



# The Labor Nature Changes and its Regulation Challenge Caused by Global Digitalization of Business

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## ABSTRACT

### Keywords:

*Digital technology, Business models, Labor organization, Social and labor relations, Employment, Employees' skills and competencies*

### Received

01 January 2020

### Received in revised form

05 January 2020

### Accepted

24 June 2020

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The digital technologies development and widespread in economy and social sphere led to serious labor nature changes and appearance new problems in labor market. The avalanche-like information flows growth, complication of production and technological processes requires countries to use actively as possible the advantages of new technologies in order to increase the competitiveness of their economies. The analysis of digital technologies impact on modern business processes in manufacturing and services sectors revealed the changes in functions and requirements for employees' knowledge, skills and competencies. This necessitates the search for new approaches to the labor organization, modification the forms and social and labor relations content within the company and the labor market as well. Thanks to modern technologies, opportunities are opening up for creating new jobs, increasing productivity and production efficiency, and new industries and specialties emergence. New digital technologies-based production business models need workers with professional as well as developed cognitive and socio-behavioral skills in complex problem solving, logical thinking, teamwork, and the ability to adapt to changing conditions and circumstances. The skills are acquired through learning lifelong. In industrialized countries, including Russia, as the conducted studies indicated employment becomes more flexible, but less stable in connection with the business digitalization. In this regard, the authors propose the measures to ensure the companies personnel potential development, the labor force competitiveness increase in response to the global technological changes' challenges.

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New digital technologies emergence and use has become possible in the modern information society digital environment. Social, mobile, analytical, cloud technologies, the Internet of things can lead to large-scale changes in business. According to the IDC analytical agency, by 2022, global spending on digital transformation will approach \$2 trillion (International Data Corporation, 2018). Russia, in terms of the digital sector contribution to the economy, is significantly inferior to other developed countries. The digital sector in Russian Federation

accounts for only 3% of GDP while it is average 6-7% of GDP in most developed countries (Titov, 2018).

Digital technology changes production seriously. The advent of 3D printing has made possible to manufacture products of any shape and size, from simple details to complex, multi-component devices. The Internet of things allows you to track the movement of raw materials, billets and finished products through all production cycle stages up to consumers' delivery. Gradually, it penetrates into the sphere of non-productive consumption. Marketing and products supply increasingly carried out through digital platforms - multifunctional information systems that ensure the interaction of market entities in a virtual environment. Block-chain technology is used for market transaction, also in state and municipal management. Crypto-currencies become more popular as a mean of payment and savings. Thus, digitalization is a multifaceted phenomenon that has a direct impact on economic processes.

The digital technology proliferation and widespread use in various material production and services sectors changes the relationship between employers and employees, affecting employment, unemployment and labor income. The labor market is affected by a large number of factors: demographic, technological, economic, social, political. Digitalization as a leading technological factor becomes increasingly important in connection with the avalanche-like information flow growth and the tools complication for industrial and economic activity implementation. Automation turns to an effective optimizing costs tool for enterprises, but for the working-age population, on the contrary, it is a threat due to job cuts caused by a decrease in labor demand.

The present study is devoted to determine new business model's formation features in the context of global digitalization and its impact on labor organization and labor relations at enterprises (based on Russian economy). The following discussions are respectively presented: the digital business model formation features as a response to the fourth industrial revolution challenges; the characteristics of changes in the labor organization, employee functions and competencies at the present economic development stage; four forms of labor organization are identified according to the employment flexibility degree and the production technologies progressiveness level, the characteristics of labor relations in digital transformation context and possible directions of their changes are determined; and recommendations aimed to increase the employees' labor potential and bring it in line with the labor market requirements. While the main focus was on the problem of professional education system improving. In conclusion, brief findings on the study are presented

## **Problem Formulation**

### **The business Digital Model Formation Features**

To successfully conduct business in a new digital environment, companies of various sizes need to rethink their business and make significant changes related to the business model and business processes as well as to personnel management structure and approaches, competencies, and general corporate culture. And, most importantly, companies need to change the relationships with clients and customers as these relationships now are taking on a new digital engagement. According to Citibank experts, if in 2010 new digital financial technologies investments amounted to \$2 billion, then by 2017 they have already increased to \$21bn (Citi Global Perspectives & Solutions, 2017) and, as a result, almost a third of banking sector employees may lose their jobs over the next 10 years.

To be competitive and successful in the new conditions, the company must invest in its structure, personnel, and develop new competencies, skills and working methods. Business digitalization primarily is necessary for companies operating in the fierce competitive

environment. For such companies, a delay in or refusal to start digitalization may lead to a defeat in the competition. In addition, the digitalization is in demand by firms that use or intend to use large data amounts in their main business. Today, the digitalization cost is relatively high, but it justifies the expenses in the first months of digital innovation introduction. At the first stages, it is important to equip the organization with digital infrastructure and launch pilot projects that can lead to large-scale business transformation. In the future, it has to be formulated a digitalization strategy considering the company's future business model in the digital world. Summarizing the accumulated to date experience, we can distinguish three directions in the digital business model's formation:

1. New market players emergence. These are startups, such as Uber (taxi market), Amazon, AliExpress and Wildberries (e-commerce), who offer to customers services with completely new content;
2. New business models introduction of traditional companies. Banks, insurance, energy companies and retailers create new effective physical and virtual space combinations (on-line/of-line);
3. New digital usage opportunities by existing companies for moving to new goods and services markets.

At the same time, a company can still remain just a manufacturer that sells its goods through other companies, or be an intermediary supplying ready for use products or services. The most effective in the new conditions is the business model of ecosystem organizer (driver) in the particular area, which provides a completer and more high-quality customer service. Such an ecosystem is a coordinated the companies, devices, customers network and may include supporting and competing products. Such ecosystems are most effective in retail. Other industries and business line move in this direction at a slower pace, due to the features of products, their complexity and digitalization possibilities. The digital business transition model can go in following directions:

1. The communication tools and software products application for the collection, accumulation, customers' data processing, including their needs, life events.
2. Changing customer relationships and expanding their role in the company's business. Social networks, focus groups, special technologies for big data processing, organizing methods customer feedback (surveys, questionnaires, testing) for this purpose are used.
3. Organizational changes related to management decision making process. Companies in new information space, with huge data arrays emergence operating in real time require many organizational changes to improve decision-making processes on reasonable information. Business transformation involves the use of IT capabilities in relation to the company organizational structure, the employees and their competencies, the main business processes logic.
4. An integrated, multi-product customer communication channel creation. This direction is one of the most difficult in company transition to new digital business model. Such integration requires more than just adding a digital online channel to a physical one, for example, organizing an online trading platform. If retailers with offline stores want to compete in the new environment successfully, they have to use digital artificial intelligence technologies, machine vision and training to participate in purchase choice.
5. New partnerships development both with competitors and additional service providers. The best solution for some strategy's implementation may become the partner companies' acquisition.
6. When a company moves into digital space, changes related to Regulatory compliance and security, are especially important. Companies building their business under new conditions must

be resistant to cyber threats, reliably protect the information confidentiality and customer data work in accordance with new legislative and regulatory requirements established by the government.

### **Changes in Labor Organization, Employees' Functions and Competencies in Digitalization Conditions**

A successful digital transformation requires a responsible attitude from all company's employees - not only top management as well as middle managerial staff and individual performers. Often, the top management actions related with digitalization are mainly limited by expenses on IT systems, legal requirements compliance, ensuring cyber security and database confidentiality, not touching the business model itself. To create a company of new generation, the leader must rely on employees who can realize the necessary changes. One of the most difficult aspects in business model changing arises when new challenges are setting for subordinates.

The Information Technology Director is called to play a key role in the transformation process. In the new environment, they are responsible not only for the computer programs operation and documentation processing systems, now they must devote more time to collaborate with external clients, be aware of all the latest digitalization innovations and be able to implement them in their company.

The modern economy prefers the digital technologies towards collecting and information processing, data analysis, forecasting, accounting reports preparing. Some managers are already reducing organizational functions, preferring chat bots instead of office managers and secretaries. Information technologies are widely used in intellectual and humanitarian activities, in particular, in education. Increasingly, students make the choice to improve their qualifications or receive additional education in favor of online training or webinars.

A number of enterprises completely abandon non-core functions in their own staff, outsourcing them, which reduces the demand for relevant professions representatives. After all, outsourcing employees perform their functions not for one enterprise, but, as a rule, for five or more. This problem is especially acute in such areas of activity as personnel management, insurance, HR administration, accounting, and others requiring routine operations. At the same time, IT workers demand is increasing annually. Currently, the labor market is not able to meet the demand of all employers due to specialists' lack in this field. However, in the more distant future, programming specialists also run the risk of becoming unclaimed, since there are already programs based on artificial intelligence that can independently write machine codes.

The constant increase in the information management systems' complexity naturally leads to increased requirements to the labor force quality both ordinary performers and management personnel. Competition for jobs takes the nature of level competence competition in digital technology usage field. Employees insecure of their own abilities to solve successfully professional problems is growing, the unemployment fear is escalating.

At the same time, when determining how significant changes will be in employment and unemployment, both the technical capabilities of production automation and its economic feasibility should be considered (Kapeliushnikov, 2017). Depending on prices ratio of production factors enterprises may be profitable and disadvantageous to carry out technological innovations. In addition, various obstacles may arise in the way of innovations (economic, legal, ethical, etc.), which slow down the rate of scientific and technical progress. In particular, the new technologies implementation may be restrained by the lack of qualified personnel capable to work with new equipment. As a result, a technological unemployment surge in the foreseeable future seems unlikely, but changes in the content of labor may occur.

In addition to technological unemployment, important and, for the most part, negative social consequences for the population are expanding the practice of concluding fixed-term labor contracts, including those providing for part-time and part-time work. According to Standing (2011), about 25% of the working-age population in developed countries belongs to the precariat, that is, to the category of workers with unguaranteed work and a low-level social protection.

About one third of employees are currently working under fixed-term contracts in Russia. For employees the fixed-term and often short-term labor relations nature in comparison with an unlimited-term contracts leads to less stability and lower social protection, creates the uncertainty about future, provokes a loyalty increase to the employer due to dismissal fear and inhibits the development of professional career (Anisimov, 2019). In these conditions, the earnings amount gap and social status increases between full time employees under long-term contracts (salarial) and those employed on temporary, “irregular” jobs (precariat). In this case, the precariat is subjected to greater exploitation than the salariat, since many part-time employees regularly perform overtime not paid work.

Digital transformation affects to one degree or another all the labor organization elements, largely determined by its influence on nature and content of labor processes. Search, recruitment and staff hiring is now largely automated. The control over the personnel labor activity is increasingly carried out by video cameras and electronic sensors, and as the Internet of Things develops, further toughening can be expected. Internet technologies serve as a tool of labor division and cooperation what is characteristic of remote work, freelance. Opening up great opportunities for remote work, digital technologies lead to changes in the labor norms and conditions, the work and rest regimes.

The digital technologies use enables more accurate and operational labor planning, enable the remote audio and video monitoring in real time the labor processes. Thus, conditions for a closer link between wages and labor productivity are formed. However, the noted above trends in increasing employment flexibility and also the weak labor unions position in the labor market make labor income less stable. Instead of the tariff payment system which guarantees to employee the wage minimum according to his tariff category, various alternative options for labor remuneration systems are increasingly applied. The wage becomes depended on both employee' individual achievements and the financial welfare of company and, importantly, subjective preferences and decisions of its leader. Introducing actively non-tariff pay systems and flexible work schedules, corporate heads got the opportunity to set themselves higher salaries and high bonuses to the detriment of the ordinary employees' interests. It is obvious that low employee wage could be a brake on the innovative development of production. This is due, firstly, that a low-paid employee is not interested in continuing education and professional growth. Secondly, wages are the main income factor that forms aggregate demand on the national market, and its reduction causes the demand decrease on goods and services of domestic production.

Currently, Russia lags behind developed countries in the digitalization field. Most companies only just begin the transition to technologies implementation “Industry 4.0”, so far, we can only talk about the digitalization of a separate entity or its part. In 2016, an average of the world economy per 69 thousand workers accounted for 69 industrial robots, in Japan, Germany, the United States - over 100, while in Russia - only 3 (TASS, 2018). In USA and Germany, the CNC machines share exceeded 70%, in Japan - 90%, and in Russian Federation it reached only 10% (Aptekman et al., 2017). A relatively high automation level in the Russian Federation is characteristic of new power plants, large industrial companies, and defense industry enterprises. At the same time, most medium and small industrial enterprises operate physically and morally obsolete equipment.

The production modernization in Russia is hindered by the low labor cost and the high capital cost, particular, credit resources. When contemplating to purchase high-tech equipment, for example, industrial robots, the company chief often is obliged to refuse them because of high cost, preferring to replace if possible, capital with cheap labor. This kind example is involvement in agriculture, construction and transport migrants from the former USSR republics. Maintain the wages at a low level, in turn, negatively affects labor motivation, and prevents the full formation human capital.

Hired workers, when choosing where and on what work conditions to be employed are forced to consider the various potential digitalization benefits and risks while in some cases risks remain very uncertain. The gain from digitalization for working population may be driven by increased labor productivity due to new, more advanced technologies exploitation, and by pay growth caused by this. Digital transformation gives employees opportunity for personal growth and career success. Through innovative training and profiling, the company identifies employees with high innovative potential. "Ability to innovate" becomes a career growth criterion, including for young workers.

### **Social and Labor Relations in Global Digitalization Context**

In digital transformation context, the most characteristic feature of social and labor relations is the employment flexibility. The workplaces thanks to modern information technology can be located outside the employer's company office for instance in other companies' offices, a client's office, a hotel, an individual home office, vehicles, etc. The work can be transferred from cities to rural areas, from developed countries to developing ones owing to opportunities of remote access is opening. Now job can be shared among participants who are situated in different time zones and different multinational corporations' divisions.

According to European Fund and ILO estimates, in the EU countries about 17% of workers are engaged in ICT-based mobile work (Drahokoupil & Fabo, 2016). And, apparently, this share will grow in the future. The digital technologies introduction reduces the employees' supervising costs, their activity coordination, quality control, searching and hiring personnel, including on the great distance too. At the same time, the development of labor monitoring through digitalization may result in excessive control over employees.

Negotiations between employees and employers are increasingly addressing issues related to the digitalization impact employment, job and leisure regimes, workplace organization, labor standards, wages and social benefits. They become especially relevant for workers employed in new sectors of the economy, such as the "economy of joint consumption", "on-demand economy". In many Western European countries, in recent years, non-profit organizations have appeared, similar in function to entrepreneurs' unions and associations, setting themselves the task of social and legal support for online platforms employees and freelancers. Such organizations' activity analysis in the labor market allows us to conclude that in addition to traditional for industrial society system of social and labor relations "wage earners - trade union - employer", a system of relations "self-employed - labor partnership (or non-profit cooperative) - online platform", characteristic for the post-industrial economy formation stage, arises (Figure 1).

In Russia, despite that "on-demand economy" companies have already taken strong market positions, associations on large non-profit organizations' basis for protecting labor rights of online-platform employees so far did not appear (labor unions for self-employed or non-profit cooperatives, SMart in Belgium, for instance). The main reason for this passivity is probably the low confidence in trade unions. In addition, the active position of a certain part employees in defending their interests before employers and customers may be hindered by fear that the

company's business could be tied with the shadow economy and could be fallen into the state regulatory bodies view.

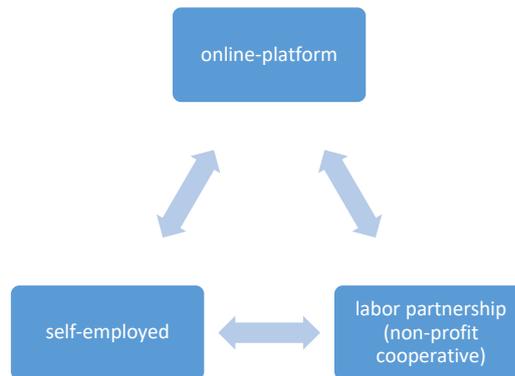


Figure 1. Social and labor relations in "on-demand economy"

To characterize social and labor relations in digital transformation context, we propose a modification model proposed by Boudreau (2016). In his opinion, in the foreseeable future, organizations will be peculiar greater transparency, virtually and globosity, and for most workers flexible employ forms will be characterized instead of traditional full-time employment. Depending on labor relations democratization degree and the production technologies progressiveness, he identified four main labor relations forms and designated as follows: "current state" (full-time employment, traditional technologies application); "today, turbo-charged" (rapid development of production technology with a slow human resources management and labor organization mechanisms evolution); "work reimagined" (traditional production technology application in combination with innovative approaches to the labor organization and employment); and "uber empowered" (innovative approaches to labor management based on advanced digital technology).

The model with four forms of labor relations, in our opinion, can be modified considering the realities of both foreign and domestic economy (Figure 2). It is proposed to replace the social and labor relations democratization degree by the labor market flexibility degree. Greater employment flexibility is not always associated with the labor rights expansion for the workers and their participation degree in production management. Rather, on the contrary, the labor market flexibility increase, entailing some workers transition from salariat to precariat, limits their labor rights, although, possibly, it makes them more the employer independent.

Based on the above proposal, the labor market flexibility degree is shown on the ordinate axis in Figure 2, and the production technology progressiveness level - on the abscissa axis, as in the original Boudreau's model. Then you can combine all the workers in four groups. In the lower quadrants salariat is placed - full-time workers using either traditional or new technologies, while the upper quadrants represent precariat, that is, workers with temporary, precarious employment.

If one or another employee falls into the upper left quadrant, where the precariat using low-tech capital is reflected, it entails its transformation into a kind of "nomad". Being in this position, they will often be forced to change their job, their labor rights will not be sufficiently protected and weak equipped workplace with modern technical means and advanced technology will impede the productivity growth and labor earnings. The changes in the labor relations system under the digitalization influence lead to the labor movement from the lower left quadrant (a salariat used traditional technologies typical for industrial society) and the upper left quadrant to the upper right quadrant, which presents the precariat busy at work on high-tech platforms. The labor flows indicated by arrows. The advanced technology use, ultimately, can positively affect

the salary amount however it will not in itself entail the employment stability increase and the labor rights protection level. For the employees the most attractive development events option seems their transition from the lower left quadrant to the lower right quadrant (salarial using high-tech capital). In this case, the employment stability and the social protection level remain high, while employees are able to earn more due to labor productivity growth.

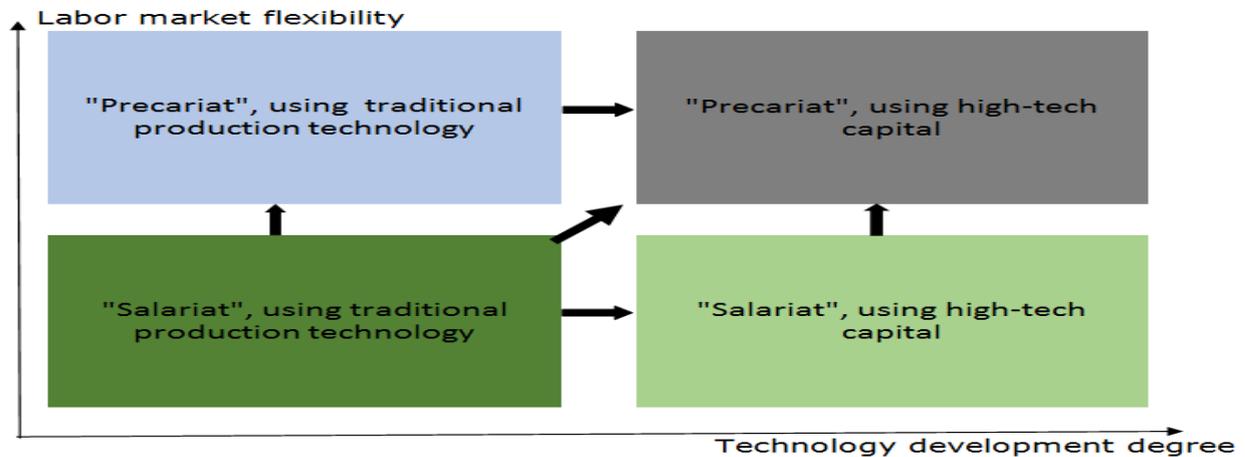


Figure 2. The labor organization forms and changes options under digital business transformation conditions

However, the problem is that maintaining the "salarial" on a previous scale is unlikely, since it does not meet the employer's interests focused on living labor cost savings. It is more likely that at enterprises the personnel core will in smaller sizes be retained, including top management and highly qualified specialists, primarily of a technical profile, and the rest of the salariat will be transferred to temporary, seasonal or even casual employment. This is also facilitated by the expansion of the organizing project work practice, when workers through the digital platforms are combined into temporary working groups, which upon the projects completion are disbanded.

We can make a conclusion that the priority in the labor sphere development for enterprises should be the advancement from the traditional labor organization system (with full, stable employment, a developed social protection system for all workers, existing the staff core) to the more flexible forms of labor organization (on a new technological basis) with maintaining a high social guarantees level for the employed.

To protect effectively the workers labor rights, ensure the sustainability and employment productivity under the aforementioned conditions, the state policy measures implementation is necessary aimed to increase the labor force competitiveness in the labor market. They will be discussed in more detail in the next section.

### Problem Solving

The digital economy development is the most priorities in the Russian Federation state policy. A number of special structures have been created to achieve this goal, such as the autonomous non-profit organization "Digital Economy" and the Agency for Strategic Initiatives. The main focus of ANO "Digital Economy" is aimed at the relationship between government and business. To provide the digital economy with competent personnel is one of the organization activities. The Agency for Strategic Initiatives, in turn, implements the "Skills of the Future" initiative, within the framework of which a number of projects are implemented aimed at modernizing general and additional education for children and youth and forming their necessary competencies.

The Russian Federation Strategy for the Scientific and Technological Development until 2035 is oriented toward the labor resources training for the digital economy. At the end of 2016, in accordance with the Russia President decree the Federal State Budgetary Institution "Foundation

for Supporting Development of Small Enterprises Forms in the Scientific and Technical Field” was established, better known as the National Technology Initiative (NTI). This initiative was aimed at the promising markets formation for high-tech products based on a new technological structure and implementation of fundamentally new technology. NTI is also engaged in training for Russian high-tech companies. This is facilitated by formation of the “NTI Circle Movement” - a community of entrepreneurs and technology enthusiasts ready to implement their projects in the digital economy. In addition, the University “20.35” was established with an expected life of up to 2035, focused on training companies’ leaders working in high-tech innovative markets in new economy sectors.

The taken measures will provide the digital economy with the necessary personnel in the future, but at present they do not contribute to a radical solution to the employment problem of endangered professions representatives. The situation complexity is compounded by the lack of a clear state strategy to ensure the professional orientation of the working-age population, whose competencies may soon become unclaimed. The fragmentation of the state, business and the population goals lead to a raising unemployment in the labor market. People have a deep fear of the technological revolution, the Internet, and robotics. In this situation, the state should take measures to contribute the formation new jobs demand. It is required to develop a concept of comprehensive legal labor relations regulation in the digital economy, organize paperless interaction between workers and employers, and introduce tools for stimulate the digital economy development in terms of the intellectual activity’ results circulation.

Among the measures of state policy to increase the labor force competitiveness in the digitalization context, it can be singled out, first of all, measures aimed at protecting the rights of workers, developing the infrastructure of the labor market and improving the education system.

*The labor rights protection* in the 20th century industrial society has traditionally been the function of trade unions and the state. However, at the end of the past and at the beginning of the new century, as the transition to the of post-industrial development rails, the role of workers professional associations in the labor market decreased significantly. The number of trade union members decreased, and their tasks began to be reduced mainly to the separate social problem’s solution. In turn, globalization narrowed the opportunities range for labor market state regulation, but at the same time contributed to the increasing role of various supranational interstate structures, such as the IMF, World Bank and ILO. In these conditions, it seems important to improve both international (ILO conventions) and national labor laws by amending them to provide more complete accounting and work regulation of the part-time workers, as well as those employed in new economy sectors, in particular, in the” on-demand economy “,” joint consumption economy “, etc. Special attention deserves the wages regulation problem. To reduce the top management and the organizations personnel wage gap and creating due to this the conditions for the labor income increasing of the main employees’ part, it seems advisable to establish not only the minimum, but also the maximum wage (through the wages taxation, with a possible 100% income rate tax, starting from a certain level). The scientific justification of the maximum wage as an instrument for regulating the income of workers is presented by Pizzigati (2018).

The next important area is the *labor market infrastructure development*. The workforce competitiveness to a critical degree depends on how efficiently the jobs searching, personnel recruiting and hiring processes are organized. In the labor market competition, the benefits will always be on the side of persons better informed about conjuncture on market and used more effective employment methods. In this connection, it should be noted the importance of the state’s efforts to create information portals allowing everyone to receive timely, accurate information about vacancies in the labor market and requirements for applicants. In Russian Federation such

approach example is the federal state information system “Work in Russia”. It should be noted that further digitalization in regions, small cities, and rural settlements will contribute to expanding population access to such information resources.

The most direct impact on the employee' competitive status in the labor market is provided by education and training policies. The emerging education model 4.0 differs from the previous model with faster Internet access, the ability to use mobile phones, social media platforms. Providing opportunities for personalized and accessible distance learning at any time of the day generates a change in teaching methods for teachers and coaches (ILO, International Labour Organization, 2017). Education 4.0 should be aimed at globalizing knowledge, preparing people to fill new jobs with high demand in the current and future areas of work. For this, new technologies and teaching methods use are necessary to develop people personal skills considering new economy sectors emergence.

Business models based on digital technologies need employees with professional, as well as developed cognitive and socio-behavioral skills for complex problem solving, logical thinking, teamwork, and the ability to adapt to changing conditions and circumstances. Such skills are acquired during all person' life, that is why it becomes so important to create a practice-oriented educational environment for permanent life-long learning.

According to experts, for successful employment at the present stage four basic competencies kinds are needed - professional, communicative, informational and digital (Sizova & Khusiyanov, 2017). Moreover, the last three competences are obviously most closely related to the use of ICT. Thus, the task to ensure digital employees' literacy regardless of age, industry and type of professional activity, comes to the fore. The ability to use a computer, mobile devices, a standard set of application programs and the Internet should already be classified as basic skills, similarly as the ability to read, write and count, and which all employees should have.

About the workforce digital literacy in Russia it can only be judged by the individual studies results, ‘because there is no regular monitoring of adult competencies. According to the RLMS-HSE population survey, 76% of employees use the Internet, but only 39% use it in the workplace or study place, 46% in job purposes. For comparison, in Germany in 2014, 92% of employees used the Internet in their workplace (Sizova & Khusiyanov, 2017).

According to the Program for the International Adult Competency Assessment (PIACC) data (2014), Russians in terms of the competencies level in reading and mathematical literacy show the results a little bit higher than the average scores in OECD countries (275 versus 273 points; 270 versus 269 points). At the same time, Russia lags behind in terms of competency shaped level in a technologically saturated environment. An average level of these competencies' ownership showed 46% the surveyed sample, a low level - 34%, while in the OECD for 57% and 19.5%, respectively. These data indicate that additional efforts are needed to increase the digital literacy level, raise the competency shaped level in the information and digital of Russian workers.

Along with communicative and informational competencies, knowledge of, at least at the basic level, foreign languages and, first of all, English as an acknowledged language of international communication becomes increasingly important. In Russia, the foreign language knowledge is required for 80% vacancies, while the language proficiency can lead to pay raise only at 15-20% (RBC, 2015). The latter circumstance is probably due to the fact that in many Russian companies, the language knowledge requirements for the job seekers are some kind of "image" filter and poorly reflect their true needs in workforce training quality.

The level of foreign languages knowledge among the adult population in the Russian Federation remains quite low. According to Education First, in 2019 Russia ranked 48th in the world among the 100 countries studied in terms of average English proficiency and, along with Belarus and Ukraine, belonged to a group of countries with a low level of English proficiency (Education First, 2019). The need for additional efforts to improve foreign language literacy, including among the working population, is quite obvious. In this case, the task is to form skills not so much in everyday communication in English as in its application in professional activity fields. And, if in large cities the language literacy increasing is motivated by the relatively high employers' requirements to the employee training level, then in rural areas, small and medium-sized cities, and peripheral regions this need is clearly less pronounced.

When developing public policy measures to increase the workers labor potential, it should be assumed that the digitalization process broadly covers not only production, but also the sphere of education itself. At the present stage, the most appropriate blended learning technologies application, within which organically is combined offline and online education. It is necessary in secondary and higher education institutions to use actively digital educational technologies, including online courses in addition to the traditional training session; automated and online testing; augmented, mixed and virtual reality; drones; various electronic devices (electronic boards, electronic desks, electronic sensors, etc.); artificial intelligence (for example, chat bots for students informing and counseling).

In terms of readiness for the digital economy Russian Federation ranks 41st, with a significant lag behind the leading countries. The Program "Digital Economy of the Russian Federation" (2017), implementing the Strategy for the Information Society Development in the Russian Federation for 2017–2030, defines the following main directions for the development of the institutional and infrastructural environment until 2024:

- comprehensive legal regulation of relations in the context of the development of the digital economy;
- personnel training and the education system to form a labor market that meets the digital economy requirements;
- shaping the necessary research competencies and technical groundwork;
- required information infrastructure creation;
- ensuring information security.
- Accordingly, the following tasks are set:
- form and introduce into the education system the requirements for the basic digital economy competencies, to ensure all education levels continuity and continuing education system development;
- develop a regulatory educational programs framework essential for the digital economy, including standards and government requirements, as well as sample programs;
- create comfortable conditions for attracting qualified employees of the IT industry for teaching in the system of vocational education in information technology.

In addition, it is planned to bring the number of higher and secondary vocational education graduates information technology field to 800 thousand people a year corresponding to the world average level. So that, the most vulnerable groups of the population - the elderly, the disabled, can find job in the new conditions their training should be stipulated.

Educational institutions are responsible for the providing new educational services depending on the current and future the labor market needs. However, in our opinion, many of them do not pay due attention to the demand for new skills and professional profiles. Sometimes they do not have a clear idea what new specialties and professions are necessary in order to bridge the gap

between supply and demand in the labor market, to reduce the imbalance in the socio-economic environment.

An important task at the present stage is to support the start-ups and small and medium-sized enterprises in the digital technologies development and implementation field through both their information acceleration (popularization, training in new business models, navigation in the management system, coordination with other participants and a number of other measures) and investment acceleration (financial support, creation of special legal and tax conditions, reorientation of development institutions, creation of new ways of support, etc.). The startups progress and promotion will lead to success in educational training models, as well as the entrepreneurship development, that will help reduce unemployment in future.

In response to new challenges arising in the labor market, as well as in order to optimize costs, many universities both abroad and in Russia in recent years have begun to actively develop distance learning programs. At the same time, it seems to us, that the mass open online courses (MOOC) used in recent years in education should not be perceived as an equivalent substitute for traditional teaching forms. This is because:

- they do not ensure the students socialization, their social capital formation;
- most of the registered MOOC students do not complete their courses until the end;
- students on MOOC projects often ignore additional materials posted on educational resources, although it is the latter that can at least partially compensate for the lack of live communication with teachers;
- MOOC becomes a redistributing the educational market tool in favor of the largest universities;
- MOOC contributes to increasing unemployment in the teacher labor market.
- It seems to us that the current state, the available personnel and scientific potential provide grounds for expecting a “digital breakthrough” in Russian education in the near future.

Despite the fact that the need for educational activities digitalization and the associated processes has already been universally recognized, the organic digital transformation integration into development strategies with the necessary funds’ allocation is still an achievement of a few educational institutions. Digital technology can improve education quality and make it more saturated with information and attractive for students. These technologies are mainly intended to be an assistant for the teacher, and not to exclude him from the educational process.

## **Conclusion**

The world community transition to the post-industrial development path leads to the creation of favorable employment opportunities for the population in new, emerging digital economy sectors, and helps to labor productivity increase and labor income through the of advanced technology use. The business digitalization, its new model’s emergence caused dramatic changes in the personnel policy due to increased requirements for the workforce quality. In order to be demanded in the labor market, employee must have a wide range of competencies - professional, information, communicational, digital. The 4th industrial revolution provoked an appearance of additional risks and threats in the labor market - technological unemployment, forced underemployment, reduced free time and the use of flexible working hours. As the “on-demand economy” develops self-employment, the need in developing new mechanisms for the labor rights protection become more relevant. Among the organizations that provide freelancers with

information, consulting, financial and other services, non-profit cooperatives (labor partnerships) should be noted, an example of which is the non-profit cooperative SMart.

In the present study, a modified model of Boudreau (2016) is proposed. In the digital economy, this model makes possible, to use four possible forms of labor organization, for the priority development vector determination in the labor field. The labor organization in enterprises and firms can change as follows. The traditional, formed in the industrial era, labor organization with full, stable employment, well-developed social protection and a personnel core (“salarariat”) is replaced by more flexible ones, in which the salariat is preserved, but it carries out work on a new technological basis, including through the digital platforms.

In order to ensure the labor force competitiveness in the labor market in the context of the production, the transference to the post-industrial development rails, government policy measures are needed to more effectively protect the employees’ labor rights, develop the labor market infrastructure and to ensure that the education system meets digitalization challenges. In Russia at the present stage, in addition to solving problems in the professional training field, it is important to increase the adult population digital literacy and the foreign languages knowledge level. Both in secondary and higher education institutions, it is advisable to switch to a blended learning model that combines traditional offline education with distance learning technology, including open online courses.

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