

Adaptation of the Russian postgraduate school model to the modern conditions of the digital economy*

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Abstract—This article is devoted to the analysis of the existing and design of an improved model of Russian postgraduate studies in the context of digitalization, including in the economics sector. The main part of the article describes the completed stage of the study, which is theoretical. The implementation of this stage is based on the analysis of scientific publications on the selected problem. A comparative analysis of the Russian and foreign postgraduate model for its compliance with the conditions of digitalization was performed. It was found that foreign postgraduate education more fully meets the requirements of the digital economy, since it is characterized by a more relevant selection of intellectually gifted young people; more flexible and adaptive organization of training; greater focus on the achievement of a scientific result by a post-graduate student. The study of publications on the problems of digitalization, as well as the current Russian and foreign postgraduate models, allowed us to make a hypothesis of the principles of designing an improved model of Russian postgraduate studies in the context of achieving its compliance with the requirements of digitalization. It is planned to test this hypothesis at the empirical stage of research, the characteristics of which are presented in this article.

Keywords—*digital economy, Russian postgraduate school, international postgraduate school, scientific training of postgraduate students, designing a new model of postgraduate school.*

I. INTRODUCTION

At the present stage of scientific and technological development, the basic documents defining the nature and direction of the Russian science evolution are the Strategy for Scientific and Technological Development of the Russian Federation [1] and the National Project “Science” (hereinafter referred to as NP “Science”) [2]. A necessary

element in the development strategy of the Russian science is the system of scientific personnel training. The task of improving the training mechanisms in postgraduate school is laid down as one of the priorities in the Federal project “Development of human resources in the field of research and development” as a part of NP “Science”. The main problem of the modern system of training highly qualified personnel in Russia is its incompatibility with the modern demands of the digital society, in particular the digital economy.

The purpose of the presented research is to develop approaches to the improvement of the existing Russian system of training highly qualified personnel. The purpose of the research is achieved by solving the following tasks: analysis the impact of digitalization on various aspects of society live, which dictates changes, including that in the system of training qualified scientific personnel; analysis of the main features of the existing postgraduate school model in Russia and abroad on the example of the postgraduate school in the USA and the UK; suggestion a hypothesis about the basic principles of designing a new model of the Russian postgraduate school, adapted to the conditions of digitalization, taking into account foreign experience; development of a strategy of empirical research to test and refine the initial hypothesis.

II. METHODS

The theoretical basis of the study was the works of domestic and foreign authors considering the interpretation of the term “digital economy”, the search for the most accurate definition of this concept, the analysis of the digital economy impact on the system of training scientific

personnel, the problems of improving the system of training highly qualified personnel. General scientific approaches and methods were used in our study, including an integrated and systematic approach, methods such as analysis, synthesis, abstraction, analogy, classification.

III. RESULTS

A. *Influence of digitalization of the economy and training of scientific personnel*

Nowadays, the concept of a digital economy is widely discussed in science and is actively used, which was emerged under the influence of the mass distribution of digital technologies. Analysis of the existing publications suggests one to conclude that up to now there doesn't exist a single interpretation of the term "digital economy". In scientific discourse, one can find various concepts that characterize certain aspects of the digital economy: "virtual economy", "e-economy", "information economy", "Internet economy" [9; 12; 22; 24; 27; 31]. Various groups of researchers focus on the most significant for them sections of the digital economy. In a joint report by Huawei and Oxford Economics, the digital economy is defined in the context of the use of digital technologies by industrial enterprises [12], which excludes from consideration the more dynamically developing service sector in the modern economy. V.I. Loyko and co-authors emphasize the structural aspect of the digital economy as a forming interdisciplinary field of knowledge, which covers the economics of the enterprise, management theory and modern information technologies [9].

In particular, two aspects are distinguished while characterizing the digital economy as a system of economic relations: 1) the transformation of the objects of economic relations into digital data; 2) representation of subjects of economic relations in digital forms, for example, in the form of accounts of sellers and buyers. In this context, the digital economy is regarded as the digital counterpart of the real economy. The real basis for the formation of the digital economy remains the distribution of digital technologies in various sectors that create the country's gross domestic product. To assess the spread of digital technologies in the business sector, the Institute of Statistical Studies and Knowledge Economy (National Research University Higher School of Economics) has developed a business digitalization index which characterizes the speed of commercial organizations adaptation to digital transformation. The indicator is calculated for 33 countries, including Russia, European countries, the Republic of Korea, Turkey and Japan. The leading position according to the index value among these countries is occupied by Finland, followed by Belgium, Denmark, and the Republic of Korea. Russia occupies the last place in this series [7].

It should be noted that digitalization significantly transforms the structure of employment, the functions of people at the workplace and their lifestyle [6; 15; 17; 18; 28]. Scientists invented the term VUCA-world [21; 25], emphasizing the volatility, uncertainty, complexity, and ambiguity of the modern reality. Digitalization as a general technological trend [20; 29] generates a request for the transformation of education, including the sphere of training of scientific personnel, an important place in which is occupied by the postgraduate school institution.

B. *Analysis of the main features of Russian and international postgraduate school*

The analysis of the main features of the Russian and foreign postgraduate school was carried out using criteria that allow assessing the compliance of postgraduate school with the current requirements of the digital economy. As evaluation criteria we selected the following: admission conditions, determining the relevance of the selection of intellectually gifted young people; conditions of study and conferring of a degree; prospects for employment reflecting the real demand for postgraduate school leavers. The criteria we have chosen allow us to obtain information about the content, forms and technologies of educational training for postgraduate students [3]. The models from the USA and Great Britain (hereinafter referred to as the international postgraduate school) are chosen as the objects of analysis of the international postgraduate school, since nowadays the postgraduate school models of these countries significantly influence the postgraduate education of the rest of the world [10].

To admit the Russian postgraduate school, the applicant must have a Specialist or a Master's degree. In addition, he must pass the entrance exams. To enter a postgraduate school abroad, one must have: a Master's degree; a motivation letter or essay containing a description of the research carried out at the time of admission; letters of recommendation or academic characteristics. Basing on the submitted documents, a competition is held to select applicants for the postgraduate school. In the USA, there is also an opportunity to enter the postgraduate school having a bachelor's degree in certain technical specialties in compliance with all the existing admission conditions [10].

In Russia, training of postgraduate students involves two parallel processes: education and research [8]. The defense of a thesis for conferring a scientific degree of a candidate of science (PhD analog in Russia) is not a mandatory step in the preparation of postgraduate students. The process of defending a thesis for conferring a candidate of science scientific degree is implemented independently from the educational process and, in essence, depends on the initiative of a postgraduate school leaver in choosing a dissertation board. Often the consequence of this choice is the need to refine the dissertation research in accordance with the requirements of the dissertation board [4; 11]. Thus, the Russian postgraduate school in the modern form does not provide full training of scientific personnel – candidates of science. As for the forms of education, in a number of leading universities, electronic distance learning platforms have been introduced, as well as electronic score-rating systems for educational and research (including publishing) activities of postgraduate students.

In the UK a postgraduate student is required to publish his scientific results at the end of his research, since the thesis is directly written and defended on the basis of these publications. In the American postgraduate school, the fourth and fifth courses are entirely devoted to research, publications and the preparation of the thesis. The degree is awarded after a public oral defense of the dissertation. Distance learning is possible in the American and British postgraduate school [5; 10]. Training in most programs is practice-oriented. Universities invite expert practitioners to

conduct training seminars for postgraduate students. Regular international and interuniversity sociological surveys of postgraduate students are conducted with the aim of further improving educational programs [10; 11]. In general, the duration of study in British and American postgraduate schools exceeds the duration of study in the Russian postgraduate school [10].

Summing up the comparison of Russian and foreign postgraduate school according to the criterion “Conditions of study and award of an academic degree”, we should note the ineffectiveness of the current institutional setting of the research process of Russian postgraduate students, its weak focus on the final result, i.e. obtaining a scientific degree of candidate of science.

With regard to employment prospects, the demand for graduates of the Russian postgraduate school can be ranked by economy sectors. First of all, the postgraduate school leavers (both with and without a degree) are in demand in the field of science and higher education. Further, in terms of demand, there are: high-tech business and industry (most of the employed postgraduate school leavers have a PhD degree); services (about half of employed graduates without a PhD degree); the state and municipal government sector (about half of employed postgraduate school leavers with a PhD degree); public organizations, marketing, advertising, PR, media and other professional areas [3].

Graduates of foreign postgraduate school are also, first of all, in demand in the field of higher education and scientific research. Next comes the public or business sector, and the least number of postgraduate school leavers are employed in private non-profit organizations. To assess the professional areas in which young scientists are in demand, national scientific foundations regularly monitor the professional trajectories of postgraduate school leavers to assess the relevance and mobility of scientific personnel, their career prospects with a view to further improving educational programs to meet the demands of the labor market [3].

As a result of a comparative analysis of the Russian and foreign postgraduate school models in the context of digitalization, we can conclude that a foreign postgraduate school more fully meets the needs of the digital economy, since it is characterized by a more relevant selection of intellectually gifted young people; more adaptive learning organization; a greater focus on the achievement of a postgraduate student's scientific result and thesis defense at the end of the postgraduate school; more postgraduate school focus on current labor market needs.

It should be noted that in the conditions of digitalization one expects rapid growth in demand for the competence of data scientists in various fields of activity, including business and science. The researchers from the Institute of Statistical Studies and Knowledge Economy (NRU Higher School of Economics) emphasize that the competence portfolio of these specialists requires a deep understanding of the scientific basis for working with data – mathematical statistics and probability theory, as well as analytical skills and skills for solving non-standard tasks. Scientists are mastering a new paradigm of conducting research based on the intellectual analysis of vast amounts of data in various subject areas [13]. Postgraduate school as a form of

scientific training should be one of the channels for the formation of such competences among the newcomer scientists. Comparative analysis of existing models of Russian and international postgraduate school in the context of digitalization allows us to conclude that it is necessary to improve the Russian model of postgraduate school, focusing on foreign experience.

C. Characteristics of the stages of the study aimed at shaping an approach to the improvement of the Russian postgraduate school model

The study of the needs of the digital economy and foreign experience allows us to formulate a hypothesis about the principles of designing an improved model of the Russian postgraduate school within the implementation of measures of the federal project “Development of personnel potential in the field of research and development” of NP “Science” [2]. These principles should include: 1) the principle of science, according to which the priority of training programs for scientific and pedagogical personnel should be the development of skills and abilities of intellectual activity of postgraduate students, first of all – skills of working with data; 2) the principle of efficiency based on consideration the following indicators: a) the number of publications of postgraduate students indexed in the Russian and international information and analytical systems of scientific citing Web of Science and Scopus; b) the number of dissertations defended by leavers of a postgraduate school; c) the quantity and quality of documented results of intellectual activity. Here we add that the conditions of digitalization correspond to the principle of adaptability. The educational process in the postgraduate school should be aimed at creating a demanded profile of competencies of scientific personnel, based on the use of modern digital technologies that can both ensure the mobility of postgraduate students and teachers, and improve the efficiency of distance training postgraduate students [14; 19; 23; 26; 30]. Designing a modern postgraduate school model should also imply the principle of ensuring the employment of postgraduate students according to the profile of their education in the conditions of digital transformation. The listed principles will allow one to realize the key directions of development of the Russian postgraduate school, namely, an increase in the number of defended candidate of sciences theses, an increase in the total number of young scientists and their retention in the scientific and technical sphere.

In order to test and refine this hypothesis, a strategy was developed for the second, empirical stage of the study. This stage is planned to be implemented as a survey addressed to two groups of respondents – postgraduate students and supervisors of postgraduate students. The survey is aimed to collect respondents' opinions on the following aspects of the approach being developed: 1) signs of an effective postgraduate school; 2) the direction of improving educational programs in a postgraduate school in the context of digitalization; 3) proposing alternative options for protecting the results of postgraduate students' research work (besides a thesis); 4) identification of obstacles to the successful defense of a thesis by graduates of a postgraduate school; 5) ways to attract talented young people to a postgraduate student. Some of the questions in the questionnaire are closed, and some are open.

It is planned to include in the survey the Russian scientific organizations and universities that are: 1) leading Russian universities participating in a state project of modernization of the higher education system to ensure the competitiveness of Russian universities at the international level; 2) leading Russian scientific organizations and universities that meet the criteria for granting the right to independently award a scientific degree of a candidate of science and a scientific degree of a doctor of science; 3) universities that occupy the top positions in the ranking of monitoring the effectiveness of universities in 2018; 4) universities and scientific organizations, on the basis of which one or more boards for the protection of dissertations for the degree of candidate of science and the degree of doctor of science.

IV. CONCLUSION

NP “Science” has the tasks of improving the mechanisms of training in a postgraduate school. These include the introduction of special grant support for research and scientific and technical projects being carried out [2]. This indicates the orientation of structural changes in the functioning of the postgraduate school to stimulate its research component and the process of preparing appropriate scientific personnel, which is quite consonant with the task of adapting the Russian postgraduate school model to the modern model of the digital economy. As a result of the study, it is planned to develop recommendations for improving the existing Russian system of training highly qualified personnel adapted to the conditions of the digital economy and meeting the objectives of NP “Science”. We expect that based on them, it will be possible to propose approaches to a clearer institutionalization of the postgraduate students' research work in the framework of preparing and defending a thesis; adapting the educational and research work of postgraduate students to the conditions of digitalization; the creation of prerequisites for the guaranteed employment of a candidate of sciences in the profile of the formed professional competencies; more active use of digital technologies in the process of teaching postgraduate students.

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