

Fourth Industrial Revolution and Management 3.0: Conditions for the Transformation of Higher Education

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Abstract:

The article deals with the basic contradictions between the technological level reached by the economy of various countries, including Russia, and the new paradigm of management accompanied by the transition period from post-industrial to information society.

Multifactorial vision of the trajectory of management development as a transition to a new technological level is proposed.

The necessity and peculiarities of using the concept of "leadership management" to ensure effective management of organizations are revealed.

The directions of implementation of digital technologies in the field of education to ensure rapid renewal of the country's human resources are shown.

Keywords: *technological level, digitalization, leadership, self-organization, emergence, digital education, Management 3.0, University 3.0*

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I. INTRODUCTION

In the last decade, in the developed countries of the world there have been radical changes associated with technical and technological modernization, which found their theoretical reflection in the concept of the 4th industrial revolution and the sixth technological level.

The main challenge of our time is the digitalization of the economy and the automation of processes, and as a result a large-scale transformation of labor markets is taking place: a large number of professions should disappear in the next decade.

At the present stage of development, companies require completely new professions and a different type of employees — people who are able

to set the tasks of designing innovative products and innovative productions, including analysis of new technologies' markets, search for investments, building sales networks, analysis of the entire production-supply system and modernizing its individual links or connections between them.

It is impossible to create effective 21st-century economy without fundamental changes in the field of education. Requirements for the content of training of graduates of colleges and technical schools, as well as higher education institutions are changing significantly. It is possible to provide key conditions for the training of innovative personnel for the Russian economy by ensuring a close relationship between education, science and industry[30-33].

The concept of the development of Russian education for the period until 2020 suggests that the implementation of modern requirements for the higher education system cannot be carried out without understanding the basic characteristics of an innovative economy and informational civilization:

- “maximum flexibility and non-linearity of organizational forms of production and the social sphere;
- inclusion of processes for obtaining and updating knowledge to all production and social processes;
- reliance on talent, creativity and initiative of an individual as on the most important resource of economic and social development;
- repeated and often unpredictable changes in technology (including social) within the short periods of time;
- change in the basics of social positioning: from material capital and a once-mastered profession to social capital and the ability for adaption;
- presence of two innovative circuits. The first is related to the generation and promotion of innovations, the second to their selection and mastering”[13].

Many researchers believe that in an era of global competition and high uncertainty of the future, those countries that rely on the individual himself, on the maximum development of his potential, on the ability of people to make their life better, develop themselves, culture, the fatherland, the planet will be successful in the face of rapid and unpredictable changes. Education plays a key role in this new agenda [7].

Using the best world practices, it is necessary to form an innovative system of universities focused on the sixth technological level and the global needs of the 21st century economy.

II. TARGET SETTING

In works of modern researchers of problems of management theory and practice, a significant lag is observed not only in the technological level, mainly characterizing the Russian economy, but also in the

level of development of management that accompanies this structure, from the level of economic development and management in the West [19].

In developed countries of the world, primarily in the USA, Japan and China, the formation of the contours of the sixth technological level is taking place. In particular, in the USA the share of the productive forces of the fifth technological level is about 60%, the fourth - 20%, and about 5% falls on the sixth technological level.

Describing the sixth technological level in short, we note that it is characterized by a focus on the development and application of high technology - bio and nanotechnology, genetic engineering, membrane and quantum technologies, photonics, micromechanics, thermonuclear energy, etc. The synthesis of these technologies should provide access to a fundamentally new level of economic development. It is expected that the technological level should achieve the phase of maturity in the 2040s [13].

In Russia, the share of technologies of the fifth technological level is approximately 10%, more than 50% of the technologies relates to the fourth technological level and about 30% to the third.

In Western countries, the Management 3.0 paradigm has long been implemented, it accompanies development and needs of market of the sixth technological level. In Russia, the level of development of management matches the paradigms of Management 1.0 and 2.0 - with the preservation of the scale of activities, the subordination of relations, hierarchy and rigidity of structures, even those that are distributed network and, by definition, should be characterized by soft communications and the absence of a rigid hierarchy.

To bridge this gap, according to L. Nikulin, it is necessary to make a “leap from the real 4th, through the virtual 5th and modern 6th, into “ something ”, namely as the 7th level” [19].

The main characteristics of the transition from the post-industrial to the information society are: improving labor efficiency and its intellectualization,

integration of technical and humanitarian knowledge, a structural shift in the employment of the population (from the sphere of material production to the service sector), changing requirements for the personnel capital of organizations (reorientation from professional specialization to key competencies), an increase in high technology intensity of the management process, an increase in share of self-management, etc. [15].

An analysis of the concepts of the current stage of management development which matches the transition period proposed by domestic and foreign management theorists and practitioners makes it possible to highlight the following trends in management: strengthening the role of leadership, creating network structures and self-organization in companies' activity regardless of their type, purposes and legal entity.

III. MATERIALS AND METHODS

A systematic approach, a structural-functional method, a formalization method and a method of scientific abstraction were used while making this research.

Analysis of the latest research and publications

Transformation economy issues, including Russian economy, and its transition to the sixth technological level are described in works of Glaziev S.Y., Fetisov G.G., Zaitcev D.A., Zbritskaya I., Zaitceva N.S., Ivanov V.V., Kablova E., Malinovsky P., Nikulina L.F., Pshenichny S.P., Kozlova N.A., Boiko I.A., Zakharenko A.V., Shvab K. [6; 9; 11; 13; 14; 17; 18; 21; 29].

Theory and practice of management development are considered in works of Adizes I., Isaeva K.V., Busalov D.Y., Kulapov M.N., Nikulina L.F., Odegov Y.G., Ponomareva M.A., Simagina S.G., Starostin S.Y., Hamel G. [1; 3; 4; 12; 15; 19; 20; 25; 26; 27].

Tasks and problems of the modern stage of modernization of the Russian system of high education are considered in works of Adler Y.P.,

Shper V.L., Volkov A.E., Remorenko I.M., Kuzminov Y.I., Frumin I.D., Efimov V.S., Zernov V.A., Lapteva A.V., Dadasheva V.A., Belyakov S.A., Klyachko T.L., Selyanskaya G.N., Smakotina N.L., Chuchalina A.I. [2; 5; 8; 10; 16; 22; 23; 24; 28] and the others.

IV. RESULTS

The modern world is characterized by high speed, the constancy of the ongoing changes and the growth of connections between economic actors. G. Hamel in his work "The Future of Management - 25 Basic Tasks" points at the insufficiency of the principles of Management 1.0 to solve the problem of creative development of the organization and its preservation (survival) in the long term. Each organization must integrate into the stream of creative development and change in a timely manner in order to stay afloat, look for ways to stimulate employees to take initiative and creativity, try to take into account the interests of an increasing number of interested parties [27].

Considering the management system as a system of relations, one can almost always distinguish such actors as the owner of a business process (or "resource crat"); manager; executor; a client, each of which can be a leader. In the context of the new economy, one of its most relevant principles from the point of view of management is the search for balance of the mutual interests of these actors.

Taking into account the views of various domestic and foreign researchers, one can state that domestic management needs a change of orientation at the present stage: from a resource-saving strategy to ideas generation.

Attention should be paid to the fact that the further path of management development cannot be adequately described by a single vector. The most accurate representation is given by a set of vectors characterizing linear and partially nonlinear development of the management trajectory according to L. Nikulin and S. Simagina [18; 20].

The multi-vector vision of the management development trajectory involves simultaneous consideration of the following seven vectors: modernized Taylorism, institutionalism, informationalism, virtualization, finance, talents and new knowledge.

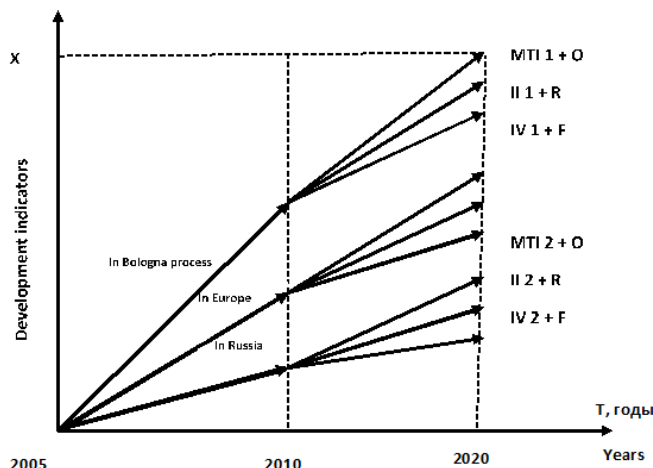
For example, in the field of higher education, the multi-vector development of the theory and practice of management is, to a certain extent, the “apogee of development”, and speaks in favor of the beginning of the creation of a post-industrial network information order and is characterized by the following factors [12]:

- rapid development of technology in the presence of a natural limit in technical and technological opportunities;
- increase in science-and-energy intensity, an increase in wastelessness, and desolation of production;
- erosion of many professions and specialties and creation of the concept of a “universal worker”;
- outflow of workers from the sphere of material production into the areas of service and education;
- increase in working time devoted to self-development;
- integration of scientific knowledge and methodologies;
- creation of a method of personal plans education, etc.

In the conceptual and theoretical aspect, the development of the sphere of education

In the conceptual and theoretical aspect, development of the field of education can be reflected by several vectors of the development of the subject of modern management using both the capabilities of modern information technologies and individual provisions of the developing practice of other sciences and the requirements of the Bologna process.

In fig. 1 presents a variant of the multi-vector development of the theory and practice of management in the field of education.



Drawing. 1. Multi-vector development of the theory and practice of management in the field of education.

Conceptually, vectors of development of the subject of the state educational organization and indicative area of the educational space in the framework of the Bologna process (after 2005) can coincide with each other in the following combinations:

- characteristics of modernized Taylorism with innovative influence and threats (MTI) and educational requirements of the Bologna Process (O);
- characteristics of institutionalization with innovative influence (II) and recommendatory requirements of the Bologna process (R);
- innovation-virtual characteristics (IV) and optional requirements of the Bologna process (F).

If we consider relationship between the temporary interaction of the carriers of all “types of knowledge” to form a new quality of relationships and, as a result, obtain a useful result, then taking into account the phenomenon of self-organization of the human factor, it is possible to maximize the synergetic effect, that is, the emergence of a new quality while ensuring coordination of relations of subjects of educational and business processes.

“New management” in educational systems should translate many entrepreneurial leadership technologies to universities while leaving for top-management practices funded by government agencies. In other words, tasks of all employees of

educational systems will expand, new organizational structures will appear, etc. Market relations should appear themselves or be implemented. We especially note the development of the so-called transformational organizational structures in which administration and organizational structure mutually adapt.

To sum up and at the same time specify the main provisions of knowledge management, we state that the basis for improving state educational institutions in the development of the educational services market is not the fulfillment of certain requirements (mandatory, recommendatory or optional) of the Bologna process, taking into account their respective principles, but their integral combination with the principal management base in the format of the “new managerialism”.

It is a multi-vector, non-linear description of the management development trajectory that can give researchers an idea of how to make a “leap” into a new technological level ahead of the economies of competing countries without using the “catch-up” model of management.

It is obvious that neither the economy nor management can exist without adequate staff, its renewal rate should be well above development rate of the economy itself and of the accompanying management, and the nature of development of the staff training system should coincide with the multivector nature of development of economy and management.

In his article “The Future of Management - 25 Basic Tasks”, G. Hamel notes that Management 1.0 was formed to solve problems of efficiency (ensure that medium-skilled employees consistently, diligently, competently and efficiently perform repetitive work) and scale (ensure production of complex goods in significant quantities). This was solved with the help of bureaucracy, its hierarchical structure, goals descending from top to bottom, a clear definition of roles and carefully crafted rules and procedures [27].

In the modern world, the implementation of the idea of the so-called HR-management or

“leadership management” is needed. Leaders and team leaders should show by personal example, employee model for a modern company, an ecosystem should be created in the company that allows employees to interact without any bureaucracy to solve the problems facing the company, as well as take initiative and experiment.

From G. Hamel point of view, the concept of Management 2.0 assumes that the Leader is transformed from tough administrator and supervisor into an architect of society, providing opportunities for cooperation of all interested parties, creativity, innovation of company employees and managers.

At the same time, managers need to expand their training and change their thinking. Along with the traditional skills of analytical and deductive thinking, they will need: systemic and value-oriented thinking, as well as the ability to creative problem solving and reflective learning [27].

Self-organization requires management not “from top to bottom”, but “from the center to the periphery” based on the management of a linear-functional (middle) level.

The implementation of the principle of self-organization is reflected simultaneously by two types of interactions: on one hand, the relations of "all with all", and on the other hand, "everyone with everyone."

According to the HR approach, all participants of the business process, both in hierarchies and in networks, are selected and used not for management functions, but for business process tasks.

In this regard, the issue of developing a system of non-monetary motivation of employees - both simple performers and managers at all levels becomes relevant.

The potential of innovative projects can be realized only with a help of strong, innovation-oriented corporate culture of the company and a positive attitude of employees to change. Even if resistance to changes in the company doesn't take place, the passive position of employees to the initiatives of the company's management, distrust of

new technologies can seriously inhibit the implementation of the innovative project.

In one of his interviews, I. Adizes pointed out one of the problems of management in Russia - lack of understanding of need for a strong corporate culture: "The need for corporate culture will appear in Russia only with the need to create an integrated team so that both "great ideas" and certain details, for which it is necessary "to connect to the decision-making process those who row, and those who rock the boat are carefully studied. And this can be done only if the company has culture "[3].

This means that the modern management training level in universities and business schools does not provide sufficient basis for the implementation of HR management concept in companies.

Special efforts are required to disseminate an appropriate management philosophy, such as training, business games, team-building events for the company's top management, line managers and employees.

New information technologies have fundamentally changed the relationship between customer and seller. For example, online sales tools have appeared to maximize customer satisfaction in terms of speed, convenience and ease of interaction with the seller, both in B2C and B2B segments.

The speed of obtaining information about products at all stages of its life cycle from development to after-sales service has increased. This enables managers to quickly and efficiently cope with the tasks of optimizing business processes, ensuring product quality, increasing the speed of launching a new product on the market and creating new business opportunities.

The trends in the development of economics and management described above set a new vector in the development of higher education. A person should be able to quickly get a new qualification, and for this it is necessary to provide the opportunity to constantly learn, develop throughout life.

Digitalization in the field of education and the use of on-line training technologies can provide a quick update of the country's human potential.

In a broad sense, digitalization can be described as the process of introducing digital information transfer systems based on network technologies, electronic means of communication and control. In a narrow sense, digitalization is the process of transition from analog form of presentation, transmission and distribution of information to digital.

By digital education, we understand, firstly, formation of students' skills in using modern information and communication technologies, and secondly, the formation of a new educational environment equipped with modern information and communication tools for both teaching and administering the educational process and managing the whole educational organization

V. DISCUSSION

Education is an important investment for the country's future prosperity. Not only higher or secondary vocational education is transformed, but the content of school education is also affected.

The concept of the development of Russian education for the period until 2020 suggests that implementation of modern requirements for the higher education system cannot be carried out without understanding the basic characteristics of an innovative economy and information civilization:

- "maximum flexibility and non-linearity of organizational forms of production and the social sphere;
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- repeated, often unpredictable changes in technology (including social) within short periods of time;

- change in the basics of social positioning: from material capital and a once-mastered profession to social capital and ability to adapt;

- presence of two innovative circuits. The first is related to the generation and promotion of innovations, the second, to their selection and mastering” [2].

All this leads to the need to develop new approaches to the organization and management of educational activities of the entire national higher education system.

To implement this task, simple quality control of learning outcomes is not enough. It is necessary to improve the educational process management technology, constant improvement of the quality of educational and methodological support of the educational process, as well as use of modern innovative and information technologies in education, and continuous development of the supporting resources (primarily intellectual).

Using the best world practices, it is necessary to form an innovative system of universities focused on the sixth technological level and the global needs of the 21st century economy.

VI. CONCLUSION:

The current stage of economic development is characterized by the rapid spread of information and communication technologies and global interconnection of networks, scientific and technological innovations in various fields, and this opens great opportunities for bridging digital gap and creating a knowledge-based society, as well as in the field of sustainable development.

Today, Russia has the potential for successful development if competent approach to the distribution and use of domestic resources is implemented. In this situation highly qualified scientific personnel is the most valuable resource.

At the same time, it is obvious that business dictates its requirements to the education system more and more actively, and development of nanotechnology and biotechnology is accompanied

by the risk of gradual standardization of people's consciousness and change in moral principles.

The fourth industrial revolution is called the "intellectual." Production of knowledge is becoming a key competency, universal for all specialties and areas of training. The possibility of building a new strategic vector for the development of the education system, which can provide accelerated training for innovative personnel capable of implementing breakthrough technologies for the transition from the 4th to the 7th technological level, lies in the industrial revolution.

At the same time, a set of measures is needed to promote the preservation and development of basic human qualities. This role is assigned to education, culture and literature.

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