The Question of Transformation of Higher Education in the Conditions of Accelerated Technological Progress

Galina P. Sorokina¹(✉), Lidiya V. Shirokova², and Andrey A. Sychev¹

¹ State University of Management, Moscow, Russian Federation
{gp_sorokina,aa_sychev}@guu.ru
² Gzhel State University, Moscow Region, Russian Federation
lida58@inbox.ru

Abstract. This article is devoted to the transformation of Russian education system in accordance with the requests of the new technological scheme of the economy. The global economy has changed dramatically during an extremely short period of time due to the COVID-19 pandemic. All levels of the economy and people’s behavior have been modified, and according to experts, these changes are almost irreversible. In this situation, there is a need not only to change the management system of all levels of economic systems, but also to transform education, especially Russian higher education system, due to the fact that now Russian education has two simultaneous tasks: to adapt to the changes that have occurred under the influence of the pandemic and to increase the prestige of Russian universities in the international educational space. Universal scientific methods were used in this research process, including comparative and factor analysis methods, synthesis, and generalization.

Achievements: 1. In the article the current trends in the development of the Russian economy in the context of the pandemic and the entry of innovative technologies in all areas of economic relations were analyzed, which have an impact on the formation of new labor market demands. 2. The specific features and problematic aspects of the current system of Russian education, which are slowing down the processes of its transformation, are identified. 3. It is justified, that the higher education system itself should correspond to the smart development model, focused on the adoption of a new paradigm of economic decision-making, on the application of progressive organizational and managerial, informational, environmental, social and other technologies to achieve this goal. 4. The positive practices, which demonstrate advanced domestic higher education institutions, are described. They fit into emerging new markets and correspond to consumer’s sentiment and expectations, taking into account the emerging professions of the future and the increasing complexity of professional tasks. 5. The main trajectories of restructuring Russian education to meet the needs in the innovative economy are made, in general, and to ensure the current basic training of graduates, in particular, to achieve their competitiveness in the labor market.
1 Introduction

The innovative nature of development within the fourth industrial revolution leads to extensive structural changes in the world economic space. These changes were accelerated and corrected by the impact of the pandemic. The domino effect of technological changes in all spheres of life has created an order for the transformation of the labor market, and then the education system. In addition to the disappearance of a number of professions, an increased demand for new skill sets and a new educational layer aimed at training future professions is predicted, since the economy based on innovative technological solutions creates special challenges to the quality of human’s asset and its current characteristics. There is an urgent need to change the conceptual foundations of Russian higher education, introduce advanced training of specialists for the needs of the high-tech industry, firstly “by stimulating the communication and functional interaction of education, science and business” (Zamlelyy 2012).

2 Methodology

Due to the influence of scientific and technological progress, there is a foundation for radical changes (Smirnov 2018). The pandemic led to a transformation of economic systems, which is almost completed the digital revolution (Solomonova et al. 2020). The operating conditions of companies, the speed of changing paradigms and models of their behavior in the market, the formats of relations with staff and customers, and the skill sets of the workforce are changing. As a result, the labor market does not remain unchanged. The direction of its changes is determined by diverse trends in economic development at the current stage. According to the analytical report of the Board of Innovation company (Shifts in the Low Touch Economy 2020), one of the consequences of COVID-19 pandemic will be a significant increase of working from home, an attention of employees to the work-life balance, a prevalence and almost complete territorial coverage of e-commerce and logistics, a proportion of the electronic services even in non-traditional e-commerce areas of activity. There are the main trends, which are peculiar to the innovative economy, which have influenced the formation of new demands to the labor market.

1. The domination of information technology (Gorbunova 2012). Apparently, today the majority of business processes in industry and services are, to some extent, automated and computerized in developed countries. But the trend of solving human problems through the introduction of new technologies is gaining momentum, because Industry 4.0 involves deep, cross-cutting automation (Baynev 2019). Many work functions are already performed by smart machines in various sectors of the economy, which is accompanied by the release of people and provokes the growth of
technological unemployment. This information confirms the forecasts made in 2016 by the World Economic Forum, which are about 5 million people, will be out of work in 15 leading countries within five years. (Schirokova 2019). These processes are naturally projected on the Russian labor market. At the moment, about 60–70% of working citizens in Russia are directly or indirectly involved in mass production. If the forecasts are correct, the proportion of process automation in production and logistics will reach 95% by 2035, and 50–70% of existing jobs will simply remain in the past (Kalinina 2017).

On the other hand, progressive information technologies and robotics initiate the outflow of labor from the industrial sector to the IT-technologies sector and social services, opening up new potential opportunities for people with disabilities, for example, remind experience of the Japanese cafe - Dawn (Samson 2019), where robot-waiters are controlled by bedridden patients. The speed of innovation development sets the labor market not only the task of mastering new specific knowledge, but what is even more significant in a competitive environment - is the ability to be flexible and freely adapt to new conditions (equipment, technologies, programming languages) and switch from one task to another (Arangin and Nehoda 2019).

The COVID-19 pandemic of 2020 and the subsequent restrictions applied by most of the States identified the following trends in the labor market related to information technology: in the best financial and strategic situation were those firms that were able to digitize their business processes or work from home; staff, who were able to work flexibly and quickly, fulfill their slightly adjusted job duties remotely, were in higher priority positions than staff, who could not work online; services based on information technologies have appeared or become widespread: telemedicine, online training, counseling, psychological training, etc. (Soldatova and Soldatova 2020).

2. Rapidly changing of technologies (Brigak 2016). The accelerated change in technology creates the need for rapid development of the required professional skills and skills related to the technical scope of the work, the so-called «hard skills», which is a direction for Russian technical higher education. At the same time, the development of «soft skills» is no less important – flexible more professional skills that cover social, cognitive, pedagogical and communicative aspects, efforts to work together with the external environment not only in the profession, but also in private life.

3. Virtualization of the communication space. The communication process is passing to a virtual environment now, the speed of information transferring in modern conditions is measured in seconds, people exchange quick messages, project teams create group chats, video conferences and other platforms for exchanging opinions are actively functioning. Searching and obtaining of information does not require spatial displacement, it is enough to do a search request, and the information will be adjusted in this case to individual user requests, it can be both visual and audio. These tendencies were especially urgent during the period of temporary restrictions of travelling, posed by the Covid-19 pandemic (Anpilov and Sorochaykin 2020). This means the widespread introduction of the «livelong learning» philosophy in the labor market, which means increased requirements of employers to the skill level of employees on the one hand, and leads to an increase in global competition for educational service providers on the other hand. Moreover, a characteristic feature of the labor market is the decline of demand for classical education documents, the transition to electronic
confirmation of knowledge, including the basis of a system of mutual confirmation of skills and business reputation, such as in the LinkedIn network.

4. Reduction of geographical and language barriers. The problem of geographical mobility has less and less impact on the labor market, and many companies are sympathetic to international teams today. Global trends are affecting changes in the labor legislation of countries in the direction of filling the labor market with the necessary staff from other countries. The globalization processes erase differences in living conditions and traditions, which reduce the discomfort of geographical mobility; information technologies allow you to get acquainted with a new place of work and residence and find friends quickly. Companies also use information technology actively in these conditions, posting vacancies on electronic platforms, which are not linked to the territory of the organization’s location (Kadochnikov 2020).

5. The transition to distributed teams. Globalization and digitalization of the economy have created a new form of labor organization – distributed teams. If earlier this trend was mainly related with teams of programmers, who developed complex software, today remote work is becoming the norm for many professions related to intellectual work. This format not only allows you to manage time and reduce the emotional burnout of ordinary employees, but also involves people with disabilities and people with special needs, such as young mothers, in full-fledged labor relations (Grosheva and Cirka 2019).

6. Special attention to environmental and social issues. The emerging intellectual economy will ultimately lead to creating a social-market, “green” – innovative economic system. These issues have been highlighted at the global level, for example, in September 2015; the United Nations adopted seventeen sustainable development goals, which are focused on the rational use of natural resources, the conservation and protection of Earth’s ecosystems, and the struggle for social equality and security. Young Russian people also worry about the social equality, which has formed a real request for the creation of mechanisms for “social elevators”. These trends have been picked up by the organizations’ personnel services, and they are developing and implementing various mechanisms for selecting personnel and creating a talent management in the form of competitions, internships, and targeted educational grants (Javorskaya and Kuznetsova 2019).

7. Mistrust for classical mechanisms of assessing qualifications. This trend is typical in modern conditions for Russia and is justified by a long period of stagnation of the professional qualification system, since the 90s of the last century. The business community, society as a whole, and government agencies has lost confidence in the classic procedures for assessing the qualifications of personnel and are beginning to implement various independent assessment mechanisms to confirm the level of qualifications. Such mechanisms include the creation of a requirements’ system for professional qualifications in the form of professional standards, the creation of industry centers for evaluating qualifications, the development of the «World skills» movement, and others. This trend creates a new intermediate place between professional educational institutions and employers, reducing the importance of traditional documents on qualifications.
Based on the features, which are specific to the modern Russian economy and changes in labor requirements, there is an urgent need for changes in the Russian higher education system. And it is not just about adaptation of the system’s elements to changing conditions, but also it is about radical transformations of the system-forming components, which ensure movement to a higher dialectical level (Maksimova 2011).

Information and telecommunications technologies are designed to change the face of most industries, and the lack of specialized specialists for high-tech industries and service areas creates an increased demand for them, which is reflected in an increase in the share of budget places for information areas. However, it can be noted, that there is a strict gradation in universities, which separates purely informational areas and areas that are close to information, such as business informatics, management in technical systems, and others. And if the content of education in areas, which are related to computer science, now mainly meets the challenges of information technologies in professional activities’ development, the situation is worse in purely technical and economic areas.

3 Results

In the research process, the content of two hundred educational programs of different universities was studied. According to the results, it can be stated that there were 5–15% technical educational programs and 2–8% economic programs, which clearly does not meet modern challenges. It was to be hoped, that modern information technologies education on a professional basis is simply not reflected in the work programs of the disciplines.

Most frequently, there are two problems: first, professional software is very expensive and requires constant updating. On the one hand, we can solve it by the interest of software manufacturers in increasing the number of users of the software product, and also most information companies have special offers for educational institutions. On the other hand, we have to understand, that because of the shared use centers’ creation with other universities and organizations. This system is already working successfully in the scientific environment. There are more than 600 shared use centers in Russia, equipped with unique scientific installations. The main barrier in the formation of shared use centers lies in the imperfection of relations in the system “university-organization” and high university competition. For example, where an educational organization originated on the basis of the “education - commercial organization” link, in corporate universities, there is no question of providing and updating software in a timely manner.

The second problem is the low level of proficiency in professional software of the teaching staff. Again, the difficulties are not solved simply by attracting young professionals from real sectors of the economy. The federal state educational standards limit the share of attracted specialists from the real sector of the economy-from 3 to 15%, and salaries in higher education institutions have already exceeded the average value for the region, so there is no shortage of people willing to engage in teaching activities. Again, the presence of internal problems and contradictions in the Russian university system does not allow using of it effectively. Pedagogical collectives of
higher education institutions were formed more than one decade, and the number of students after the “baby-boom” of the early eighties significantly expanded the staff of departments. However, the population’s lack of the nineties forced universities to optimize the teaching staff, and due to the fact that one of the criteria for evaluating a university is the proportion of teachers with a degree and title, the first to be reduced were young people, who have the ability to adapt to changes quickly and to learn.

According to the website, News.ru, in Russia, the proportion of teachers over 65 years of age is 19.5%, even bigger this proportion in Moscow, according to the publication, it is 24.7% (News.ru 2020). In this situation, the low percentage of information technology implementation in the educational process is completely understandable.

A significant barrier to attracting staff from the real sector of the economy drew the increased attention of universities to their scientific reputation, when the requirements for the teaching staff are not only and even so much about knowledge of modern teaching technologies, but quantitative and qualitative indicators of publication activity in leading world journals. As a result, potential candidates from the real sector of the economy are obviously losing out to higher school theorists.

The way out of the current staff collapse is seen in the practice of some universities, which introduced gradations in job duties and entrance requirements for different levels and types of positions, defining special requirements and different job categories for the teaching staff, who have real practical experience, and the teaching staff, who provide academic achievements.

The quick change in technology claims the development of both special and general human capital. The development of «hard skills» competencies is contributed, for example, by the system that universities recently joined, training in working professions in the context of higher education and the creation of the «World skills» University League. This system can serve as an auxiliary system and it can be implemented in the initial courses of higher education, although the technologies used in the «World skills» system, conducting exams in the «World skills» paradigm, are recommended for use not only in those cases and specialties that are close to the competence of the competition.

Here is an idea of professional exams based on the «World skills» model. First of all, this is a proposal for solving real business problems, in which students must show not only knowledge, but also skills, which are acquired in the course of education, «the technology of business cases». Secondly, the introduction of elements in the process of performing the task, on the one hand, which are complicating the task, on the other, are bringing the task closer to reality.

Another approach to the development of special human capital is about a dual education. The system of higher education, based on the dual principle, involves combining full-time education and practical work. It was tested in the Soviet Union in the late fifties of the last century and successfully developed in the system “university-industrial enterprise”. This combination allowed, firstly, to reduce the time of adaptation of young teachers in the workplace, and secondly, to attract the intellectual potential of university’s teachers to solve practical problems of enterprises. This system is poorly used in Russian universities now, but it is actively resorted to by corporate institutions.
Education about «soft skills» is a more difficult task. It is aimed to develop the general intelligence, cultural horizons of system thinking. Unfortunately, in the race for «hard skills» there is an increasing of graduating departments, humanities subjects disappear from the curriculum, or their share is negligible, and the quality of teaching these subjects has not recently given the desired result. The main purpose of humanitarian subjects in technical information and socio-economic education is to form critical thinking, increase general and socio-cultural level, and improve the culture of speech. Such classes should be held in real or virtual museums, on open discussion platforms, but the traditional education system and current education schedules make it difficult to use such interactive forms of learning in the educational process. In addition there is a situation, where experience and competence are not allow to move from a vertical system, where the teacher is more important and intelligent, to the horizontal, in which the teacher acts as mentor and moderator for constructive discussion.

On the other hand, «soft skills» is a professional skill that is in charge of flexible response to changes in the external environment, establishing social communications, and building a constructive dialogue in the team. Project-based education helps to develop these skills. Universities focused on scientific-applied education are trying to adapt to the requirements of the external environment, using project forms in the education of specialists of a new generation. In a real work environment, it is easier to develop business, professional, social skills, and acquire practical skills of communicating with a wide range of contacts (Astafeva 2017).

In Russia, the system of project-based education is becoming more and more developed, there are advantages and disadvantages of practice-oriented education, but today it is one of the most advanced education methods, which allows you to get «soft skills».

Virtualization of the communication space also comes to the educational process. For the first time, elements of electronic and distance education began to be used on the territory of Russia in the early nineties of the last century.

However, the system of electronic and distance education has been quite discredited due to difficulties with identifying the student now. Modern technologies are already solving the problem of identification, and their primary task is to create interesting and relevant educational content. For now, short-term courses and electronic educational resources created by the largest participants in the education market are doing well. However, the procedure for encouraging the studying of new material and attracting new students based on gamification, which is actively used in short-term business courses, has not been implemented in universities yet, again due to the intention to the sluggishness of the educational activities.

The distance learning format also reflects the global trend of reducing language and geographical barriers. Because of the information technology, today you can easily get acquainted with the course of the «Massachusetts Institute of Technology», listen to a lecture by a famous scientist. The largest universities in Russia have already joined this system: «Universarium» and «Coursera», which is a clear confirmation of this. A lot of great universities form educational programs in foreign languages, attracting students from different countries all around the world.

However, Russian universities are poorly involved in this process, which reduces the speed of transfer of national education. More often, this fact is explained by the low
willingness of universities to enter the public space. The technological and method-
ological ability of Russian universities to respond to global challenges is also confirmed
by the involvement of leading scientists, both in working with scientific developments
and in conducting lectures in the videoconferencing system. Modern educational
technologies allow both domestic and foreign scientists to conduct video lectures and
videoconferences from home, and at the same time participate in scientific research
without interrupting the educational process. However, few universities are ready for
this form of education due to technical and methodological backlog.

Increasing attention to environmental and social issues creates a specific demand
for higher education. The most interesting thing is that the growth of issues related to
environmental problems does not lead to a significant increase in demand for ecology
or security. But it creates demand for programs related to the development of green
energy and energy-saving technologies.

Social justice is a topic that has been interesting to young people for a long time.
There is a growing demand for so-called social elevators in the regions. In that respect,
higher education will be the basis of «a social elevator», if it actively promotes and
supports programs and competitions aimed at selecting young and talented people for
their further development and promotion. Social entrepreneurship as a separate subject
discussion is activated in the media space (Pastuhova 2015).

The Russian contest of youth author projects and projects in the sphere of education
“My country - my Russia” (Pastuhova 2019), which is one of the programs of the
presidential platform “Russia - the country of opportunities”, aims to develop social
elevators, support the participation of young people, volunteers and social activists in
the social and economic development of Russian regions.

The theme of spatial development is supported by both regional and Moscow
universities, by not only providing information assistance to the competition, but also
by performing work on expert support for projects. This combination has helped to
enrich both the competition and the practice of universities. It should be noted, that the
competition fits into the system of project education harmoniously, at the same time
targeting young people to find solutions to regional problems and study regulations in
the public and regional management, as well as introduces them to project
management.

The transformation that occurred in Russian universities in the last 30 years has led
to a certain degree of distrust to the classical mechanisms for assessing qualifications.
Industry communities have preferred the creation of independent centers of quali-
fication assessment, where everyone can pass the exam and get a certificate of quali-
fication. Universities in this system can become a base for personnel education in
accordance with the requirements of professional standards, which opens up new
opportunities for them.

Let’s sum up the results and recall the key elements of educational institutions:

– activating of a model of special education for the needs of the innovative industry
  and the service sector, based on changes in the content of education and its
  methods, in order to guarantee the education of creative staff with fundamental
  knowledge, maintaining continuity in the development of domestic science (Sha-
drikov 2019);
– restructuring of the educational process into programs for the releasing and retraining of specialists for new markets;
– offer relevant programs of basic and additional higher education, which are accompanied by qualification certification of the knowledge, obtained in the parameters of the European Credit Transfer System of knowledge assessment;
– making social investments in teachers, including improving their skills on a regular basis at the expense of educational institutions;
– ensuring social accessibility of higher education for people with disabilities.

4 Conclusions

To sum up, we can say, that it is obvious - the integration of the Russian economy into a global high-tech future fully depends on a large-scale restructuring of the Russian education system. Few domestic universities and educational platforms meet the requirements of the time; many of them are trying to find their place in the market of educational services in the new conditions. At this stage, the key problems are revealed and the directions of development of the educational system are determined, which, on the one hand, determines the vector of its reorientation to advanced development, on the other hand - sets the parameters for creating competitive advantages in the labor market for consumers of educational organizations services.

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