

**CDSSES 2020****IV International Scientific Conference "Competitiveness and the development of socio-economic systems" dedicated to the memory of Alexander Tatarkin****EDUCATION AND LABOUR MARKET IN THE CONDITIONS OF REGIONAL DIGITALISATION**

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**Abstract**

Digitalisation is one of the areas of the region's development identified in national projects in Russia. One of the conditions for digitalisation is the training of a workforce that meets the digital economy's needs. The federal project "Human Resources for the Digital Economic" suggests creating such an education system that would provide training for highly qualified personnel and retraining of existing specialists for the needs of the digital economy. Achieving this goal requires interaction between the education system and the labor market. The purpose of the article is to consider new challenges of interaction between the education system and the region's labor market in the context of its digitalisation. Research methods: analysis of theoretical literature, foreign and domestic experience, analysis of statistical data and secondary analysis of research data. Conclusions. The competitiveness of the region in the context of digitalisation directly depends on the characteristics of the interaction between the labour market and the education system (the balance of supply and demand in the regional labour market, an adequate response of the education system to the challenges of the digital economy). The study results show that it is more difficult for regions to adapt to digital changes than for the state as a whole. The unbalanced interaction of the labour market and the education system leads to the need to follow federal regulatory development models, and not their path, which poses an even greater threat to competitiveness.

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## **1. Introduction**

Over the past few years, digitalisation has become one of the priority areas for its development. The development of the digital economy inevitably entails changes in the labour market associated with changes in the demand and supply of labour, the transformation of professions and competencies, the redistribution of factors and forms of interaction between the main actors. The education system, which is in close interaction with the labour market, is also forced to respond to the digital economy's challenges, meaningfully revising the entire process of providing educational services: from the needs for them to the final result. At the state level, effective interaction - a guarantee of economic stability or sustainable socio-economic growth - is ensured through various actors' targeted actions, supported by national programs and projects. At the regional level, the most important direction of development remains the competitiveness of the region, supported by the formation of human capital in the labor market's mutual actions and the education system.

## **2. Problem Statement**

Digitalisation as a global trend has had a significant impact on the interaction of the labour market and the education system, both in the national and regional aspects. As a result of this influence of services, the imbalance of supply and demand has been reduced, and the gap in the speed and quality of response to the digital challenges of the labour market and education system has widened. The research problem is the need for systematisation of information and qualitative analysis of the ongoing changes in the interaction of the labour market and the education system, determining its development prospects.

## **3. Research Questions**

Key research questions:

- the main approaches to understanding the phenomenon of interaction between the labour market and the education system at the regional level;
- the impact of digitalisation on the conditions of interaction between the labour market and the education system at the regional level;
- the state of interaction at various levels in the region;
- prospects and contradictions in the development of interaction.

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

The article's main research goal is to consider new challenges in the interaction of the education system and the labour market of the region in the context of its digitalisation.

## **5. Research Methods**

Analysis of theoretical literature, foreign and domestic experience, analysis of statistical data (Federal State Statistics Service, Governments of the constituent entities of the Russian Federation) and

secondary analysis of research data on various aspects of the labour market and education (conducted by research organisations and researchers, labour exchanges, consulting companies and government organisations).

## **6. Findings**

### **6.1. Interaction of the labour market and the education system at the regional level: theoretical aspect**

In the scientific literature, there is an understanding of the goal of the interaction of the education system and the labour market as increasing the well-being of each member of society through meeting personal needs, in implementing educational services in practice, obtaining an appropriate level of income and increasing the population's ability to pay. A significant number of publications are devoted to this issue, in which attempts to analyse the interaction of the labour market and education at the regional level are made: Khlabystova (2015) on the situation in the Krasnodar Territory, Khamalinsky and Zavgorodnyaya (2010) - in the Omsk region, Kogan, Kuteinitsyna, Postalyuk, Prudnikova - based on materials from the Volga Federal District (Kogan et al., 2015), Aliyeva - on the example of the North Caucasus Federal District (Aliyeva, 2012).

Khamalinsky and Zavgorodnyaya (2010) define the interaction of the educational services market and the labour market as regional socio-economic subsystems as the interconnected functioning of the subjects and mechanisms of these markets, which is formed under the influence of various factors. The result of this interaction is a situation when the available labour force, in terms of its professional and qualification composition, meets the requirements of the regional labour market.

The question of the subjects of interaction and their role in this process also remains debatable. In our opinion, the interaction of the labour market and the education system occurs at several levels: institutional, organisational and individual-personal. The main subjects of interaction are public authorities, employers, employees, educational organisations. Many factors are influencing the interaction of the selected subjects, but the main ones among them will be socio-economic. The mechanism of interaction between the labour market and the education system should take into account the interests of all actors.

The lack of stable ties between the subjects of interaction leads to a number of problems in regional labour markets, such as a shortage of personnel in certain specialties, on the one hand, and difficulties in the employment of a significant number of graduates of vocational education institutions, on the other hand.

Analysing the publications of the last decade, we can conclude that the problems of interaction between the labour market and the education system have become permanent. So, for example, the following interaction problems can be distinguished:

- Orientation of educational organisations when offering educational services primarily to the demand of consumers (applicants and their parents), and not to the needs of employers (Gushchina, 2014).

- Inconsistency of the state order for the training of specialists (budgetary places) with the real needs of the regional economy.
- Lack of real influence of employers on the content of training in educational institutions.
- Slow response of the education system to changing needs of the labour market (Fedolyak, 2018).
- Insufficient amount of practical knowledge acquired in the course of training by young specialists.

Thus, it should be noted that the interaction of the regional labour market and the education system is a topic that is relevant for researchers, since it is the effectiveness of such interaction that is understood as one of the conditions for sustainable economic growth in the region, growth in the well-being of the population, and increased regional competitiveness. Nevertheless, recent studies indicate the presence of certain, persistent problems in such interaction, indicating not only the existing serious imbalance between supply and demand, but also the asymmetry of needs and opportunities, as well as a significant gap in the development and responses to the challenges of the digital economy.

## **6.2. Impact of digitalisation on the interaction of the labour market and the education system: a literature review**

The development of digital technologies, as well as the emergence of the phenomena of the digital economy and digitalisation, aroused the interest of the scientific community. The expression “digitalisation” or “digital transformation” refers to “changes associated with the application of digital technologies in all aspects of human society” (Bejinaru, 2019, p. 368). Digitisation is also seen as “the ability to transform existing products or services into digital options, thereby offering advantages over a tangible product” (Parviainen et al., 2017, p.64).

The fundamental trend is associated with the restructuring of many sectors of the economy in the direction of automation, digitalisation and the strengthening of the role of information technology in most industries. According to experts, this will inevitably lead to a restructuring of the labour market and a change in the type of employment of individual specialists (Alekseeva & Sazonov, 2019).

The assessments of various representatives of the scientific community regarding the impact of digitalisation of the economy on the labour market and the unemployment rate differ (Koznov, 2019). Digitalisation is often assessed by researchers as a threat to the labour market associated with a sharp reduction in jobs, the release of a significant amount of labour, a decrease in its competitiveness, and as a result - an increase in pressure on the current social security systems (Bloom et al., 2018). Tax evasion (self-employment, freelancing), unfair competition (local and global) and gaps in the social protection system (uncertainty and multiple objects of social support) are also called the main challenges to sustainable development in the context of digitalization (Dølvik & Jesnes, 2017).

Gorskina and Propp distinguish the following trends in the labour market, which have arisen under the influence of digitalisation: reducing the need for "living labour" due to the increased efficiency of economic processes; the emergence of competitive advantages for those employees who have the necessary skills and level of education to work in the digital economy; changes in the structure of employment; changing the principles of division and cooperation of labour; the emergence of new forms of employment in the form of freelancing, crowdsourcing, insourcing, flexible forms of involving

professionals in labour activities, distance employment is developing, etc.; an increase in the mobility of an employee during his working life (Gorskina & Propp, 2019).

However, in recent years, not only global challenges are increasingly being considered, but also the global prospects for the development of digital technologies - including the fact that artificial intelligence and advanced robotics will create 133 million jobs, compared with 75 million that would be destroyed (Lovergine & Pelleri, 2018) that structural unemployment is possible only in the short term, because in the long and medium term, the adaptation of the training system for new specialties will take place (Koznov, 2019), that there will be an increase in the need for highly qualified personnel with constant advanced training, a decrease in time norms, the emergence of a need in continuing education (Bannykh, 2020).

Digitalisation has an impact not only on the labour market, but also on the education system. In the book by Harteis "The Impact of Digitalization on the Workplace. The educational aspect" is a very detailed study of the impact of digitalisation on both the labour market and the education required in the workplace (Harteis, 2018, p. 55). The author concludes that there is a growing social inequity between those who learn in traditional ways and those who acquire the skills they need in their work digitally, between the so-called "traditional" educational organisations and subjects, and new realities.

In the education system, the authors trace the impact of digitalisation on various elements and processes, for example, Machekhina (2017) calls one of the contradictions that seriously impede the modernisation of education - the discrepancy between the digitalisation rate of educational resources and the digitalisation rate of the educational process itself, which is still very low. Ashmarina, Kandrashina, Izmailov, Mirzayev talk about similar problems, that is, about the uneven process of digital transformation in the education system. (Ashmarina et al., 2020)

Kornelakis and Petrakaki (2020) conducted a study on the interaction of the labour market and higher education in the UK in the context of digitalisation. According to the results, in the first place in the need for interaction is the cooperation of universities and employers to determine the needs of the latter in workers and their skills, in the second place is the need to link the process of acquiring knowledge and the process of obtaining skills in the workplace in a more efficient way, and thirdly, university teaching has a great potential to transfer digital skills and 21st century skills to students if it is done in small groups.

Let's try to summarise the main changes that digitalisation has brought to the interaction of the labour market and education (and outline the challenges that face their interaction today):

- a demand for a new generation of specialists who use digital systems as the main tool of everyday work ("digital humanities");
- in a number of segments directly related to digitalisation, the labour market is actively growing (AI, data analysis, VR / AR, robots and drones, etc.), but the education system does not produce specialists for these segments in the right time and in the right amount;
- in the digital economy, one of the key trends is the departure of a significant part of education online.

At the regional level, the problem is further complicated by the weak influence of regional authorities on the education system and by trends in migration and the extraterritorial nature of education

and employment. The state, creating conditions for the employment of workers in the context of digitalisation, relies on the principle of “accessibility”, which makes it possible to provide employment and education services remotely, regardless of the location of the applicant. But from the perspective of the regional labour market and the regional education system, this serves as another challenge to the competitiveness of the region.

### **6.3. Interaction of the labour market and the education system in the regions of the Russian Federation in the context of digitalisation**

In conditions when digitalisation in the Russian Federation has become one of the most priority areas of state policy, the role of institutional mechanisms of interaction between the labour market and the education system is increasing. First of all, to achieve a balanced interaction between the labour market and the education system. According to the Global Talent Competitiveness Index, Russia ranks 48th place in 2020, however, according to the creation of opportunities for talent development, its place is already 65th, and the talent attraction sub-index puts Russia in 86th place (Global Talent Competitiveness Index - 2020. <https://gtcistudy.com/the-gtci-index/>). There is a significant gap, which is precisely determined by the characteristics and factors of interaction between these two capital-forming spheres - the labour market and education.

The national program “Digital Economy” includes the federal project “Personnel for the Digital Economy”, the activities of which include, among other things, the orientation of the system of higher, secondary and additional vocational education to training specialists with the competencies the digital economy needs, forecasting the need for personnel for the digital economy, creating models of competencies of the digital economy, as well as profiles of personal competencies.

According to the Federal State Statistics Service, in 2018, universities graduated 3.2 thousand people (bachelors, specialists, masters) in the direction of computer and information sciences, and 4.4 thousand in the direction of training “Information security” (see [https://rosstat.gov.ru/storage/mediabank/Trud\\_2019.pdf](https://rosstat.gov.ru/storage/mediabank/Trud_2019.pdf)). The target figures for admission to budget-funded places of universities in areas related to digitalisation for 2020-2021 approved by the order of the Government of the Russian Federation are much higher: more than 51 thousand budget places.

The discussion is caused by the calculation of the forecast of the needs of the Russian economy, including the regional level, in the number of workforce in the field of information technology. According to High School of Economics research, 1,077,000 ICT specialists were employed in the Russian economy in 2017 (see <https://www.hse.ru/data/2018/12/26/1143130930/ice2019kr.pdf>). According to a study by the Association of Computer and Information Technology Enterprises with the participation of non-government organisation “Digital Economy”, a total of 1.8 million IT specialists are involved in the Russian economy in 2018, that is, 2.4% of the economically active population. At the same time, in the regions of Russia (excluding Moscow) this figure is much lower - at the level of 1.5%.

Such a spread in estimates of staffing for the digital economy inevitably leads to a difference in the level of forecasting the need for such personnel. At the same time, it is necessary to take into account the regional specificity of the needs for IT personnel, associated with the specifics of regional development. For example, experts predict by 2024 in the Chelyabinsk region only a moderate increase in the need for

IT personnel, and then only in certain areas, and more than double growth is expected only by 2036 (Sichinsky & Stashkevich, 2019). Accordingly, we can talk about the existence of a contradiction between the normatively established results of the development of the digital economy and the needs of regional labour markets.

The education system must meet not only the quantitative but also the qualitative needs of the labour market. The needs of the digital economy are associated with the emergence of new professions related to big data, artificial intelligence, etc., digitalisation specialists, as well as the introduction of new technologies in traditional types of professional activities - medicine (telemedicine), education (online training, etc.), trade (online stores), etc.

A study by the Analytical Centre for the Government of the Russian Federation “Barriers to the development of the digital economy in the constituent entities of the Russian Federation” (see <https://ac.gov.ru/archive/files/publication/a/25838.pdf>) states such a barrier as the lack of qualified personnel for the development of the digital economy in 27 regions of Russia. This implies not so much IT specialists, but highly qualified personnel with analytical and managerial competencies who will be able to carry out digital transformation in various sectors of the economy. For 17 regions of Russian, the lack of educational programs and advanced training courses in the field of the digital economy became a barrier.

The emergence of new professions requires the development and implementation of new educational programs from the vocational education system. Leading Russian universities are now beginning to actively include in the educational process various programs for training specialists in the field of ICT. In 2015, three Russian universities entered the international ranking of QS Computer Science & Information Systems, in 2018 - already ten universities, in 2020 – twelve universities (see <https://www.topuniversities.com/university-rankings/university-subject-rankings/2020/computer-science-information-systems>). For example, as of August 1, 2020, the profession of Big Data Analyst can be obtained in 217 universities of the Russian Federation for 113 bachelor's and specialist's programs and 103 master's programs (see <https://postupi.online/professiya/specialist-po-analizu-bolshih-dannyh-big-data/>). At the same time, one can note another problem of interaction between regional labour markets and the education system: the level of wages by profession. So, according to Yandex.Rabota, the average salary of a big data analyst in Volgograd is 35 thousand rubles, in Yekaterinburg - 53 thousand rubles, and in Moscow - 95 thousand rubles. It turns out that even if there are relevant training programs for these specialists in regional universities, then employment in the same region may not be the result of this training. And the balance of internal migration of the population is increasingly shifting towards economically prosperous regions - the Central Federal District, the Northwestern Federal District, etc.

In addition, there are problems in the “quality” of graduates in the context of digitalisation. Thus, according to a study by The Boston Consulting Group, 60% of employers note an acute shortage of practical professional skills among graduates of vocational education, 83% of employers regard the level of training in universities as medium or low, while more than 80% of the working-age population of Russia does not have skills and competencies to work in modern markets (see [https://d-russia.ru/wp-content/uploads/2017/11/Skills\\_Outline\\_web\\_tcm26-175469.pdf](https://d-russia.ru/wp-content/uploads/2017/11/Skills_Outline_web_tcm26-175469.pdf)). It turns out that today the labour market,

including the regional one, remains insufficiently attractive for the most talented workers - carriers of universal competencies of the 21st century.

Employers need not only representatives of new types of activity, but also specialists of “traditional” professions with the competencies of the digital economy. Many sectors of such “traditional” professions are experiencing a shortage of young professionals, since they are considered “not prestigious” for them, and the real aging of personnel begins there. At the same time, more than 42.2% of older professionals recognise themselves in need of updating their professional knowledge and skills in connection with the digitalisation and modernisation of the sphere of professional activity (Bannykh et al., 2020).

In the Sverdlovsk region, additional professional programs for advanced training and professional retraining of teachers in 2018 were implemented by 10 colleges, 9 universities, 23 non-governmental organisations of additional vocational education, 13 training centres of enterprises of the Sverdlovsk region. However, at the same time, according to the Federal State Statistics Service, only 25.3% of the employed have completed various forms of additional education. The data indicate that workers are not sufficiently interested in the official forms of additional education available in the region. But the structure of household expenditures suggests that, in general, the acquisition of additional skills is in great demand - in 2017, 40% of Russians paid for the services of the additional vocational education system on their own (see <https://ac.gov.ru/archive/files/publication/a/15831.pdf>).

The main forms of interaction between universities and potential employers are as follows: targeted training, organisation of internships for students, participation of employers in the educational process. Federal State Educational Standards require the approval of educational programs with employers, as well as the involvement of a certain share of practicing teachers from among managers and specialists in the implementation of the educational process, their participation in state certification. Recently, a project-based approach in education has been gaining popularity, which includes, among other things, the performance by students of various works commissioned by employers (course and diploma projects). However, often at the regional level, the most active interaction is carried out only by large employers of the specialised industry in the region with specialised universities.

At the same time, the opposite problem can also be identified - enterprises in various sectors of the national economy are not equally included in the wave of new industrialisation and have updated their production potential using digital technologies, so their need for personnel capable of working with new technologies turns out to be small. For example, in the Sverdlovsk region, two universities train specialists in the direction of “Robots and robotic systems” (bachelor's degree) and “Cyber-manufacturing” (master's degree). The number of graduates is no more than 100 annually. At the same time, no more than 10 manufacturing and 20 agricultural enterprises have introduced the use of industrial robots in the region.

Career guidance remains a promising area of interaction between the labour market and the education system, starting from the level of school education. For example, the Digital Lesson project, in which the leading Russian ICT companies popularise the professions and areas of the IT sphere among schoolchildren. The project involves Yandex, Mail.ru Group, Kaspersky Lab, the Fund “Contribution to the Future” of Sberbank of Russia, and the firm "1C". Today, this integral system includes such

educational institutions as “Quantorium”. Thus, in the Sverdlovsk region, in 2020, there are four Quantorium children's technoparks in the region: Quantorium of the Russian Railways, Quantorium of the Sverdlovsk Region, Quantorium of Pervouralsk, Quantorium of Verkhnyaya Pyshma, the IT-Cube Digital Education Centre, which study more than 1,500 children from 7 to 17 years old. The “Quantorium of Nizhny Tagil” and the mobile “Quantorium” are planned for opening in the near future.

Summing up, it should be noted that the interaction of the labour market and the education system in Russia in the context of digitalisation at the federal and regional levels is different. The national labour market and education system are better able to respond to the challenges of the digital economy, both in terms of regulatory aspects, financial support, and in terms of the manifestation of global trends. At the same time, at the level of Russian regions, there is significant differentiation: in terms of the need for personnel and corresponding forecasts, in the characteristics of labour markets and education systems, in the main indicators characterising the behaviour of consumers and employed people. Global trends in extraterritoriality, freelancing and self-employment have an impact on internal migration, hindering the balanced interaction of the labour market and education at the regional level.

## **7. Conclusion**

In the course of the analysis, the issues of the peculiarities of interaction between the labour market and the education system were considered from the standpoint of various approaches. The main subjects of interaction are public authorities, employers, employees, educational organisations. There are many factors influencing the interaction of the selected subjects, but the main ones among them will be socio-economic. The effectiveness of such interaction is of fundamental importance as one of the conditions for sustainable economic growth in the region, growth in the welfare of the population, and increased regional competitiveness. However, researchers record the presence of a number of acute problems within the framework of this interaction, creating a general imbalance between supply and demand, as well as an asymmetry of needs and opportunities, a significant gap in development and responses to the challenges of the digital economy.

Regional labour markets and education systems turn out to be less competitive in the formation of the human capital of the regions and less adaptable to the challenges of the digital economy. This is due to several reasons: a stable imbalance of supply and demand in the labour market, migration factors, factors of socio-economic stability and attractiveness of the region, as well as global trends.

To improve the region's competitiveness, it is necessary to promote the accelerated digital transformation of the education system, taking into account the existing both Russian and foreign experience. The system needs to integrate not only formal institutions and mechanisms, but completely new flexible structures (digital twins of educational organizations) and working methods (project activities, cooperation with various structures on the market, etc.)

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