Digitalization of the Labor Market in the Fourth Industrial Revolution

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Abstract. The article analyzes the trends of digitalization of the labor market in the fourth industrial revolution. In the course of our work, we used empirical (observation, description, calculations and measurement) and theoretical (analogy, comparative analysis, literature analysis) research methods. New specialties and competencies that will be in demand in the future, as well as barriers to retraining of employees, have been identified. The impact of the covid-19 coronavirus pandemic on the labor market is also being considered. On the example of the entertainment industry, the effect of the introduction of quarantine measures is demonstrated. The conclusion is made about the future prospects for the development of the labor market in the conditions of the crisis. A number of anti-crisis measures based on the methods of planned economy are proposed.

Keywords: Crisis · Employment · Labor market · Pandemic · Trend

1 Introduction

The basis for the fourth industrial revolution, which is currently recognized by many researchers as a consequence of the third industrial revolution, is the process of digitalization of the economy. Based on the HSE data from 2018, it could be argued that the trend of internal spending on the development of the digital economy in the future will take an exponential form (Fig. 1).

However, the coronavirus epidemic of 2020 has made significant adjustments to this forecast. Provoking a new global economic crisis, it will lead to fundamental changes in the life of society. This dramatically increases the degree of uncertainty about the future state of the economy, its digitalization processes, and the labor market itself. The task of this work is to consider possible prospects and directions of digitalization of the economy and the development of the world labor market itself.
2 Methodology

The object of research is the labor market. Practical (empirical) and theoretical methods are used for its study. As theoretical tools, such as analogy, comparative analysis, study and analysis of literature. The analogy is to compare the current situation in the labor market with an earlier one and draw conclusions about possible measures to overcome the crisis that will be taken. To assess the current state, we analyze news reports and statistical reports on the problem under study. The practical methods are observation, description, calculation, and measurement. The observation consists in analyzing the dynamic series of various indicators that characterize the labor market. Then, based on these indicators, its current state is described. Based on mathematical operations with numerical data, conclusions are made about the low availability of higher education. We measure the level of service efficiency in the digital economy.

3 Results

Like previous industrial revolutions, the fourth industrial revolution will lead to the disappearance of a large number of professions. This is due to the extensive processes of production automation that took place in the past. However, along with the gradual increase in the unemployment rate, new types of professions will begin to appear, such as virtual reality designer, bioengineers, analytics “the Internet of things”, the curator of the personal data, engineer for development of permanent power supply devices, digital linguist, financial trajectory designer, etc.

According to the report of the world economic forum (WEF), robotization will lead to the disappearance of 75 million jobs, but will create 133 million new ones [8]. An important feature in this case is that the vast majority of new professions will perform the tasks of servicing the digital economy. To master them, a person will need a serious investment in their education. The last study on calculating the average cost of training for a programmer in Russia was conducted in 2017 - 143297 rubles per year, with a total duration of training of 4 years (11941 rubles/month) [12]. Average household savings in 2018 amounted to 3232.9 rubles/month, which is almost 4 times lower than the cost of education [5]. According to the RBC news Agency: “Two-thirds of Russian families-65%-do not have any savings, according to the results of a survey by the

Fig. 1. Domestic spending on digital economy development as a percentage of GDP (data for Russia) (Source: authors based on [1]).
Levada center research laboratory (Levada Lab)” [3, p. 9]. The average wage indicator does not reflect the real picture, due to the imperfection of the method of calculating it, in which the organization’s payroll is divided by the number of employees. Thus, the average salary includes personal income tax and its objectivity is reduced by the polarization of the income level of the population (the effect of “average temperature in the hospital”). In other words, a household with a lower-than-average income level is currently unable to provide education in one of the “future economy” specialties. Thus we get two theses:

1. Children from low-income families will lose the opportunity to find work, due to the disappearance of available work professions. Thus, over time, their average income will fall, which will lead to the growth of the “poverty” class.
2. People from affluent families will be able to get an education and become high-class specialists. At the same time, you should keep in mind that:
   - some of them will refuse or fail to complete their training due to various circumstances, and will not be able to find work in the new digital economy in the future. The class of the poor will be replenished;
   - getting an education after a while will become an impossible task for them, and even more so for their children. Thus, once a family falls into the category of low-income, it will not be able to move back to the middle class.

These theses can be considered an explanation of the following graph (Fig. 2):

Fig. 2. Share of the top 10% by income level in the world, 1980–2015 (Source: authors based on [16]).

Many researchers refute the fact that the social catastrophe is spreading by the fact that in developed countries there are many institutions to support poor families, which does not allow the situation to become threatening. Indeed, the European Union, the United States and Canada have always had an expanded social security system, but this does not prevent, but only slows down the growth of inequality. The solution to the problem is not in the area of evaluating the effectiveness of social security measures. The labor market is often considered from the position of such an indicator as “unemployment”. The global average unemployment rate in 2018 was 5.7%, which can
be considered an acceptable indicator. However, recently there is evidence that even in developed countries, the level of discontent among the population is growing, despite the low unemployment rate. For example, in the UK, unemployment was only 3.8%. British discontent with the situation in the labor market and the decline in living standards was one of the reasons for the vote to leave the EU in June 2016, says economist at the University of Warwick Tiemo Fetzer, «Vedomosti» reports [10]. The main reason for discontent is the increase in the number of part-time jobs that do not strengthen the financial position of employees. From 2009 to 2018, the share of temporary employees increased in France from 13 to 16.2%, in the Netherlands from 16.4 to 20.1%, and in Italy from 10.8 to 16.5%. Thus, in this work, we want to identify the most important, in our opinion, trend of transformation of the modern labor market – an increase in non-permanent employment, which leads to an increase in the level of social tension and reduces confidence in the future of the population. However, in 2020, there was an event that could lead to fundamental changes in the situation on the labor market.

The coronavirus infection of the COVID-19 virus turned out to be such a significant factor that without taking into account its impact on the economy, it is unlikely that any reliable research can be conducted and any forecast made. Therefore, in this study, we will touch on the impact of this event on the modern labor market. Like any other large-scale negative event, the epidemic had a significant impact on the economy [6]. Due to the need to suspend the activities of service organizations, some of them were on the verge of bankruptcy. As a result, there was a jump in unemployment, which threatens to increase social tension in the developed countries of the first world (Fig. 3) [14].

![The unemployment rate in the United States by months. (2019-2020, %)](image)

**Fig. 3.** Dynamics of the US unemployment rate (Source: authors based on [14]).

Major financial losses were incurred by organizations that:
- did not have the ability to organize the workflow remotely,
- did not have the ability to conduct remote customer service.

Thus, all entertainment centers fall under this category, such as cinemas, museums, water parks, festivals, etc. At the same time, developers of computer games, such as
Wargaming or Gaijin Entertainment, on the contrary, were in the black, because they do not have the above disadvantages. An important circumstance in this case is that it is easier to bear the “coronavirus crisis” precisely those enterprises whose level of digitalization is quite high.

The entertainment industry clearly demonstrates the main problem of digitalization of the labor market. Industry employees who have lost their jobs, even with the necessary qualifications, will not be able to find a job in a company with a high level of digitalization, because they do not require a large number of specialists. For example, the number of employees of the largest game developer in the CIS, Wargaming, in 2020 was only 4,500 people with an audience coverage in the “online” mode of 318,965 players, only on the servers of the Russian sector and only for three games: World of Tanks Blitz, World of Tanks, World of Warships. In other words, the number of clients served simultaneously exceeds the number of employees by more than 70 times. Not every organization in the entertainment industry can match this indicator. For simplicity, in this work, we will call this indicator the “service efficiency index” - $I_{SE}$, which is the ratio of the number of clients served at one time ($Q_c$) to the average number of employees (ANE) (formula 1).

$$I_{SE} = \frac{Q_c}{ANE}$$

For example, for a small movie theater with 100 seats and 6 employees, this figure is significantly lower, at 16.6, and for an average entertainment shooting gallery – 5. Similar processes occur in other industries, such as construction, heavy engineering, and so on. Almost all professions that do not involve creative work can be automated and robotic.

Digitalization leads to the disappearance or transformation of industries with low $I_{SE}$ and the emergence of industries with high $I_{SE}$. This process is fundamental and is observed in all industries without exception. For this reason, when assessing the consequences of digitalization, it is not necessary to refer to the number of new professions, since in this case the number of new vacancies is the determining factor. Thus, over time, the variety of professions will grow, and the total number of vacancies will significantly decrease, exacerbating the situation in the labor market.

The effect of exposure to a coronavirus infection will consist of several consequences:

1. At first, there will be an acceleration in the pace of digitalization in the desire of employers to reduce the number of personal contacts between employees, in order to avoid the spread of new types of viruses.
2. An abrupt increase in unemployment due to mass bankruptcy and general recession in the world economy will lead to a prolonged economic crisis. In order to overcome it, States will resort to Keynesian reforms and protectionist policies. If the situation continues to deteriorate, there may be labor camps that took place in the United States in the 30 s. The unemployment rate in the United States in 1933 was 24.9%. 
3. If states do not change the market methods of managing the economy, the economic crisis will lead to the fact that the processes of digitalization will take a local character and in general will be significantly slowed down. In industries such as mechanical engineering, they may even be curtailed in order to retain the same number of employees.

If global economic reforms are carried out, mainly on the left, the current technological progress can be maintained. We will see below what type of changes in the economy are necessary for this.

Scientific and technological progress changes the nature of economic relations. The old production methods are being replaced by more modern ones. All industrial revolutions led to increased labor efficiency and increased unemployment. Digitalization is no exception in this case. In the end, it will lead to the almost complete disappearance of professions that can be automated, which means that in the future there will only be those professions that require not just mental, but creative work.

The problem in this case is the economic barrier that does not allow the broad masses of workers to re-qualify as workers in industries with a high level of digitalization. Inevitably, the unemployment rate will increase and, as a result, poverty, which will lead to new social catastrophes, such as revolutions and wars. The only proven method of preventing such a scenario at the moment is the transition of the economy to a planned character, and the following reforms, such as:

- full nationalization of large industrial enterprises, on which the life of the state depends, and the transition from the concept of “work for profit” to the concept of “work for the plan”;
- restoration and creation of powerful state planning structures based on a scientific approach and which are inextricably linked with research institutes,
- establishing universal and free primary, secondary and higher education,
- eliminate the consequences of “optimizing health care” in order to prevent the spread of dangerous diseases. Medicine should be absolutely free, and its level should not correspond to “current” and “maximum possible requests,
- establishing broad measures of social support for the population, without reducing its economic freedom.

A high degree of automation will lead to a significant reduction in agricultural and manufacturing workers. There will be an expansion of the class of workers in science and art, which will lead to the acceleration of scientific progress.

4 Discussion

Recently, many articles and papers have been published on the problems and institutional pitfalls that arise in the process of digitalization. Below is a small analysis of the literature in this area for 2019–2020 from the peer-reviewed journal Terra Economicus. In the article, Nikolaychuk and Nureev as modern trends (among others), the low level of financial literacy and the growth of household debt is noted, which is a brake on the development of the Russian economy [11]. Shmakov, analyzing the features of ritual
behavior, notes the fundamental changes in the psychology of society, initiated by the processes of digitalization [13]. The issues of lagging Russian legislation in the field of cryptocurrencies are considered in the article by Dörr, Kowalski, and Nevskiy [4]. The general decrease in the level of information security and low topics of information technology implementation in the Russian Federation are noted in the work “Digital component of people’s quality of life assessment in the regions of the Russian Federation” [9].

The problems of the neoliberal way of digitalization of the educational system, which consists in reducing the results of educational activities to quantitative indicators, are identified in the article by Volchik and Maslyukova [15]. Because of the neglect of important aspects of academic life there is a decrease in the quality of education. A sharp increase in unemployment due to the release of labor is noted in the work of Balatsky [2]. A general study devoted to the study of factors that determine the pace of digitalization is the work “development of digital infrastructure in the regions of Russia” [7]. The above articles partially echo this work on the consequences of digitalization. In addition, the study takes into account the impact of events in 2020 on the economic situation.

5 Conclusion

This paper describes the new and future professions that are emerging in the context of the fourth industrial revolution. Barriers to training and retraining of employees for more popular specialties have been identified. As an additional trend of digitalization of the labor market, the growth of part-time/non-permanent jobs is indicated. The conclusion is made about the negative impact of this factor on the financial situation of employees in developed countries. The article considers the impact of COVID-19 coronavirus infection on the labor market. One of the main consequences is a sharp increase in unemployment and, as a result, an increase in social tension. The example of the entertainment industry shows that the pandemic has reduced organizations with a low level of digitalization, and vice versa, has had a beneficial effect on organizations with a high level of digitalization. There is also a significant difference between these organizations in terms of the IEO service efficiency index. The conclusion is made about the probability of a crisis, similar to the “great depression” of the 30 s. Anti-crisis measures are proposed, which consist in transferring the economy to planned “rails”.

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