Labor Market and Staff Competence in The Digital Economy

Radjabova Gavkhar Umarovna

Associate Professor of the Department of Pedagogy
Kokand State University,
https://orcid.org/0009-0005-5268-0321

ABSTRACT

The article provides a comprehensive analysis of the changes occurring in the labor market with the transition to a digital economy, and how the introduction of digital technologies will lead to significant changes in the demand for personnel and requirements for specialists.

Keywords: digitalization trends, digital technologies, digital economy, digital skills, competencies, demand for highly qualified employees, "soft skills", "artificial intelligence".

The main factor in the success of digitalization processes is the availability of highly qualified personnel in sufficient quantities and appropriate jobs, as well as a system for training specialists with certain competencies for the development and implementation of digital technologies. The transition to a digital economy significantly changes the labor market: along with the spread of information technology in all spheres of life, digital skills are becoming increasingly important from the point of view of employers.

The requirements for professionals are expected to change significantly, as many operations that were not affected by previous waves of digitalization may be automated in the near future. The key competency that will determine the competitive advantage of future companies is big data analysis.

The introduction of digital technologies will lead to significant changes in the requirements for personnel and the requirements for specialists:

- Reduced demand for professions associated with repetitive operations;
- Reduction in the life cycle of professions due to rapid technological changes; - Changes in the competency profiles of certain categories of employees (risk analysts, HR managers, marketers, contact center operators, etc.) due to changes in work tools;
- The emergence of new types of activities and professions;
- Increased requirements for employee flexibility and adaptability;
- Increased requirements for "soft skills";
- The presence of social and emotional intelligence, that is, the abilities that ultimately distinguish a person from a machine;
- the need for specialists with “digital agility” has increased;
- the ability and willingness to use new technologies to improve business results [Gartner, 2018].

Let's look at some facts and figures that will help analyze the impact of digital technologies on the labor market: For example,

1) At least 30 percent of tasks within professions can be automated at the current level of technology development [McKinsey, 2017].

2) By 2030, global GDP could grow to $ 9 trillion due to the automation of jobs using AI technologies [McKinsey, 2018].

3) With the simultaneous introduction of automation in Russia, 49.3% of labor operations could be eliminated (Zemtsov, 2018).

4) By 2030, 375 million workers (approximately 14 percent of the world's workforce) will be forced to change careers [McKinsey, 2017].

5) 98% - there is a possibility of automation of such professions as bank operator, auditor, loan officer [Frey, Osborne, 2017].

6) Due to the introduction of AI in the Chinese banking sector, working hours in non-extinct professions may decrease by 29% by 2027 [BCG, 2018].

In the medium term, the demand for highly qualified IT specialists in the labor market of Uzbekistan is expected to increase. In particular, the need for personnel in such promising areas as artificial intelligence, big data analytics, robotics, virtual reality and the Internet of Things is growing. Currently, there is a significant shortage of labor resources with the necessary digital competencies.

Another major obstacle is the lack of specialists who can teach relevant digital skills. Due to the inertia of the formal education system and dynamic changes in technology, companies are experiencing a growing shortage of personnel. The results of the analysis of the impact of the introduction of innovative technologies by leading corporations show that the main result of automation and robotics is not the elimination of activities, but their renewal [Arntz et al., 2016; BCG, 2018; McKinsey, 2017]. Technical capabilities are often overestimated, and infrastructural, economic, regulatory and ethical barriers to the spread of technologies are not taken into account.

So far, technologies can only perform a narrow range of tasks, such as recognizing images, voices and other biometric data, assessing the likelihood of bankruptcy, analyzing device data, predicting equipment failures (weak artificial intelligence), and others. Systems do not yet have the ability to recognize and change themselves (strong artificial intelligence). The problem of "certain artificial intelligence" has not been solved - automated systems are able to express opinions and explain the logic behind some decisions to users, which is important in such important areas as healthcare, security and law.

Given these limitations, the development of technologies in the near future may not lead to the complete replacement of workers, but rather to an increase in the efficiency of individual tasks within professions. The demand for specialists performing high-level tasks, especially those related to managing people, communicating with contractors, finding non-standard solutions, developing methodologies and possessing the necessary "soft" skills, will continue to grow. In connection with the partial or complete automation of labor activities of organizations and their employees, a transition to a flexible career growth model will be required, taking into account the transfer of employees from one functional unit to another.

According to the results of the ISSEK NRU HSE study, the following professions can be distinguished among the promising, highly qualified professions in demand in the digitalization market.

Architect - Internet of Things - connecting many different devices to the network, transmitting and processing data in real time, optimally organizing data storage, minimizing the cyber-dependency of the system [4].

Bioinformatics - analyzes experimental biomedical data, develops and applies computational methods of solution, in particular, to solve such problems as predicting the function of genes and their proteins, genetic diagnostics of diseases, designing drugs, creating models of the origin of species.

Data journalist - creates various types of reports based on data, as a result of which the content of the text, the facts presented in it and the author's opinion are quantitatively substantiated.

Virtual environment designer (VR architect) - develops hardware and software for broadcasting virtual worlds, creates their design, develops interactive storyboards.

Voice Interface Designer — develops interfaces for voice interaction with digital assistants, chatbots, personal robots, and also creates response algorithms for artificial intelligence.

Internet of Things Interface Designer — designs the interface of the Internet of Things system, taking into account the variety of devices and methods of their control.

A data security engineer is responsible for the confidentiality, encryption and prevention of unauthorized access to data both inside and outside the company.

Robotics operator-engineer - solves problems of managing and monitoring the operation of robotic systems in the field of production and service.

A data analyst is a person who processes and analyzes large amounts of data using statistical analysis methods and mathematical models, finds patterns and develops forecasts to solve business and scientific problems.

IT lawyer - provides legal support to enterprises in the digital economy.

A computer linguist develops programs and algorithms based on natural language, creates text and speech recognition tools, translation systems and thus participates in the development of artificial intelligence.

A robotics consultant understands the ethical, social and legal aspects of the interaction between robots and people, develops solutions on such issues as defining areas of responsibility for the "actions" of system architects, operators and owners, the rights and freedoms of robotic systems, and the identification of robots.

Developer of cyber prostheses and implants for creating functional artificial devices (cyber prostheses) and organs compatible with living tissue.

Manufacturer of neural interfaces — develops communication systems designed to read human brain activity, exchange information between the brain and external devices (computers, neuroprostheses, virtual reality neurohelmets, household appliances, etc.).

Digital logistics specialist — offers innovative solutions for optimizing resources and creating added value in the digital supply chain.

Tissue engineering — designs and grows living functional tissues or organs outside the body for subsequent transplantation.

A digital marketer promotes goods and services through digital channels of interaction with the audience, including the Internet, digital television and social networks, using various digital devices (smartphones, game consoles, smart watches, fitness trackers and others).

Digital Producer - Manages complex media projects that involve the use of multi-platform and digital content production capabilities, including mobile platforms, multimedia books, video games, online courses, web series.

Work is underway to implement training programs in the most relevant areas of training highly qualified personnel for the digital economy. Joint training centers are being created near leading technology companies, and joint training programs are being developed. Among them are the Samsung and Baesian Methods research group, the Samsung Internet of Things at MIPT, the Microsoft research center at FEFU, and the HSE Summer School on Deep Learning and Baesian Methods in collaboration with GS Group "City and Business" at HSE [5].

The type of activity that is most likely to be replaced due to its full automation and differentiation by robots or software solutions includes, first of all, specialists engaged in performing formal, repetitive operations. For example, the development of automated question and answer systems and voice biometric systems has led to the complete displacement of support staff who help customers solve typical problems.

In the future, workers performing simple mental operations will participate only in non-standard situations where AI is not involved. With the development of machine translation and speech recognition technologies, the professions of translator and call center operator will disappear in the future, and even live applications will quickly become exotic - they will be replaced by neural networks that create an adaptive composition for each user.

"Disappearing" professions include tour operator, chief analyst, archivist, auditor, bank teller, service worker, construction engineer, cashier, customer service manager, credit manager, notary, office builder, recruiter, telemarketer, salesperson, legal consultant, etc. The development of technologies, digitalization of companies, increased competition for jobs and increased life expectancy lead to the fact that workers have to change professional activities several times throughout their lives, acquiring new skills and abilities.

To be in demand in the labor market, a person must acquire new knowledge faster than before. For this reason, approaches to training are being revised, educational models are changing. The main challenges facing education today include creating educational content that meets the dynamically changing labor market and human needs, as well as reducing costs through technology [Global Education Futures Report, 2018].

Among the most important areas of education: continuous education or lifelong learning, omni-learning (using all possible communication channels), social learning, microlearning, adaptive learning, neurolearning, distance learning, mentoring, blended learning, project-based learning, "self-learning" organizations, EdTech startups and others.

The very concept of a profession is changing in content, since the demand for an employee who has undergone training in a certain profession or specialty and has competencies is not fixed and static: competency profiles are becoming more fluid, they change as a result of technological and organizational changes and become a "dynamic portfolio".

In such a situation, the role of a qualitative approach to forecasting the organization's personnel composition increases. In such circumstances, companies should focus not on employees, but on the organizational "skill pool", which allows employees of different professions to create a diverse set of competencies needed in a given situation, within the framework of a common "competency portfolio".

It is necessary to distinguish between basic digital literacy, skills understood as basic computer and Internet skills, and advanced digital skills related to digital literacy. Complex skills are included in the job responsibilities of specialists supporting the digital environment [Cedefop, 2016; OECD, 2016]. Digital skills can be understood as a whole range of skills: from working with basic office programs to using the latest digital methods, from purely theoretical knowledge to practical everyday use.

In 2017, the ISSEK MTU OIM (Institute for Statistical Studies and Economic Knowledge of the National Research University Higher School of Economics) conducted a survey among more than 2,000 specialists representing all fields of science and working in the academic sector (research institutes and universities), as well as in industrial production and service organizations [6]. Respondents were asked about their awareness of the most widely used digital technologies. It turned out that among the surveyed candidates and doctors of science, 85% regularly use computer and Internet skills in practice, and another 10% do so occasionally. Candidates and doctors of science almost never work with computers alone (as a rule, these are older and middle-aged employees; most of them work in universities). 48% of diploma holders regularly use data collection and processing skills using ICT, 33% - periodically.

As for advanced digital skills, respondents have at least heard of many technologies, but their practical application is very limited. Researchers are more aware of modern digital technologies (in many ways, the share of students in research institutes is higher than in universities and the non-academic sector). Young scientists have a better command of digital terminology: the difference in the level of knowledge between the group under 29 and the average value of all samples for individual technologies is 10-15 percentage points.

In the digital economy, advanced digital skills (the ability to quickly master new IT tools and programming skills) are crucial, for example, for marketers (to optimize advertising management and predict users' emotional reactions to advertising), lawyers (to automate the analysis of materials, the process of preparing for litigation, etc.), geologists (to map deposits of complex minerals, analyze seismic data) and many other specialists.

For engineers, professional digital skills, especially programming, are an integral part of the skill set required by employers. Demand for data scientists who can organize data and extract additional value from it is expected to increase sharply in all sectors of the economy. Their key in-demand competencies are: a deep understanding of mathematical statistics, probability theory, analytical skills, problem solving skills, the ability to effectively present work results, curiosity and a strong interest in working with data.

In conclusion, it should be noted that digital skills have become an integral part of professional skills in both education and science. Thus, the implementation of new technological projects in the digital economy creates a demand for specialists with strong, adaptive and specific digital competencies, including:

- deep knowledge in their field, as well as knowledge and experience in related fields ("T-shaped specialist");
- understanding the opportunities and risks associated with the use of new technologies;
- knowledge of project management methods;
- "digital agility";
- Knowledge of big data tools and visualization tools;
- understanding of cybersecurity fundamentals;
- database skills;
- systems thinking;
- emotional intelligence;
- teamwork;
- ability to continue learning;
- ability to delegate tasks;
- flexibility and work in conditions of uncertainty.

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