DEVELOPMENT OF INFORMATION TECHNOLOGIES AND THEIR IMPACT ON THE LABOR MARKETS

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Abstract

Information society, information, information technology are often used terms nowadays. Informatization of society is aimed at developing the potential based on knowledge, information, people and their ability to use information effectively. Nowadays, information technologies are being brought to the attention of not employers and employees, but also to young people, graduates of high schools or secondary schools. They relate to the fourth industrial revolution, called INDUSTRY 4.0, which is more influential on the labor market and individual labor market players, in particular employment and unemployment. Most future employees are expected to know and be able to adapt to the new times and society. In the article, we try to point out how new technologies affect those entities.

Key words

Industry 4.0, information technology, labor market, employment, wages

JEL Classification: O30, M52, J20

Introduction

Our world is constantly changing. Today, more and more emphasis is being placed on the development of new technologies that will make it easier and at the same time optimize not only production but also everyday life. Industrial production experts and futurologists are constantly asking how production will look like in the future. The beginning of the 21st century is connected with the rocket boom of the Internet, smart technologies and their penetration into all areas of human activities. Constant innovation, optimization or efficiency are key to gaining a competitive edge in today's market. The classic business model is changing because current production cannot meet the demands of increasingly demanding customers. The customer has more and more demands and their difficulty increases, moreover they want to have everything in the shortest time. A classic business model based on mass production is no longer enough. Informatisation of society is aimed at developing the potential based on knowledge, information, people and their ability to use information effectively. It is necessary to focus on ICT literacy, security and education for the new generation of efficient workers and the development of the Slovak economy. It is very important for the Slovak Republic to get to the level of neighboring countries with its economic activity and knowledge economy and thus to increase its competitiveness. Before today's technology came to the fore, there were seven basic ways to communicate: telephone, wire, television, radio, mail, fax, or pager. Radio signals and wires, as well as telephone wiring, allowed us to transmit a lot of information faster. The onset of mobility, which is connected to information sources 24 hours a day, 7 days a week, is still quite recent. Thanks to the progress that has been made, it is not possible to say what is being stored in the future, but more than a few light years from where we were 20 years ago. Workers can get the information they need within 2 seconds instead of 2 to 7 days. These technologies completely eliminate the need for mail or even the cost of overnight mail for very sensitive documents that can be encrypted (electronically encoded) and digitally signed. Also due to increased security measures, it is virtually impossible for foreign partners to access sensitive or private company information (Greene, 2017).

Goal and Methodology

The main aim of the paper is to explore the development of new technologies and their impact on the labor market. In order to realize this

goal, we had to study various publications dealing with technologies or the labor market itself. As a method we used comparison, observation, analysis and we worked with various statistics or research. With our work, we want to point out that new technologies are largely influenced by unemployment and employment, which are being dealt with by employees and their employers, which is a daily issue.

Findings

With the development of new technologies, automation and thus robotization are related, where it is said that robots will replace the work of a person, in the labor market, many people may lose their jobs. People's jobs are the main theme of the last decade. However, the opposite seems true. Research from (manpowergroup, 2019) suggests that more employers than ever (87% globally and 83% in Slovakia) plan to increase or maintain their employees due to automation for the third consecutive year. Businesses do not reduce jobs, but rather invest in digitization, transfer jobs to robots, and create new jobs. At the same time, companies are adjusting the qualifications so that their employees can perform new tasks that will complement the operations performed by the machines. The skill revolution is in full swing. More than ever, more employers (83% in Slovakia) plan to increase or maintain the number of employees due to automation. According to this survey, which in 19 countries had 19,000 employers, employers asked about:

• the likely impact of automation on their staff over the next 2 years

• the positions most affected by their business, and which skills they value most,

• what strategies they are introducing to ensure that they have the necessary skills and skills for the future.

Automation creates jobs - but in Slovakia we are just getting started. More than ever, more employers assume that, as a result of automation, it will increase or maintain the number of employees - an increase from 83% to 87% globally and in Slovakia from 80% to 83% in three years. At the same time, the share of companies expecting job cuts has declined globally from 12% to 9%, and in Slovakia it was 11% and 10% in 2018 and 2019. Companies that introduce automation most intensely create the most jobs - but Slovakia is facing major structural changes. Companies that digitize are growing, and this growth is creating new and new types of jobs. Those companies that are already using automation and digital transformation claim that they will increase the number of employees. Globally, 24% of these companies expect to create new jobs in the next two years. Only 12% of automated companies say they will reduce stocks, while 3% are not sure what the future will bring them. In Slovakia, automation is primarily focused on replacing routine production work, with only 9% of companies expected to grow, but 15% of the companies that automate are planning to decline in the next two years. Of the 41% of companies that will automate some activities in the next 2 years, 24% will create new jobs. In Slovakia, 46% of companies automate and 9% create new jobs. The increase in skills development is due to the fact that companies are developing their employees due to the greatest shortage of people with the necessary profile in the last 12 years and the demand for new skills that are emerging as quickly as the old ones are disappearing, most companies plan to build talent in history and this trend is only expected to grow by 2020. Companies are finding that they can no longer expect to find the necessary talent when they look for it. Up to 84% of companies globally and even 93% in Slovakia expect to increase their employees' skills by 2020. Companies expect automation for the future. Trust in automation is growing around the world. In 35 out of 44 countries, more firms are planning to strengthen or maintain staff numbers rather than reduce them. Robots help increase productivity and prove that they are essential to economic growth. Anyone who does not invest in automation risks running out of business and job creation. Countries and regions are introducing robotics at a very different rate: Southeast Asia is overcoming Europe and North America, and China is ahead of the US (Manpowergroup, 2019). Industry Industry 4.0 is also perceived as a time where robotization (robots) will replace human labor and many people lose their jobs. Industry experts, technology suppliers, academics and the National Robotics Center are dedicated to this issue. According to these experts, the 2018 reveals not only the continuing growth of the market but also a positive shift in the perception

of the importance of robotized workplaces and the impact of robotization on employees. Robots streamline and speed up production, eliminate risky, strenuous and monotonous workforce, and release them for further professional growth. The positive trend in robots deployment is negatively affected by the lack of R&D support from the state. One of the experts, Martin Morháč, who is a member of Industry4UM, replied to whether the robots will replace human work. *"Today, the fear that robots will deprive people of their jobs. But we somehow missed the fact that robots almost wiped out professions with heavy and harmful work, such as welders and varnishers. This is how the robotics direction is set for the future, primarily removing the hard, risky and health-threatening work from human life."* Deploying robots increases the competitiveness of businesses, and it is the best way to maintain or increase jobs, increase business profitability and employee wages (Industry4UM, 2018). The forecast for 2025 is that robots work more hours than people do. At present, 29% of the work is done by robots. In 2018, employees spent 71% of the total hours worked at work. Within six years, robots work up to 52% of their working time, people only 48%. Many industrial enterprises are automated, over 300,000 new industrial robots have been put into operation last year. Slovakia is one of the most vulnerable countries. More than a third of current jobs are at risk from automation, with low-skilled positions being the most vulnerable. With the need for education and practice, the risk of jobs is reduced by machines. Slovakia is one of the countries where the automotive industry is moving the most towards more efficient production processes. Worldwide, the number of industrial robots will grow by 2.6 million in 2019. This is a million more robots than in the record year 2015 (TASR, 2019).

According to the survey, the share of Slovak firms fully applying Industry 4.0 is growing and is 14%. Some companies in Slovakia do not have an organizational and personnel structure for innovative management and change implementation.

Industry4UM representative Martin Morháč said: *"Industry 4.0 is a topic for most companies, but the stage they are in is different. Overall, we can conclude that businesses are gradually beginning to enter the first stages of Industry 4.0. Most companies are still in the process of implementing rather isolated measures focusing on individual optimization goals without a more comprehensive strategy."* According to the survey, enterprises are primarily focused on improving the efficiency and effectiveness of internal processes, they want to manage their business intelligently and reduce costs, and they also consider solutions to replace employees' scarcity. Over the next three years, they plan to innovate production (84%), more than half focus on innovation in the preparatory phase of production, logistics, storage and maintenance. The results of the survey also showed that companies are creating specialized application teams and up to 60% of companies have confirmed that they have enough knowledge and information about Industry 4.0 to take the next steps.

1. Information technologies

Information technology can be understood as the use of any computer, storage device, network, and other physical device, infrastructure and process to create, process, store, secure, and exchange all forms of electronic data. Typically, information technology is used in the context of business operations as opposed to personal or entertainment technologies. Commercial use of IT includes both computer technology and telephony (Rouse, 2015). Information and communication technologies are already our future. We can hardly imagine them without using a mobile phone, a personal computer, or a simple calculator. However, informatisation in our society is not the same as in other European Union countries. The knowledge economy is based on the information society and the Slovak Republic has the potential to improve it by using ICT. However, this improvement cannot be achieved without the technical equipment of people, enterprises, government and a technically educated society in basic informatics. The Slovak economy does not have as much money to support these changes. The European Union provides sufficient support to its Member States in this area. Its main goal is to integrate its partial economies into the global economy.

1.1 Impact of technology on employment and unemployment

Technological change undoubtedly influenced the amount, manner and situation of all workplaces. At the same time, technology has created new jobs for the people who have kept up with it. Many people today believe that the impact of technology on destroying jobs is more pronounced than creating it.

1.1.1 Impact of technology on unemployment

The impact of technology on our lives integrates quickly. Expanded technology has raised concerns that it can replace the various jobs of unskilled workers who cannot adapt to technological change. To keep up with technology, working people need more work flexibility and lifelong learning. But not all are reluctant to change, new technologies have a major impact on local jobs. Computers replace most jobs and create a fear of losing their jobs.

• *Impact of technological change on work* - using the machine increases efficiency and performance by eliminating human errors and risk factor.

• *Inability to adapt to change* - if one fails to cope with technological change, then they have the same chances to face unemployment.

• *The speed of technology development* - the pace of technological progress is so drastic that workers are unable to constantly monitor these changes. Income inequality is increasing rapidly

1.1.2 Impact of technology on employment

On the other hand, there are some positive effects of technology on unemployment. Technology development has a strong workplace impact with increased productivity, performance and performance while eliminating risk and human error.

Key points on the impact of technology on employment are:

• *Creating skilled jobs* - technology creates jobs for skilled workers.

• *Easy to communicate* - use of phone and fax now replaces tablets and notebooks to improve workplace communications.

• *Improve performance and accuracy* - technology creates a computerized workflow that can reduce risk and errors in improving performance.

• *Increased salaries* - increased demand for skilled workers with higher wages has led to increased jobs in sectors.

• *More production creates more jobs.*

• *Increasing the working profile* - when we outline the relationship between technology and unemployment.

Technology has brought new work profiles in software, IT and AI for professionals. Technology has made various positive changes in areas such as medicine, agriculture, education, industry and many, so it is important that people can adapt to new innovations (Warfield, 2018).

2 Labor markets

Work fulfills many important functions in human life and in society. Therefore, the definition of the term work is not uniform, it is based on the diversity of the concept of work. These definitions can basically be divided into two large groups. The first group is characterized by understanding work as a subject of market exchange and a means of achieving economic interest for man. The second group defines the definitions of the term work, which understands work mainly as a form of self-realization of man in society. Therefore, in practice we can encounter a different understanding of the concept of work. The most commonly used definition of work is the definition by Samuelson (1992), which states that "Work is a purposeful activity of man, aimed at creating material and non-material goods and services that meet his needs." Labor and the labor market are basic economic categories." The labor market is an important area in which the company operates. It is attended by individuals, sellers of their work, employers and the state. From an individual's perspective, work is a source of income, but also self-fulfillment or a source of social status. For the employer, it is important to have a sufficient job market offer in quality that is able to guarantee its smooth production. The state is entering the labor market not only as an employer but also as a creator and guarantor of market rules (Workie, Tiruneh, 2012).

Unemployment is a socio-economic phenomenon associated with the existence of a market, namely the labor market. Unemployment is therefore a consequence and imbalance in the

labor market, between supply and demand for labor. At present, unemployment is becoming a serious economic problem because it represents the lost potential value of the whole economy. At the same time, however, it acts as a social indicator, as it is associated with negative social phenomena such as crime. Also, the adverse effects of long-term unemployment on physical and psychological status of the individual, poor physical and mental health, increased divorce in families and many other negative social phenomena are also demonstrable.

Employment is a macroeconomic category that, according to Habánik et al. (2014, p. 201) "characterizes the involvement of the working population in the process of creating new products and services" and is one of the most important indicators of the performance evaluation of individual regions and economies. Employment is the ability of an individual to find a job that is consistent with his or her individual characteristics and objective labor market requirements (Kuchař, 2007).

The wage is the monetary fulfillment or fulfillment of the monetary value (wage in kind) provided by the employer to the employee for work. In particular, wage compensation, severance pay, severance pay, travel allowances including non-claim travel allowances, social fund contributions, supplementary pension savings allowances, employee life insurance contributions, capital gains (shares) or bonds, tax bonus, compensation, are not considered as wages. income in case of temporary incapacity for work, supplementary payments to sickness benefits, compensation for work readiness, monetary compensation pursuant to § 83 and par. 4 and other performance provided to the employee in connection with employment under this Act, special regulations, collective agreement or employment contract that is not a wage. Further wages provided by the employer to the employee after profit after tax are also not considered as wages (Alexy, 2005). The rapid and breakthrough technological development of recent years has transformed all areas of individual life as well as the functioning of society as a whole. It also manifests itself in the way industrial production is organized. In general, we can say that labor market conditions are improving. But there are areas struggling with structural problems. Even if the total number of places is maintained, some employees will require new competencies from some employees. The difference in qualification needed to handle one particular assembly step and oversee the complex system of intelligent production lines is so great that it is quite possible that many people will not be able to re-qualify accordingly during their remaining working life. On the other hand, Industry 4.0, on the other hand, has the potential to involve people with disabilities in work in production, people who have not been able to do so by their physical constitution or qualification. In fact, the entire Industry 4.0 concept also includes intelligent assistance systems for workers.

The employment rate is approaching the European average at a fast pace. In the third quarter of 2017, it reached 71.2% in Slovakia, compared to 72.3% in the European Union. Long-term unemployment and high unemployment among vulnerable groups and low female employment rates remain a challenge. There is also a lack of action in this area and perhaps also a political will to address this long-standing problem. The generally stated principle of gender equality does not work in practice. The biggest barrier to this situation is the unwillingness of political elites to admit that gender inequality exists in Slovakia. Historically record employment brings another phenomenon with which the Slovak Republic has almost no experience. Labor shortages are putting increasing pressure on demand for foreign workers. Their number increased year-on-year by 40% in 2017. There is a lack of legislation in place to regulate the conditions of employment to protect domestic workers. Third-country employees are willing to work in poor working conditions and for lower wages. Another factor affecting the lack of jobs is the low wage assessment that persists in Slovakia despite the acceleration of wage growth. The higher the minimum wage, the more motivated the employee is to work and prefer employment before receiving various social benefits, which also affects the overall social protection and security system. The minimum wage eliminates the growth of the gray economy and black work, or the payment of some part of the remuneration to the employee's hand. Growing wages support the dynamics of consumption, which is positively reflected in the revenues of the state budget, as

well as in the self-government, but also in the growth of the business sector, while the growth of the minimum wage stimulates the overall growth of wages. At the same time, it contributes to reducing social inequalities and pay gap. Employers often argue with the threat of layoffs and rising unemployment if the minimum wage increases or pressure on wage increases. Recent years are a clear indication that the increase in the minimum wage does not have a negative impact on business environment and employment. Unemployment is declining and employers still point to the problem of finding suitable workers for thousands of vacancies. One of the reasons for this is the low and unattractive salaries offered. Stimulating the purchasing power of the population stimulates the economy, increases sales, thus creating a precondition for further growth in salaries or increasing employment. If an employer is not willing to pay his employee so that he can lead a dignified life (which should already be guaranteed by the minimum wage), he demonstrates the inability to lead a decent business and disrespect for the people who work for him and help him generate profit. Slovakia has the ninth lowest average wage cost among EU countries, the eighth lowest minimum wage and the third lowest ratio between minimum wage and average income from countries with a minimum wage. It has the highest labor productivity among V4 countries, which accounts for 80% of the EU average, but wages are at one third of the EU average. As many as 240,000 workers in Slovakia earn only up to € 500, putting these employees at risk of poverty. This may also be the reason that in 2017 the official number of Slovaks working abroad was 150,000. Of course, the unofficial number may be much higher. For example, according to health insurance data for the last 15 years, population decline due to migration is 5% (Klokner et al., 2018).

3 Industry 4.0

The Industry 4.0 concept originated in Germany in response to a decline in industrial production as a result of shifting production capacity to cheaper countries. Leading German concerns such as Siemens, Bosch, Schunk and Volkswagen have joined the initiative. The aim is to reindustrialize Germany with cutting-edge technologies capable of competing with even the cheapest labor force. At the same time, a number of jobs will be created for highly skilled people and will expand opportunities for further research and development. The term "Industry 4.0" means the fourth industrial revolution. Other terms we face include "Smart manufacturing", "Industrial Internet of Things" (IoT) or "Digital Enterprise". While Industry 3.0 focused on automating individual devices and processes, Industry 4.0 focuses on the complete digitization of all physical assets and their integration into digital ecosystems that communicate with each other, including partners throughout the value chain. The term Industry 4.0 by (Pirvu, Zamfirescu and Gorecky, 2016) for the current trend of automation and data exchange of manufacturing technologies. In practical terms, this is the fourth phase of the Industrial Revolution. Industry 4.0 is a name for large-scale changes entering the industry today. The carriers of these changes are digitization. It is about digitizing products, digitizing and optimizing all business processes, including services. The current wave of digitization will affect almost all areas of human life.

3.1 Industry 4.0 for 2018 in Slovakia

The year 2018 was the onset of digital transformation for Slovak businesses. Businesses began to perceive the fact that Industry 4.0 is not only a technological shift, but also a gradual change in thinking in the smart future. Last year we recorded 6 important moments that impacted Industry 4.0. Belongs here:

- *Industry 4.0 pace increases.*

The number of companies starting to perceive Industry 4.0 is growing. Implementation in enterprises has a significant shift, but on the other hand, there is a high uncertainty amongst small and medium-sized enterprises as to what Industry 4.0 implementation requires and how to apply and use it. According to the Industry4UM survey on Industry 4.0 in Slovakia, 14% of companies started to apply the elements of the Industry 4.0 concept last year. Mainly companies are represented, which are represented by foreign capital. In 2018, 31% of businesses started with smaller measures and the first steps towards smart production, compared with 15% from 2017. Enterprises implement the implementation independently, without external cooperation

(60%), 11% cooperate with external suppliers. Last year's survey saw the penetration of the philosophy of transformation into the corporate culture of businesses. Companies are beginning to perceive the importance of a special team in charge of the transformation agenda, and are starting to address innovation and smart solutions.

➢ *The state takes the first conceptual steps to support Industry 4.0 in Slovakia.*

In October last year, the Government of the SR approved 35 measures to support the development of infrastructure for the development of intelligent industry prepared by the Ministry of Economy of the Slovak Republic. The measures are embedded in the Smart Industry Action Plan, which is important for the industry's current needs and development plans. Functional and real state aid should be the point to kick-start the business of digitizing and automating businesses and supporting their growth.

➢ *Research and development still insufficient.*

It can be said that support for science and research is not sufficiently secured in Slovakia. Slovakia does not have a secure and functioning ecosystem linked to science, research and innovation, as well as the development of human resources where they are needed. Our industry is largely lacking in research and development that will innovate and push production and higher levels in businesses. Well-established and elaborated state support documents and education systems will help businesses to innovate, compete and develop their economic growth.

➢ *Industry 4.0 encounters education.*

The year 2018 did not achieve a significant shift in the structure of employment under the influence of Industry 4.0. In our company, there are no qualified staff, no students' interest in studying technical subjects, insufficient elaboration of dual education, lifelong learning programs and retraining processes. Robotization and plant automation are beginning to be the solution for lack of staff. Businesses are beginning to see that if they want to be successful in transferring to Industry 4.0, the expertise and sufficient training of employees must be one of the most important requirements. Without the training of workers, it is not possible to talk about smart industry.

➢ *Robotizing and automating even in small and medium-sized businesses.*

Last year, companies' interest in automation and robotics increased. Increasing salaries, more responsibilities and reliability of machines, the need to produce better and faster, insufficient workforce are the reasons why companies are starting to implement. Our country confirms the robotic power, even though it does not produce robots, it belongs to the world. In the automotive industry in Europe, our country is third, Germany and France are ahead of our country. In 2017, Slovakia was ranked sixth in the global survey. It can be stated that robotics in Slovakia is a successful one, but the missing side is the missing research centers and institutions dealing with robotics.

➢ *Industry 4.0 communication intensified.*

One of the problems why Industry 4.0 does not go ahead is the lack of communication. Many companies, whether smaller or larger, cannot transfer or apply this fact or move to their business. The problem is also lack of information and poor and insufficient communication between employees and employers. One third of companies inform their employees about the basic steps in Industry 4.0. 2018 confirmed that quality information is becoming increasingly important. Compared to 2017, when up to 80% of companies evaluated the possibilities of obtaining information about Industry 4.0 as insufficient, last year up to 60% of companies confirmed enough necessary information and knowledge for further steps (Bendová, 2019).

4 The profession of the top and attention of industry 4.0

Industry 4.0 will need people with technical and analytical skills, new jobs, creative and professional skills, the quality of people's skills will change, and the value of people's skills will change as well.

• *Most at risk* - less skilled people, with low digital skills, but also, as it is becoming standard, people over 50. Furthermore, officials handling numerical data, general and auxiliary administrative staff, motorcycle and car drivers, and at all transport and logistics workers, staff in services, sales, construction, etc.

• *At least threatened* - management positions, such as in district, education, health, social and other areas, nurses, midwives, veterinarians and teachers.

• *Most in demand* - database and network specialists, ICT executives, software and computer analysts and developers. Increasing the number of people with higher education who may be more attractive to employers, but there is a lack of specialists who program, maintain and set up robots.

In the selection of human resources, attention will have to be focused on the selection of people with a high level of learning (LQ) and a system of their continuous development. Thus, employees will have to be able to learn new skills to remain employable.

The most endangered professions:

- Accounting Officer
- Librarian
- Watchmaker
- telemarketer
- Postman and delivery man
- Salesman and cashier
- Machine tool operator
- Warehouse worker and logistics worker

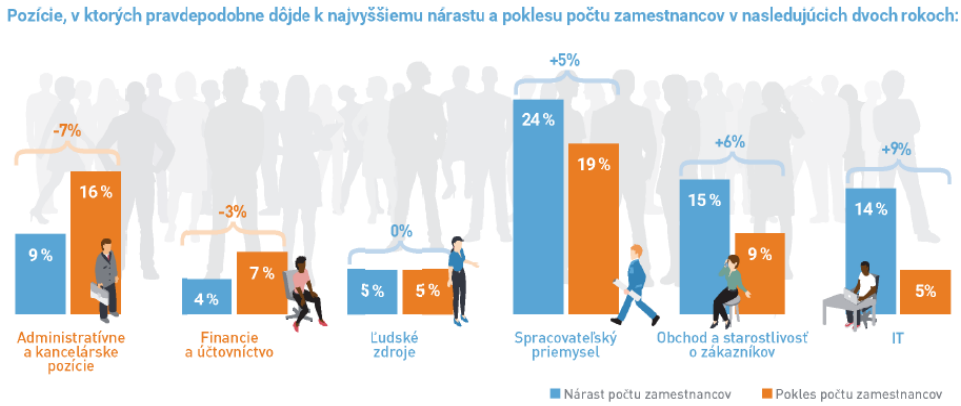
The least endangered profession:

- Teachers
- Nurses
- Therapists
- Doctors
- Entrepreneurs
- Writers
- Painters
- Cast

5 Methods to provide human and machinery cooperation

- Ensure that women are part of the solution. Women account for 50% of the workforce, and in 2017, they outstripped men in their education. Creating a culture in which women can thrive has never been so important and, moreover, when it is good for women, it is good for others.
- Remember that leadership is important. Managers need to initiate change, innovation and culture to ensure that their companies are learning organizations in the times of rapidly changing skills.
- Understand what your workers want. In 2025, millennium and Z generation will be more than 2/3 of the world's workforce. Companies need to respond to this by adapting NextGen work models, including freelancers, project work and part-time jobs, to attract and retain the best skills, as 87% of employees are interested in doing so.
- Customized training. Companies need to replace standardized training with precisely
- Targeted strategies and professional guidance, so workers can develop core, desirable skills.
- Know the skills of your people. Companies need to use evaluation, clean data, and predictive performance in an effort to deploy talent as efficiently as possible and avoid the creation of so-called talent. Bank Skills.
- Allow people to create synergies with technology. Companies need to continually improve their staff skills and create talents. They need to evaluate and re-evaluate the skills needed to make human talent complement automation.
- Build on soft skills. Businesses should align their strategies on talent with the fact that soft skills are more complex to develop than technical skills (Manpowergroup, 2019).

Figure 1. Position with the lowest and highest increase in the number of employees



Source: Manpowergroup, 2019

Conclusion

In our work, we focused on the concept of employment, Industry 4.0 and information technology. Employment is one of the factors affecting the labor market. Many people lose their jobs because they cannot and in some cases do not want to adapt to new technologies, innovations. In some sectors, such as banking, automotive, or customer service (mobile, internet), there are constant changes, both for the employee and for the consumer. Customers have a big problem adapting to new innovations, which is why it is more complicated for the employee. In today's fast and modern times, it is expected to control all the necessary features, be it computer, mobile, tablet control. Our company is located in Industry 4.0, which means that we are coming to a time where artificial intelligence, digitization, informatisation or electronization will come first. It is supposed to help us to make the job easier, but also to make everyday life. The development of new technologies is related not only to the control of mobile phones or computers, but also to the control of machines with artificial intelligence, or intelligent or smart production itself. These concepts are unknown to people and also uninteresting. We believe that in our work we have contained everything that was needed to fulfill employment and its impact on technology development.

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