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DIGITAL TRANSFORMATION OF PUBLIC ADMINISTRATION: DIGITAL EDUCATION STRATEGY

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Abstract

For the effective realization of the digital education strategy in Russia, nowadays it is essential to develop its main elements. The educational system of the country needs a conceptual model for the formation of a system of digital education and mechanisms of strategic management for maintaining this system. To solve these tasks, it is important to define digitalization goals for Russia quite clearly, understand purposes of digitalization for the national educational system, and determine formation and development paths for achieving these aims. These paths depend on making appropriate management decisions, first of all in the organizational and technical sphere. Important is also a synergistic effect by practical realization of these decisions. The role of the thesaurus of workers grows as the economy, to which the digital education system contributes, develops. Based on the thesaurus approach, it is possible to model many processes in the socio-economic system related to innovative processes and human participation. The flow of thesaurus information into the socio-economic system includes the knowledge and skills of the employees obtained as part of the digital education strategy, new relevant information obtained by the employees within the production system (for example, as a result of advanced training and retraining using the digital education strategy). It is the growth of the thesaurus of workers and related human capital that should be considered as the main goal of the digital education system in Russia.

Keywords: Digitalization, education, strategy, network.

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1. Introduction

The digital education strategy in the Russian Federation implies the development of some basic elements. To build a model and choose a control mechanism for the creation and functioning of the strategic management system for education in Russia, it is important to be aware of digitalization goals in Russia in general and in relation to the education digitalization, in particular. A necessary task is also to determine possible development paths for achieving these goals. Managerial decisions of organizational, technical and other character determine these paths and ensure a synergistic effect in their practical realization. The role of the thesaurus of workers is growing as the economy, to which the digital education system contributes, develops. Based on the thesaurus approach, one can simulate many processes in the socio-economic system associated with innovative processes and their human participation. The flow of thesaurus information included in the socio-economic system includes the knowledge and skills of employees acquired by them as part of the digital education strategy, new relevant information received by employees within the production system (for example, as a result of advanced training and professional retraining using the digital education strategy) (Kolbachev & Pakhomova, 2019a). The growth of thesaurus information in different socio-economic systems is one of the results of the innovative development. It is the buildup of the thesaurus of workers and the associated human capital that should be considered as an important goal of the digital educational system in our country. The assessment of human capital growth (in terms of the growth of the professional thesaurus of employees and the number of high-tech jobs) is used in the formation of methodological bases for the creation and management of the infrastructure of the digital training system and in the development methods for managing the formation of a strategic management system for the digital education development.

2. Problem Statement

To build a strategic management system for the development of digital education in Russia, there is a set of possible options of different nature that serve as an information base for the formation of alternative paths of innovative development. Some of these alternative ways become dominant by implementing competitive or quasi-competitive procedures. It means a concrete expression of the rational choice of subjects having certain preferences and acting under specific conditions. For our research, relevant are issues on digitalization goals in general and digital innovations related to education. These aspects can be considered through the application of the axiological approach to digitalization when we take into account the axiological nature of innovative educational activities, and interrelations of different values among them.

3. Research Questions

It is obvious that the rational creation and implementation of projects for the development of information systems (digitalization) of education can and should be a step towards removing the Russian secondary and higher schools from the protracted crisis, its modernization in accordance with the above-described global trends in the development of modern economy and society and, accordingly, to solving problems of Russian society and the state accumulated to date.

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However, numerous researchers point to the existence of threats and risks directly related to the digitalization of education. A number of other authors also devote their research to the potential threats of digitalization of education for Russian society. Systematization and analysis of these risks were performed in our work.

In light of the foregoing, the risks of inadequate implementation of policy documents (the risks of "Khrushchev corn" in digitalization) and the risks of inconsistency with global development trends (the most important of which were listed at the beginning of this article) should be added to these risks.

The model for the designing process of a strategic management system in the sphere of the digital education development in Russia, proposed by the authors, can contribute to overcoming all these risks. This model provides for several levels of selection of projects (activities) for digitalization of education, the upper (federal) of which is to monitor the proposed projects for possible risks. In our opinion, the composition of risks controlled in this case should include:

a) risks due to the specifics of digitalization of education;

b) the risks of inconsistency with world development trends;

c) the risks of inadequate implementation of policy documents.

Obviously, to analyze digitalization projects for the absence of these risks, special techniques are required. The risk analysis of group "a" can be carried out on the basis of the approach described in, its adaptation to the conditions of education digitalization projects was proposed in.

It is advisable to analyze the risks of group "b" on the basis of the methodology for testing innovative projects and other developments to the current global development trends proposed.

The methodological basis for monitoring and evaluating digitalization projects is the provisions of an evolutionary economy, in particular, the theory of technological structures. The provisions of evolutionary economics and the theory of technological structures are used in the Methodology, taking into account the content of directive documents of the Russian Government that determine directions and content of research and development in the field of digitalization. The technique is based on a combination of methods for evaluating qualitative characteristics of a digitalization project based on their objective indicators and expert judgment.

4. Purpose of the Study

The purpose of this research is to identify main elements of the digital educational system in the Russian Federation. The interlinkages of the core elements, their characteristics and management systems are essential for developing a digital education strategy. The authors attempted to determine the effectiveness of digital education for the socio-economic system.

5. Research Methods

The network organization can be conditionally presented as "abstract social and economic world" which model is offered by Achrol and Kotler (1999). This model is based on a hypothesis of the existence of differences in parameters of the information exchange between participants of joint activities.

The evaluation of the R&D results in the digitalization sphere is carried out on the basis of the

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technological structures theory, in order to ensure the compliance of these research and development results achieved in the framework of a certain digitalization project with features of a particular technological structure. The allocation of R&D results to one or another technological structure is realized based on their characteristics. Besides, the materialization degree of information in the production system is used for assessing characteristics of the R&D results. This degree becomes deeper as we move from one mode to another, and is estimated based on the technological relations and functions concept.

The authors use the indicator of managing a socio-economic system as an additional criterion that shows the progressiveness degree of a digitalization project and reflects conditions of applying the R&D results. To determine the compliance between the scientific & technology components and the technological structure, we applied a special algorithm which includes the following measured characteristics:

- x1 – the level of proximity of the technology to the maximum allowed;
- x2 – the information materialization degree;
- x3 – dimensional scale of formation processes.

Limits of parameters' changes: [0,1].

The approaching degree to the maximum efficient indicator is estimated for technology by experts as follows: = 0, if the technology level does not achieve the possible maximum by more than 50%; x1 = 1 if the considered level corresponds to the maximum allowed one; ∈ (0, 1) in all other cases. The information materialization degree is assessed by experts as follows: = 0, if the indicator is > 5; x2 = 1, if the indicator = 2; ∈ (0, 1) in all other cases. The dimensional scale of formation processes is determined by experts as follows: = 0, if it is> 100 nm; x3 = 1, if the dimensional scale is ≤ 0.1 nm; ∈ (0, 1) in all other cases.

The degree the opinions coherence is determined based on the analysis of variation of estimates. The variation coefficient is calculated, i = 1,2,3. If the variation coefficient is less than 30% for each indicator, then the integral indicator was calculated.

The integrated value of assessing the compliance between the scientific & technology components and the technological structure is calculated using the Euclidean distance method and taking into account weight coefficients.

$$TU= \sqrt{\sum_{i=1}^{3} \alpha_i (1-x_i)^2} \quad (1)$$

where α_i – significance coefficients for factors for which the following condition is true $\sum_{i=1}^{3} \alpha_i = 1$.

(at the first stage, all parameters are considered as equal).

A comprehensive indicator of compliance with the technological structure can take values in the interval [0,1]. Depending on its value, the following solutions are possible: - if 0 ≤TU≤ 0,3, then the digitalization project as a whole corresponds to the modern technological structure; - if TU>0,3, then the digitalization project does not correspond to the modern technological structure.

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Assessment of the compliance of the project with directive documents is conducted based on an expert method. The measured PN characteristic takes the value 0 or 1: PN = 1, if the digitalization project complies with the directive documents, PN = 0, if it does not.

The integrated value of the digitalization project assessment is based on the convolution of the eligibility criteria given above:

$$IP= (\alpha_1 TU+\alpha_2 PN+\alpha_3 CT+\alpha_4 TP+ \alpha_5 SR), \quad (2)$$

where α_i- significance factors for which equality holds

$$\sum_{i=1}^{5} \alpha_i = 1 \quad (3)$$

Values α_i determined on the basis of the ranking of the evaluation criteria with the assessment of consistency by the coefficient of concordance:

$$C_{conc}= \frac{12\sum_{k=1}^{n}(\sum_{l=1}^{m} R_{kl} - \overline{R})^2}{n^2(m^3 - m^2)}, \quad (4)$$

where n=8 (number of experts), m= 5 (number of alternatives evaluated), R_{kl}- ranks defined by the l-th expert for the k-th criterion, $\overline{R}$ - average amount of ranks. The result of the assessment is considered consistent if $K_{конк}$ no less 0,4.

The values of weighting factors (indicators of the significance of the criteria) are distributed as follows: {0,33; 0,1; 0,12; 0,2; 0,25}. IP can take values in the interval [0,1].

At the monitoring stage, changes are evaluated and decisions are made to exclude certain digitalization projects from the recommended ones. To assess the risks of group «B», the development of a special technique is required, which is an independent task.

6. Findings

Along with the development of the risk assessment system described above and the selection of digitalization projects, further elaboration of the development of a digital education strategy is necessary, which, in our opinion, should be as follows: Organization of interaction between educational institutions developing content and other components of digital education, coordinating their activities on the basis of co-competition.. Preparation of faculty for conducting the educational process in a digital environment while improving their skills in subject areas. Organization of business interaction with higher education, which provides training for specialists in accordance with modern tendencies in the development of Industry 4.0: in-depth study of methods for creating digital doubles, the development of kyierphysical production systems, etc.. Formation of the university environment of digital education. The expansion of academic freedoms and student opportunities in terms of choosing a learning path, in particular - providing a choice of student learning opportunities both on the basis of digital platforms and traditional methods. Realization of the concept of lifelong education, taking into account additional opportunities due to digitalization.

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Taking into account the above mentioned information, we can conclude that a quantitative assessment of the socio-economic system development (for the progress of this system, digitalilzation of education is being realized) can be carried out based on the awareness of the amount of information contained in this system and its entropy. A similar conclusion was made by L. Hirschhorn in relation to socio-economic systems. According to this scientist, the economic evolution can be considered as a process of increasing the negative entropy of the economic system (Hirschhorn, 1986). At the same time, there are processes of economic links complicating and streamlining of the internal structure of a system (Ashmarina, Kandrashina, Lebedeva, & Izmailov, 2019).

The socio-economic system in which innovative processes are carried out (including those related to the growth of human capital through the operation of a digital education strategy) is under the influence of an external environment, under which this influence is internally transformed and as a result becomes a non-equilibrium (Kolbachev & Pakhomova, 2019b).

In other words, the level of development of the socio-economic system can be characterized by the amounts of information of various nature materialized in it and the ideal information contained in the knowledge and skills of the employees involved in the activities of the system. The degree to which ideal information is added to the process of innovative development of the socio-economic system can serve as a measure of the social impact of digital education systems.

7. Conclusion

The role of the thesaurus of workers is growing with the development of the economy, to which the digital education system contributes. Based on the thesaurus approach, one can simulate many processes in the socio-economic system associated with innovative processes and their human participation.

The flow of thesaurus information included in the socio-economic system includes the knowledge and skills of employees acquired by them as part of the digital education strategy, new relevant information received by employees within the production system (for example, as a result of advanced training and professional retraining using the digital education strategy). The growth of thesaurus information in the socio-economic system is one of the results of its innovative development. It is the buildup of the thesaurus of workers and the associated human capital that should be considered as an important goal of the digital education system in our country.

The assessment of human capital growth (in terms of the growth of the professional thesaurus of employees and the number of high-tech jobs) is used in the formation of methodological bases for the creation and management of the infrastructure of the digitalized educational system and in the development of a set of methods for managing a strategic management system for the digital education development.

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