

## PEDTR 2019

### 18<sup>th</sup> International Scientific Conference “Problems of Enterprise Development: Theory and Practice”

## LABOUR MARKET IN DIGITAL ECONOMY: NEW OPPORTUNITIES, REQUIREMENTS AND THREATS

V. M. Svistunov (a), S. A. Grishaeva (b)\*, V. G. Konovalova (c)

\*Corresponding author

(a) State University of Management, 109542, Ryazansky Pr., 99, Moscow, Russia, svistunov@guu.ru

(b) State University of Management, 109542, Ryazansky Pr., 99, Moscow, Russia, grishaeva@bk.ru

(c) State University of Management, 109542, Ryazansky Pr., 99, Moscow, Russia, konovalova\_v@mail.ru

### *Abstract*

This article is dedicated to the estimation of the influence that modern technology has on today's world and Russian Labour market. The relevance of the chosen problem is sufficient due to the fact that the level of social digital development has a significant impact on the size of the labour markets, the qualification range of the employees and on the demand for certain professions. In this article citizens' psychological readiness to implement digital technologies and unevenness in digital services distribution in Russia are estimated. This article also provides the results of the analysis of the influence of digital technologies on the Russian GDP growth, moreover, it reflects the contribution of different factors of growth to additional value of different economic sectors in Russia including industrial sector. Furthermore, it shows implementation dynamics of digital technologies across regions of the country, as well as it outlines the results of studies that characterize new labour market trends as a response to proactive implementation of digital economy in the socio-economic sphere of society. The article reveals proof of the need to develop basic user skills that provide access and usage of various digital devices and services online, both for the everyday life and for communication, as they are aimed at creating the ability to deliberately apply familiar information technologies in order to obtain specific practical results at workplace. Developing a creative approach in dealing with applications and digital services is considered crucially important.

2357-1330 © 2020 Published by European Publisher.

**Keywords:** Labour market, digital technologies, population employment, new labour market trends.



This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## 1. Introduction

The labour market in modern economic conditions is undergoing a fairly noticeable transformation (Fregin, Levels, & van der Velden, 2019; Genz, Janser, & Lehmer, 2019). It allows us to say that this is one of the most dynamically changing markets in the digital society (Frank et al., 2019): the requirements for employees on the part of employers are changing, professions are transforming, and the employees' expectations of the labour market are also seeing modification. These changes are not easy: there are all sorts of barriers on the way of digital technologies implementation to the labour market, such as barriers of trust (as noted by experts of the Ministry of Labour (Golyschkova, Lobachyov, & Metyolkin, 2018), one of the most significant reasons for the appearing risks in digitalization and automatization is insufficient psychological readiness of citizens (youth and employees) to change in accordance with transforming conditions), technical barriers (hurdles in the access to technical devices), and many others.

## 2. Problem Statement

Insufficient psychological readiness for digitalization reduces the competitiveness of several categories of Russians on the labour market, as, in the medium term, the demand for highly qualified IT-personnel is expected to increase on the labour market of Russia. At the same time, according to KPMG, a significant part of employees would prefer not to undergo retraining or qualification improvement to develop digital skills without special requirements from their employers; moreover, most employees are indifferent to education or even perceive it negatively, even if corporate digital skills training programs have already been launched. Currently, Russian organizations have widely mastered basic and relatively simple digital technologies, but only a few of them have carried out deep automatization and have restructured business processes according to advanced digital technologies, and, in the meantime, the use of computer engineering and virtual modeling technologies, additive technologies, industrial Internet, mechatronics and robotics has not received significant distribution yet.

The introduction of digital technologies provokes significant changes in both personnel needs and in the requirements for specialists:

- A decline in the demand for professions related to formalized repetitive operations performance;
- Shortening the life cycle of professions due to rapid technological changes;
- Transformation of competency profiles of several personnel categories (risk analysts, HR managers, marketing analysts, contact center operators, etc.) due to operational tools modification;
- Appearance of new roles and professions;
- Increasing requirements for staff flexibility and adaptability;
- Increasing requirements for "soft skills" — the possession of social and emotional intelligence, meaning the abilities that distinguish a person from a machine;

Growing demand for specialists armed not only with certain digital skills, but also with "digital dexterity" - the ability and desire to use new technologies in order to improve business results (Gartner, 2018).

### **3. Research Questions**

One of the main objectives of the digital economy development (OECD, 2016) is ensuring that all people have the skills necessary to participate in digital economy and digital society, including assistance in developing potential of educational and training systems aimed at identifying the demand for general and specialized digital skills and at training those skills, and on the digital literacy increase.

The very concept of "profession" is transforming, since the set of competencies that must be possessed by an employee, who has received training for a particular profession or specialty, stops being static; competence profiles are becoming become unstable, they are modifying accordingly to technological and organizational changes, they transform into "dynamic portfolios". A so-called "supra-professional competences", including those determined by the use of modern information and communication technologies (ICT), are becoming increasingly important.

### **4. Purpose of the Study**

The purpose of this study is to define opportunities, requirements and threats for the labour market in general and for the Russian labour market in particular in the conditions of society digitalization. As a result, the evaluation of the new labour market trends, formed as a response to an active penetration of the digital economy to the socio-economic sphere of society, is carried out. This implementation requires an understanding of the awareness level in using digital technologies and an assessment of the information security problem.

### **5. Research Methods**

The methodology of the labour market research is represented by a combination of systematic and situational approaches. This allows us to assess the interconnection and interaction of all the components of the labour market and its peculiarities under the digital economy conditions. The article provides a secondary analysis of researches and statistical data on the transformation of the Russian labour market in the age of digital economy.

### **6. Findings**

The transition to digital economy affects the labour market significantly: along with the spread of ICT through all the areas of life, digital skills are becoming crucial for the employers. A large-scale transformation of requirements for specialists is expected, since many operations that have not been affected by previous "waves" of digitalization are anticipated to be automated in the nearest future (King & Zaharchuk, 2017; Digital Literacy, 2019). Big Data Analytics ("Big Data") is becoming a key competence that determines the competitive advantages of the companies of the future.

Main indicators that reflect the impact of digital technologies on the labour market are the following:

- At least 30% of functions within professions can be automated at the current level of technology development;

- World GDP may grow by 9 trillion dollars by the year 2030 due to the job automatization on the basis of artificial intelligence introduction;
- 49.3% of professions in Russia could be eliminated in case of momentary automatization;
- 375 million workers (approximately 14% of the world's workforce) will have to change professions by 2030;
- The probability of automatization of such professions as banking operator, auditor, credit specialist is 98%;
- The number of working hours in professions that will not disappear by 2027 may decrease by 29% due to the introduction of artificial intelligence.

In a number of sectors, the inflow of highly qualified personnel will not be able to compensate for the dismissal of low-skilled personnel, which will lead to a negative contribution of the labour factor to the growth rate of several sectors of the economy.

According to national and foreign experts in Russia, an active implementation of digitalization processes can lead to a reduction of 20-25 million jobs. The technological modernization and scientific and technical development monitoring center has conducted a study, the results of which have made it possible to assess modern potential of physical and mental labour automatization in the Russian Federation. The obtained results indicate a fairly high (approximately 50%) total potential of labour automatization in our country (All-Russian People's Front, 2019). However, as a result of a more detailed analysis, it was found out that the relatively high value of the mentioned indicator is the merit of industries that mainly use physical labour. In the industries in which mental labour is predominant, routine operations are automatized, as they are easily amenable. This confirms the assumptions of the world's leading experts, based on the ongoing macroeconomic changes, that predict the largest reduction in jobs (up to 23.9%) in the manufacturing sector, up to 14.8% - in agriculture and up to 9.3% - in the transport sector of the world economy by 2030. According to experts, today not more than 2% of the Russian employed population operate the functions connected with the development and active use of modern digital tools. By 2030, the share of this category of the workforce should increase to 5-7 %.

The predicted indicators for the reduction of jobs in the regions of the Russian Federation are not less interesting. The research results, which are summarized and presented below, were based on the data of prevailing sectors of the economy in the regions of the Russian Federation, as well as on the forecasts for potential of business processes automatization within each industry. According to experts, digitalization will most likely cause a reduction of workforce in the capital region (in Moscow - approximately 670 thousand jobs, in the Moscow region - more than 350 thousand). The following are: St. Petersburg (more than 270 thousand), Krasnodar region (more than 230 thousand) and Sverdlovsk region (more than 190 thousand). According to experts, in the next 10 years more than 6.7 million jobs in the industrial sphere of the Russian Federation are expected to be automatized (All-Russian People's Front, 2019). The implementation of robotic and automated technologies mostly puts a threat on professions associated with physical labour, machinery operation, fast-food preparation, as well as on the experts in data collecting and processing, in accountancy, etc. Digital technology experts are unanimous in the opinion that the processes occurring today will not only lead to a significant reduction in the number of personnel, but also seriously affect the number of working places that require an employee to have an average qualification within

existing professional training. The mentioned trends will result in an increased wage gap which will create serious additional difficulties for the management of companies and the state in general.

The results of the McKinsey study also show that in 13 years about one-fifth of the world's workforce will become unemployed with an increase in automatization and robotization rates in industrial and non-industrial spheres by 30% at most. The quantitative and qualitative characteristics of modern digital technologies and the current pace of their implementation indicate that by 2030, we can expect automatization of at least 60% of human employment, while full automatization is expected from 5% to 10% of labour spheres. McKinsey specialists estimate that 81% of the time that employees spend on physical labour can be transferred to robotic complexes; data processing automatization can free up to 69% of the working time; digital technologies of data collection will liberate at least 64% of the working time of the employees, that previously performed these operations.

Least of all, digital economy threatens professional groups whose representatives need to constantly contact and communicate with other people, as well as those professionals who, when performing their duties, must demonstrate not only a high level of theoretical and practical knowledge, but also creativity and lateral thinking. The list of such professions includes scientists, teachers, medical workers, IT specialists, as well as engineers and social workers. Deloitte experts draw attention to the fact that at least a third of new professions will require skills of communication, social interaction, the ability to determine the context and set goals, and highlight, in addition to empathy, knowledge of professional field and customer needs (professionalism), oral speech perception, oratorical mastery, native and foreign language proficiency, skills of active listening, presentation, perception of written speech, proactivity, literacy, critical thinking, analyzing abilities as the most required skills of the employee of the future (Evans-Greenwood, Lewis, & Guszczka, 2018).

The figure of 375 million people stated above could have been much higher, at least by 50-55 million people more, according to McKinsey experts, without taking into account that the process of creating high-tech jobs is accompanied by the process of creating additional working places necessary for the maintenance of robotized equipment and processes in working condition (Aptekman, Kalabin, Klintsov, Kuznetsova, Kulagin, & Yasenovets, 2019). The expert community believes that robotization has already led to the creation of at least 10 million additional working places around the world, and we should expect a significant increase in this figure in the future.

Thus, digitalization also has a positive impact on the labour market. Along with creation of additional high-tech jobs, digital technologies and platforms create the necessary prerequisites for the development of additional skills by the employees, including digital skills; professional development, especially for those who previously have not used digital tools and technologies in their daily activities due to social or geographical restrictions. At the same time, remote workplaces and educational platforms have a special influence, implementation of which is aimed not only at improving personnel involvement in the economy, but also at ensuring access to high-quality education for the wider groups of population.

It has already become obvious that for the majority of people the pace of ICT skills development is lower than the pace of digitalization, so the problem of increasing digital literacy level of the population arises, especially in the professional environment (including Russia): the more the population becomes

proficient in ICT, the more it is adapted to technological changes and consequently, the ability to learn and to explore new technologies becomes higher.

Digital fluency implies the ability of a person to confidently apply ICT tools in everyday life and in the workplace, to analyze information obtained from multiple sources, to assess its credibility and usefulness using independently established criteria, as well as the ability to solve problems that require searching for information related to an unfamiliar context, in conditions of ambiguity and without clear instructions.

Such type of literacy in the age of digital economy acquires a "supra-professional" character: it is necessary for all the members of society and forms an important component of human information culture (Vasilenko & Vakhitova, 2018).

Digital literacy is considered as one of the areas of digital intelligence (Digital Intelligence (DI)) (DQ Institute, 2019), which is characterized by a set of social, emotional and cognitive abilities that allow people to withstand modern technological challenges and adapt to the demands of digital life:

- Digital identity (an ability to create and manage your online-identity and reputation: awareness of an online-personage and managing short- and long-term impact of an online presence);
- Digital consumption (an ability to use digital devices and mass media, including mastery of control, to ensure a healthy balance between life online and offline);
- Digital security (an ability to manage risks on the Internet (cyberbullying, radicalization, etc.); problematic content (such as violence and indecency); and to avoid and limit these risks);
- Digital protection (an ability to detect cyber threats (such as hacking, fraud, virus software), so that to understand and use appropriate data protection tools);
- Digital emotional intelligence (an ability to be empathetic and build good relationships with other online users);
- Digital literacy (an ability to find, evaluate, use, share, and create content; algorithmic thinking);
- Digital communication (the ability to communicate and collaborate with others using digital technologies and mass media);
- Digital rights (an ability to understand and support personal and legal rights, including the rights to privacy, intellectual property, freedom of speech, and protection from incitement to hatred).

Modern business processes, on the one hand, lead to a substantial complication of most professions. On the other hand, the active use of digital technologies in their operation helps to free up the employees' time for solving a larger number of creative tasks that require, as a rule, having a high qualification and a lot of professional experience. As a result, the use of a fundamentally new model of responsibility distribution in the company is becoming more and more frequent. The practical implementation of the new model is carried out as a counterbalance to the model developed in the last century and is used in modern management practice – "one person – one task".

Within the framework of the previous model, each employee, as well as the management of the company, is responsible for maintaining the managerial balance by applying the reactive nature of management actions as a response to current events and changes in the external and internal environment

of the organization in order to mitigate the consequences of these actions. The modern model of responsibility distribution implies an ability of a company to be fully responsible for a complex management process (or product) or several multidirectional management processes with the efforts of one employee or a small team of employees. In such conditions, the most important task of each employee and the management team of the company can be formulated as follows - the anticipation of the changes that not only can, but should have a positive impact on the current internal state of the company, and, moreover, significantly improve its position in external environment. Thus, each employee and the management team in general should always be guided by the principle of proactivity – to anticipate events and independently initiate the necessary and desired changes.

In the next decade, the development of the world economy and labour markets will continue to depend on key trends that already have a significant impact on the employment processes. Indeed, digital technologies will continue to be actively improved and developed. It will be relatively easy to access them. But there will be a strong need for the experts who are able to make a use of all their advantages and opportunities. Even today there is already a serious deficit of specialists who can ensure an effective application of digital technologies that can be seen in many countries. As for the IT specialists, in recent years there has been an ongoing increase in demand for such professionals in corresponding professions. The data presented in Table 01 confirms that this trend will continue in the upcoming years (Aptekman, Kalabin, Klintsov, Kuznetsova, Kulagin, & Yasenovets, 2019).

**Table 01.** The dynamics of the changing demand on IT professions by the year 2024

<b>Profession</b>	<b>Demand</b>
Web developer	demand growth by 24%
Computer analyst	demand growth by 21%
Information security analyst	demand growth by 18%
Software developer	demand growth by 17%
Data processing specialist	demand growth by 16%
System administrator	demand growth by 8%

Source: authors based on (All-Russian People's Front, 2019; Aptekman et al., 2019).

The results of the research on the most promising high-skill professions that are in high demand in the market in the conditions of digitalization show the following:

- Internet-of-things architect - provides network connection for many devices, provides data transmission and processing in real time;
- Bioinformatics specialist - analyzes experimental medical and biological data, develops and implements various calculation methods in practice;
- Data-journalist - creates various types of reports based on the data, with the use of which the content of the text acquires a quantitative justification on the basis of stated facts and the author's opinion;
- Virtual environment designer – develops the equipment and software for broadcasting the virtual world, creates its design and interactive storylines;

- Voice interface designer – develops interfaces for voice interaction with digital assistants, robots, builds algorithms for artificial intelligence responses;
- Data security engineer – provides privacy, deals with encryption and prevents unauthorized access to data;
- Engineer-operator of robotics – manages the performance of robotic systems in production and in service are;
- Data researcher – operates processing and analysis of large data sets, using statistical analysis Methods to determine patterns and trends and to develop forecasts for solving business and scientific problems;
- IT lawyer – legal support of business in the digital economy;
- Computer linguist - develops programs and algorithms based on natural language, creates text and speech recognition tools and translation systems;
- Robotic prostheses and implants developer - develops functional artificial organs and devices that are compatible with living tissues;
- Neurointerface developer – creates a communication system designed to read human brain activity and exchange information between the brain and external devices;
- Digital logistics specialist - implements innovative solutions to optimize resources and added value in digital supply chains;
- Tissue engineer - constructs and cultivates living functional tissues or organs outside the body for the following transplantation;
- Digital marketing specialist - promotes products and services through digital channels of interaction with the audience;
- Digital producer - manages complex media projects that involve multiplatform system and the use of digital content production capabilities.

## 7. Conclusion

To conclude everything stated above, it is already necessary to evaluate the ability of the working-age population to obtain new competencies, to develop a state system of retraining for various spheres of industry and for non-industrial activities, to review the system of professional standards among the sectors of economy and to reexamine state educational standards for various levels of education in the country. Disparity between professional capabilities of the workforce and new economic realities and structure will lead to irreversible process: the loss of competitiveness of Russia in world markets and, as a consequence, delays in economic development and a sharp decline in living standards of the population.

## Acknowledgments

The article was prepared according to the project №1 “The analysis of the readiness of Russian society for digitalization processes” as part of the donation agreement № 1154 dated March 01, 2019.

## References

- All-Russian People's Front (2017). The NTR Center has identified the main industries where the introduction of digital technologies will lead to the greatest reduction in jobs. Retrieved from <https://onf.ru/2017/06/19/centr-ntr-vyyavil-osnovnye-otrasli-gde-vnedrenie-cifrovih-tehnologiy-privedet-k>. Accessed: 12.11.2019.
- Aptekman, A., Kalabin, V., Klintsov, V., Kuznetsova, E., Kulagin, V., & Yassenovets, I. (2017). Digital Russia: New reality. Retrieved from <https://www.mckinsey.com/~media/McKinsey/Locations/Europe%20and%20Middle%20East/Russia/Our%20Insights/Digital%20Russia/Digital-Russia-report.ashx> Accessed: 12.11.2019.
- Digital Literacy (2018). All-Russian study “Digital literacy index 2018”. Retrieved from: <https://xn--80aaefw2ahcfbneslds6a8jyb.xn--p1ai/about/>. Accessed: 06.11.2019.
- DQ Institute (2019). DQ Global Standards Report 2019. Retrieved from: <https://www.dqinstitute.org/news-post/worlds-first-global-standard-for-digital-literacy-and-skills-launched-by-the-coalition-for-digital-intelligence/> Accessed: 03.11.2019.
- Evans-Greenwood, P., Lewis, H., & Guszczka, J. (2017). Reconstructing work: Automatization, artificial intelligence, and the essential role of humans. *Deloitte Review*, 21. Retrieved from <https://www2.deloitte.com/us/en/insights/deloitte-review/issue-21/artificial-intelligence-and-the-future-of-work.html> Accessed: 08.11.2019.
- Frank, M. R., Autor, D., Bessen, J. E., Brynjolfsson, E., Cebrian, M., Deming, D. J., ... Rahwan, I. (2019). Toward understanding the impact of artificial intelligence on labor. *PNAS*, 116(14), 6531-6539.
- Fregin, M.-C., Levels, M., & van der Velden, R. (2019). Labour market institutions and the challenge of allocating the right people to the right jobs: Evidence on the relation between labour market institutions and optimal skill matching from 28 industrial countries. *Compare: A Journal of Comparative and International Education*. <https://doi.org/10.1080/03057925.2019.1695197>
- Gartner (2018). 4 Steps to develop digital dexterity in your workplace. Retrieved from: [https://www.gartner.com/binaries/content/assets/events/keywords/digital-workplace/pcce13/4\\_steps-infographics-3.pdf](https://www.gartner.com/binaries/content/assets/events/keywords/digital-workplace/pcce13/4_steps-infographics-3.pdf). Accessed: 03.11.2019.
- Genz, S., Janser, M., & Lehmer, F. (2019). The impact of investments in new digital technologies on wages – Worker-level evidence from Germany. *Journal of Economics and Statistics*, 239(3), 483-521.
- Golyshkova, I. N., Lobachyov, V. V., & Metyolkin, P. V. (2018). Development of the transport sector of the Russian economy in the context of globalization. *E-Management*, 1(2), 20-29.
- King, M., & Zaharchuk, D. (2017). Navigating the global skills crisis. Retrieved from <https://www-935.ibm.com/services/us/gbs/thoughtleadership/skillsstorm/> Accessed: 03.12.2019.
- OECD (2016). Ministerial declaration on the digital economy: Innovation, growth and social prosperity («Cancun declaration»). Retrieved from <http://www.oecd.org/sti/ieconomy/Digital-Economy-Ministerial-Declaration-2016.pdf> Accessed: 03.11.2019.
- Vasilenko, N. V., & Vakhitova, L. R. (2018). *Adaptation to the digital environment: Digital skills formation*. St. Petersburg: Polytechnic Institute Publishing.