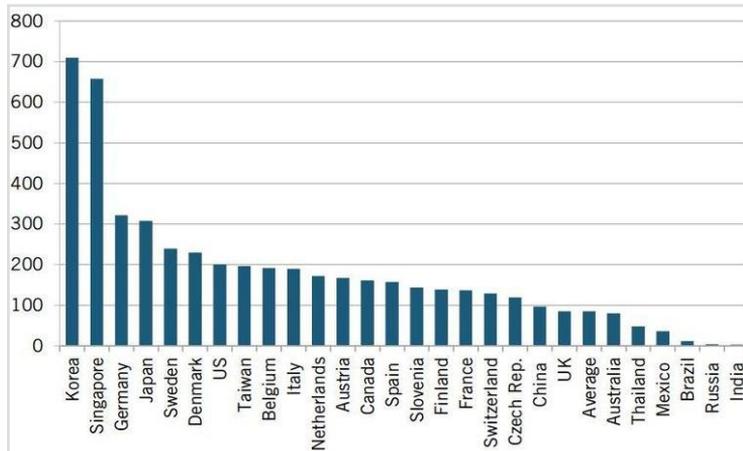


Figure 2: Robots per 10 000 manufacturing workers [25].

Despite predicted above-average social progress and quality of life in the Czech Republic, the HSB Global Research report draws attention to the risks regarding competitiveness in the form of low birth rates (1, 6 children per mother), which means a 1.5% decrease in total working age population and total population of about 100 thousand in-

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habitants. Higher economic growth potential and competitiveness against developed markets is predicted for developing countries with high population growth rates (China, India, Bangladesh, Philippines, Pakistan, Vietnam and Malaysia) [25].

Predictions of the impacts of automation and robotization in the Czech Republic made by a company Deloitte give significant positions of importance to machine learning, artificial intelligence and robotics in terms of their impact on the Czech economy. Modern technologies can support economic growth, wage growth, return on capital and other characteristics of the economy. However, modern technology will have a major impact on the labor market. More than half of employees will be at high risk of automation. This will require strong workforce flexibility and a willingness to re-qualify. Given the structure of Czech employment, the potential for automation is estimated at 51% of jobs. However, in the short term, there should be no significant increase in the unemployment rate due to automation, provided, that labor markets are flexible enough and employees are willing to adapt. In the long run, lost jobs will be compensated by new ones, both in new technological fields and in the rest of the economy, as a result of growing productivity, income and demand. Automation and robotization will be most progressive in agriculture, construction and manufacturing [26].

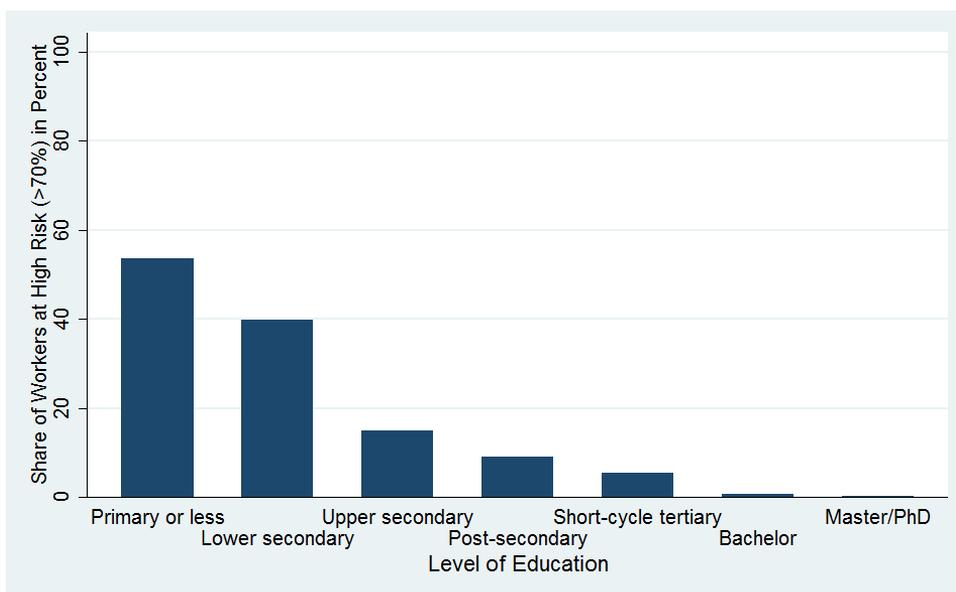


Figure 3: Share of workers with high automatibility by education [27]

Specialists, legislators and managers are exposed to the lowest level of threat caused by automation. On the contrary, the high level of risk of automation is directed towards a group of employees operating machinery and equipment, fitters, clerks, service workers and sales staff. The level of risk for technical and professional staff is evenly distributed and it is not clear which category they fall into. Craftsmen and repairers are exposed to a higher risk of automation, and skilled workers in agriculture, forestry and fisheries fall

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into the category of medium risk. Auxiliary and unskilled workers are on the border of medium and high risk³ [26].

Ultimately, the automation of some industries may not be essential for the as a whole economy. An example could be mining and quarrying with a large proportion of employees at risk of automation. However, given that the sector accounts for less than 1% of total employment, its relative impact on the labor market is not high. In contrast, automation in the manufacturing industry, wholesale and retail trade, transport and storage will have the greatest impact on the dynamics of the Czech labor market, since these sectors together account for 38% of the Czech Republic's GDP [26]. In terms of regional impacts regarding the structure of the labor market, the Ústí nad Labem and Karlovy Vary regions are among the localities with the highest degree of risk of job automation. The opposite is the case in the capital city of Prague and the Central Bohemian Region [28].

“Automation mainly affects routine manual work and will increasingly also concern routine cognitive work. This process will reduce the share of the workforce with an average or below-average wage and thus increase the average wage for employees whose work will not be machine-automated. Thus, the wages of those employees who are complementary to automation capital rather than a substitute” [26].

Conclusion

The economic and social development of the Czech Republic raises several questions towards immigration, economic migration, a gradual but steady increase in the share of foreigners in the population, social integration or marginalization. While in the late 1990s the number of foreigners residing was around 200,000, in the new millennium there is a continuing increase of 200,000 between 2003 and 2008 and by 2018 to the current 556,931 people, representing 5.3% of the total population [7], [19].

Foreigners represent a reservoir of cheap labor. Their attractiveness on the part of employers lies in the willingness to work for lower wages compared to the domestic population, to work overtime and in non-standard working hours. Increasing numbers of immigrants expose Czech society to the challenge of coping with the dynamic growth of ethnic, national, linguistic and cultural heterogeneity, especially in developing industrial regions, where most foreign economic migration is directed. That fact is relating also with increasing demands on internal security and integration process of incoming foreigners.

Currently, we can observe countless analyzes of the economic sustainability of European markets depending on the demographic trend of European populations and the role of foreign labor migration in the economic sustainability of the competitiveness of national economies and their economic security. The Czech Republic is also exposed to a shortage of skilled workers in the domestic population, deficit of which employers try to make up

³ From the overall view of the number of jobs in the Czech economy, the above-mentioned 51% of jobs are exposed to a high level of automation risk, 21% to a medium level and 28% to a low level. The first category of labor sectors includes transport and storage, mining and quarrying, accommodation, food and beverage service activities, manufacturing and wholesale and retail trade. The second category includes rather low-skilled and unskilled workers in agriculture, forestry and fishing. The third category includes education, information and communication activities, professional, scientific and technical activities, finance and insurance, health and social work [26].

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for with foreign workers. We are convinced of the significant pace of this growth by the above-mentioned data on foreign economic migration to the Czech territory.

According to some economists, the Czech economy is facing a shortage of workers in most sectors due to its significant growth. According to economist Miroslav Radiměřský, low unemployment cannot offer personnel reserves in the domestic population, and the automation of production and the transition to higher value-added production are for the time being a strategic goal of a more general nature that will not help with the current labor shortage. Production automation is economically advantageous for companies from a certain number of employees and volume of production. The simplification of access conditions to selected foreigners for the Czech labor market is still the ideal way forward [20].

On this issue, economist Petr Zahradník emphasizes the ever-deepening mismatch between the high demand for labor across sectors, educational preconditions and the low supply that currently exists on the labor market. Raising wages by employers in order to increase employment and motivate the domestic population has its limits in the level of cost increases in proportion to the planned expansion of the business. The second option is to "import" labor from abroad. However, a long-term solution should be systematic work with domestic unemployed citizens and their participation in the labor market. However, this requires the adaptation of the education system and the motivational ways and tools of the labor market system, which complement the above measures with an appropriate combination of conditions [20].

“According to the analysis of the Office of the Government of the Czech Republic, digitization should create about 300,000 jobs within fifteen years, but at the same time eliminate 700,000 old ones. The net decrease therefore represents 400,000 earning opportunities. Workers working with metal will have problems - more than 40,000 positions are expected to be lost. Also, secretaries, saleswomen or insurers and drivers. On the contrary, data processing experts, Internet application developers, doctors or nurses in retirement homes do not have to worry” [29].

In other words, digitization in the Czech Republic will be responsible for about a third of job losses and one-eighth of new jobs. According to the analysis of the Department of Strategy and Trends of the Office of the Government of the Czech Republic, the risks of labor market automation can be divided into three aspects. The first is the current professional structure of the Czech Republic, which will be affected more or less by automation. The second aspect influencing economic dynamics is the economic and capital structure of the Czech economy, which conditions the ability to create and manage physical capital (replacing lost jobs). And the third aspect is the rate of economic development and urbanization. The ratio of newly created jobs to lost jobs is estimated at 2:5. [28].

“Digitization will have more of a positive impact on economically developed regions. Risks will be realized more in poorer regions” [28]. In the current pandemic situation, we can observe a certain signal of this growing trend of labor market automation, since Czech technical universities and companies have rapidly increased the production of various 4.0 generation products that help employees, especially in healthcare.

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