

Prospects for the spatial organization of the regional professional education system under digitalization conditions

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Abstract — The article is devoted to the spatial organization of the regional professional education system under new economic conditions: digitalization processes, new industrialization, the beginning of the information era, etc. The factors of the functioning and development of the regional system of professional education, that affect the dynamics of its spatial organization under changing conditions, are identified. The provisions about the ongoing process of transformation of the studied system through the introduction of innovative elements in the professional education system, that change its value at the regional and country levels, are argued.

Keywords — regional professional education system, digitalization of the economy, informational transparency of the educational system, formation factors and spatial organization of the regional professional education system.

I. FORMULATION OF THE PROBLEM

Currently, the process of modernization (reforming) of the educational sphere goes on (since 2013). The reform of the education system as a whole, including professional, is of a strategic nature: education belongs to the group of the most important factors of social development, since in the new economy, this sphere acts as the basis for the accumulation and development of human capital, which affects the competitiveness of territories, regions, and the country. As a result of the reforming of the educational sphere, the transformation of regional professional education systems (hereinafter - RPES) is taking place. The analysis of the spatial organization of RPES is carried out through the example of seven subjects of the Ural macro-region.

Under the conditions of the formation of an innovative economy, the processes of change in RPES are evident. Which factors have a major impact on its transformation, and how the spatial organization of RPES is changing under the new economic conditions?

II. RESEARCH OBJECTIVES

The objective of the research is to highlight the factors, influencing the formation and development of RPES, assess the impact of the ongoing digitalization processes, new

industrialization, the formation of the information era on the transformation and spatial organization of the studied system.

III. RESEARCH METHODS

Based on a comprehensive theoretical approach, which includes the provisions of the systems approach, theories of spatial development and the theory of socioeconomics [1, 9, 11, 12], the conceptual position on ensuring the functioning and development of RPES in space is justified, groups of factors, affecting the transformation of this system, are highlighted.

The research showed, that RPES is one of the subsystems of the complex socioeconomic system of the region and in this capacity it is itself a complex and interconnected socio-economic structure [3]. Moreover, it forms the basis of the prospective socio-economic development of the region, is controllable and acts as a factor in increasing its controllability.

Under the new economic conditions: with the beginning of the information era, accompanied by the formation and development of the digital economy, the wave of new industrialization, a complex approach allows to analyze the process of transformation of the content of RPES.

The analysis and assessment of the trends in the digital development of the RPES are carried out using the index method, which allows to get the digitalization index of RPES, revealing the progress of the process of its digitalization, including the ongoing changes in its spatial organization under the new conditions. To analyze digitalization trends, statistical indicators characterizing this process were selected, then they were converted into dimensionless values using the following formula:

$$R_i = (X_i - X_{\min}) / (X_{\max} - X_{\min}), \quad (1)$$

where X_i - the value of the selected indicator for the i -th region; X_{max} and X_{min} - respectively, its maximum and minimum values.

Then, each indicator is converted into an index with values from minimum to maximum, i.e. from 0 to 1. As a result, we obtained a consolidated index of digitalization of the RPES as the arithmetic mean of the obtained private indices [1].

IV. RESULTS OF THE RESEARCH

Displayed equations are centered and set on a separate line. Since 2013, as a result of legislative changes at the federal and regional levels, the process of reforming the education system led to a reduction in the total number of elements of RPES, where, in general, the total number of elements of RPES decreased, but the number of higher education organizations (HE) decreased to a greater extent, and the number of secondary professional organizations (SPO) increased slightly, but this happened due to the introduction of primary

professional education organizations (PEO - until 2012) into its level.

The listed educational organizations, including higher education organizations, which train academic staff (graduate school, doctoral studies), form the total number of elements of the professional education system, i.e. form the structure of RPES. On the basis of statistical data, the dynamics of changes in the total number of elements of RPES is shown in figure 1, where we can see that the total number of elements by 2016 compared to 2004 as a whole decreased.

We highlighted the factors, affecting the formation and functioning of RPES. Among the many different-quality factors, related to the local, regional and national levels, the basis for the development of the RPES to a greater extent is the external environment, but the internal environment gives it identity, endowing it with regional features, or attributes, specific of a particular territory. Figure 2 presents a group of formation and development factors of RPES.

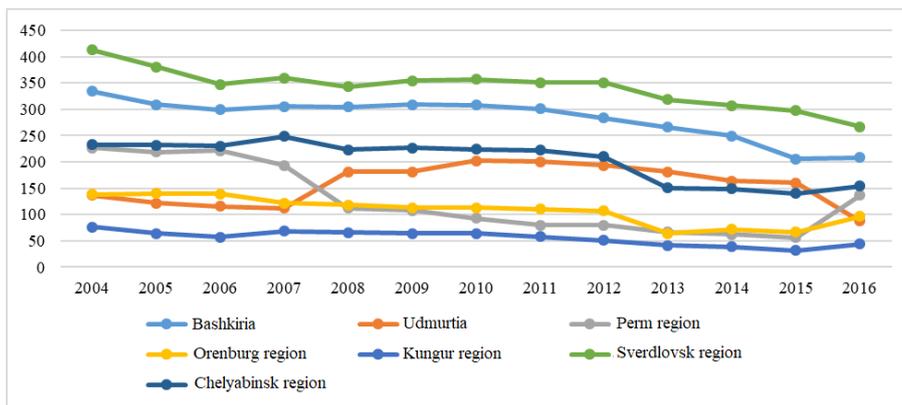


Fig. 1 The dynamics of the change in the number of elements of RPES subjects of the Ural region from 2004 to 2016 [6].

Figure 2 presents general groups of factors, that have both a direct and indirect effect on the functioning and development of RPES.

Y.P. and others, appear as the basis for creating a qualitatively new model of economic life, changing the format of the education system and society. The development of the digital economy and the education system is a issue of national security, and we agree with the view of scientists that “digitalization of the economy is directly related to the formation of the educational environment” [8, p.22].

With the beginning of a new information era, the processes of digitalization of society and the transformation of the education system, including RPES, become strategically priority for modern Russia. We highlight one more group of factors, affecting the functioning and development of RPES under the new conditions, presented in Figure 3.

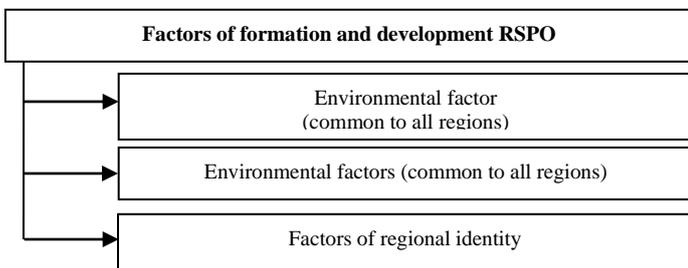


Fig. 2 Groups of factors in the formation and development of RPES

The highlighted groups of factors under the conditions of the beginning of a new information era, the formation of the digital economy affect the transformation and formation of RPES. During the process of development of the digital economy, the role and importance of professional education (HE and SPO), according to scientists of Animitsa E.G., Silina

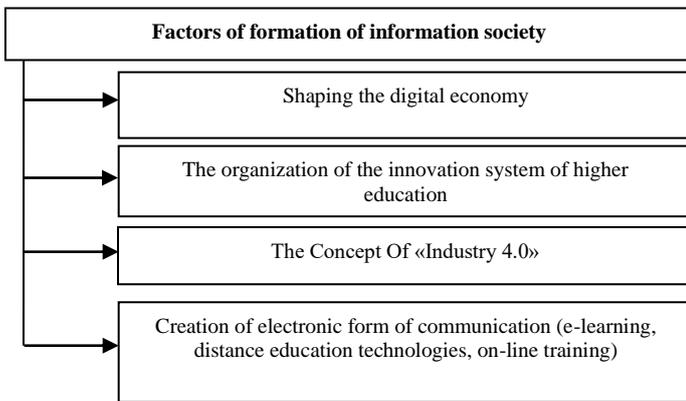


Fig. 3 Group of factors of an innovative society

The digital environment contributes to obtaining equal access to education for all, the possibility of forming an individual path of education. These characteristics of the modern educational environment are contained in state programs for the development of education at the federal and regional levels, and form the main task of IHL and universities of the country, which researchers define as “creating a fruitful educational and research environment ...” [8, p. 22].

The following indicators, in our opinion, characterizing this modern process, were selected for the analysis and evaluation of digitalization: informational transparency of educational organizations, the use of special software in the educational process, the implementation of educational programs using distance learning technologies (DLT) and using e-learning (EL).

Currently, the beginning of a new information era requires ensuring the transparency of the activities of educational organizations in the process of their functioning. The vast majority of educational organizations (99.8%) [7] are characterized by informational transparency (compliance with legal requirements at the federal level) and have their own websites on the Internet and e-mail. Mertsalova T.A. considers the informational transparency of educational organizations to be a global trend, a state priority, and a regional resource [4]. In researchers view, informational transparency leads to an increase in the quality of education, is subject to statutory regulation, i.e. it is being stimulating, controlled, regulated and managed.

The performed analysis of the use of special software in the educational process, distance learning technologies (DLT), e-learning (EL) and other new forms of education allows to say, that they are being actively used since 2013. And since 2015, there are statistical indicators of the use of special software by educational organizations in the field of solving organizational, managerial and economic issues in educational organizations.

New technologies and new forms of learning are actively applied in the educational process - DLT, EL, etc. Like everything new, they have positive and negative qualities, that have to be analyzed and studied, which takes time. It should be noted, that the use of new forms of learning in the educational process is recommended in regulatory legal documents of the federal and regional levels, for example, the

State program “Development of Education of the Russian Federation” until 2025 [5], state programs on the development of education of subjects of the Russian Federation, strategies of socio-economic development, etc.

In the FL of December 29, 2012 “On education in the Russian Federation” (as amended on 08.03.2018) art. 16 the essence of e-learning is disclosed as “... the organization of educational activity using the information, contained in the databases and used in the implementation of educational programs and the information processing technologies, technical means, as well as information and telecommunication networks, that provide transmission of the specified information through communication lines, the interaction of students and teachers” [10]. I.e. e-learning differs from distance learning by the implementation process itself (EL is a software product, used in the indirect interaction of a teacher and students; and distance learning requires direct participation).

The use of new forms of learning requires appropriate technical means and software, which not all educational organizations (especially in rural areas) currently possess, but their positive dynamics are obvious. Table 1 presents data from the federal statistics base only for 2015 and 2016, it was not previously obtained because because of its novelty.

All statistics data, characterizing the digitalization process, was converted to dimensionless values using the formula, given at the beginning of the article. Based on the obtained dimensionless values of the indicators, the author obtained a consolidated digitalization index of RPES as the arithmetic mean of the private indices, included in it (information openness, the use of special software, the use of DLT and EL). According to the index, it is possible to determine, that in the subjects of the Ural region there is an active process of digitalization of education, without which the functioning and development of RPES in the future no longer seems effective. The final RPES digitalization index, characterizing the trends of this process, is presented in table 2.

According to the table, we get the rating of the studied subjects, in which the Sverdlovsk region is the absolute leader, and the Kurgan region is the outsider. The remaining subjects, in decreasing order of values of the consolidated index, were distributed as follows: Chelyabinsk Region, Republic of Bashkortostan, Perm Territory, Orenburg Region, Udmurt Republic.

TABLE I. INDICATORS OF THE IMPLEMENTATION OF EDUCATIONAL PROGRAMS WITH THE USE OF EL BY ORGANIZATIONS OF HE AND SPO IN THE SUBJECTS OF THE URAL REGION, [7]

Subjects	HE educational organizations		SPO educational organizations	
	2015	2016	2015	2016
Republic of Bashkortostan	25	24	112	134
Udmurt republic	15	22	46	60
Perm region	27	25	42	74
Orenburg region	9	9	76	95
Kurgan region	14	14	14	10
Sverdlovsk region	60	49	145	152
Chelyabinsk region	51	38	112	82

TABLE II. RPES DIGITALIZATION INDEX [1]

Subjects	2013	2014	2015	2016
Republic of Bashkortostan	0.9	1.0	1.3	1.4
Udmurt republic	0.2	0.2	0.3	0.3
Perm region	0.7	0.8	0.5	1.0
Orenburg region	0.3	0.3	1.0	0.6
Kurgan region	0.0	0.0	0.0	0.0
Sverdlovsk region	1.7	1.8	2.2	2.2
Chelyabinsk region	1.3	1.2	1.4	1.4

As we see, in most subjects the dynamics of the index is positive. It should be noted, that zero index values for the Kurgan region are not an indicator of the lack of digitalization of its educational space. This condition is explained by the fact, that there is the smallest number of elements of RPES in the Kurgan region among all subjects of the Urals, in the process of reforming the education system, their number was mainly reduced throughout the entire period under review (see Figure 1). I.e. the process of digitalization in the subject presents, but differs in extremely low values of index indicators.

V. RESULTS OF THE RESEARCH

RPES, as part of the education system, occupies one of the leading places in the development of the region. The development and functioning of this system are affected by various groups of factors, under the influence of which the content of RPES is transformed, but in the end its role and significance has strategic importance under the new economic conditions. RPES acts as the basis for the formation of the labor potential of the regional economy, in connection with which it should not only follow the trends of digital development in space, but also build advanced strategies for development.

The research showed, that the process of digitalization of the economy, which has begun relatively recently, characterizes the modern development of RPES and has positive dynamics, as evidenced by the obtained digitalization index, which demonstrates the growth in the space of the studied subjects (table 2). Its positive dynamics is confirmed by the analysis of the obtained calculations: against the background of a decrease in the total number of elements of

RPES (fig. 1), there is an increase in the values of the RPES digitalization index (table 2).

Based on the obtained results, it can be concluded, that in the near future, the digitalization process will continue to develop, the concentration of elements of the RPES in large cities will increase under its influence, which characterizes the modern polarized spatial organization of the studied system.

References

- [1] Efimova, E.G. Digitalization of the educational space of the industrial macro-region. Proceedings of the 2nd International Scientific conference on New Industrialization: Global, national, regional dimension (SICNI 2018). Yekaterinburg: USEU, December 4-5, 2018 Pp. 721-726 (2018).
- [2] Animitsa, E.G. Prostranstvenno-vremennaya paradigma v sotsioekonomike: regional'nyy aspekt: monografiya. B.G. Animitsa, V.A. Sukhikh; Perm. un-t. Perm', 140 s. (2007).
- [3] Dvoryadkina, E.B., Efimova, E.G. «Nauchnye podkhody k izucheniyu regional'noy sistemy professional'nogo obrazovaniya». Nauchnye trudy Vol'nogo Ekonomicheskogo Obshchestva Rossii, Moskva. № 2. Tom 210 (2018).
- [4] Mertsalova, T.A. «Informatsionnaya otkrytost' obrazovatel'noy organizatsii (v kontekste gosudarstvenno-obshchestvennogo upravleniya). [Elektronnyy resurs]. Access mode: http://273-fz.rf/sites/default/files/2015_03_19
- [5] Postanovlenie Pravitel'stva RF ot 26 dekabrya 2017 g. N 1642 «Ob utverzhdenii gosudarstvennoy programmy Rossiyskoy Federatsii «Razvitie obrazovaniya». Sistema GARANT: <http://base.garant.ru/71848426/5df3cf44452aab7de28d69de5bee2373/#ixzz5Z7b2JE6f>
- [6] Regiony Rossii: sotsial'no-ekonomicheskie pokazateli.: R32 Stat. Sb. Rosstat. M. 2003-2017 gg.
- [7] Sayt MON RF: <https://minobrnauki.rf/ministerstvo/statistika/>
- [8] Silin, Ya.P., Animitsa, E.G. Kontury formirovaniya tsifrovoy ekonomiki v Ros sii. Izvestiya Ural'skogo gosudarstvennogo ekonomicheskogo universiteta. T. 19, №3. S. 18–25. DOI: 10.29141/2073-1019-2018-19-3-3 (2018).
- [9] Sukhikh, V.A. Razvitie teoretiko-metodologicheskikh osnov formirovaniya sotsioekonomiki v prostranstve regiona: Avtoreferat dis...d-ra ekon. nauk. Ekaterinburg. (2009).
- [10] Federal'nyy zakon ot 29.12.2012 N 273-FZ (red. ot 03.08.2018) «Ob obrazovanii v Rossiyskoy Federatsii», st.16. [Elektronnyy resurs]: <http://www.consultant.ru/document>
- [11] Shabanova, M.A. Sotsioekonomika: ot paradigmy k novoy nauke. Obshchestvennye nauki i sovremennost'. №1. (2006)
- [12] Eттsioni, A. Sotsioekonomika: dal'neyshie shagi (1991). Per. I.S. Dobryakovoy. Ekonomicheskaya sotsiologiya. T.3. №1. S. 65-71. www.ecsoc.msses.ru (2002).