

# THE ROLE OF HIGHER EDUCATION AND UNIVERSITIES IN KNOWLEDGE MANAGEMENT IN THE DIGITAL ECONOMY

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ABSTRACT

*Higher education, University,  
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*This paper elaborates on the role of higher education in knowledge management in the conditions of the digital economy, considers challenges and prospects connected with the digital transformation of economy and society and the necessity for the formation of new competencies with employees, analyses the trends of development of the digital economy in the Russian Federation and the level of digital literacy of the population and the state of personnel training for the digital sector, substantiates the importance of adapting the system of higher education to new realities through the integration of digital technologies into the educational process and development of digital competencies of students and teachers, and emphasizes the necessity for the system approach to the development of the digital economy in the Russian Federation, in particular, in the context of import substitution, investments in science and education, and commercialisation of R&D.*

*The research methodology is founded on theoretical approaches to the educational process and its transformation under the influence of modern digitalisation trends. It covers the provisions of connectivism, constructivism, and the theory of active training and socio-cultural theory. These theoretical concepts are analysed in the context of Industry 4.0 and University 4.0, which involves a close integration of digital technologies into production and educational systems. General scientific methods of analysis, synthesis, observation, literature review, graphical method, etc. are used to formulate theoretical conclusions.*

*The main value of the paper lies in substantiation of the necessity to create an adaptive organisational model of knowledge management, which combines academic traditions and values with the flexibility of information systems and the potential of digital technologies, as well as the generalisation of the adaptive measures of the higher education system, which are a reaction to current trends inherent to the educational environment.*



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## **1. INTRODUCTION**

The modern stage of development of the global economy is closely connected with the processes of quick digitalization of all spheres of social life, which predetermines the necessity for transformation of the traditional approaches to knowledge management. Higher education – as one of the main producers of knowledge in the digital economy – is assigned a key role. However, the challenges it faces require reconsideration of approaches, mechanisms, and tools for ensuring the educational process. Digital technologies are reasons for such changes and, at the same time, form opportunities to solve important problems.

Global processes of digital transformation, which take place in the world economy, are reflected in strategic programmes of different countries' development. An example of the strategic approach to digitalisation management is the European Union's initiative "Digital Europe". It involves investments in the development of digital skills and the implementation of digital technologies in all spheres of the economy. Similar programmes are implemented in other countries, which is a sign of the necessity for the expansion of penetration of digital technologies into the higher education system for the growth of innovativeness and competitiveness of the economy.

Digitalization of the economy in the Russian Federation also has a strong strategic basis, which includes government strategies and programmes. The main factors that restrain the digital transformation of the Russian economy are problems with the development of digital infrastructure and an increase in the level of digital literacy of the population. Apart from this, an important issue is the insufficient level of financing scientific research in the sphere of digital technologies and the low effectiveness of using investments in education and science. In the conditions of globalisation, this complicates the realisation of national strategies of digital transformation and reduces the innovative and intellectual potential of the country.

Thus, studying the role of higher education in knowledge management in the digital economy is an important scientific issue, which requires in-depth research on educational processes, technologies, and tools for the generation and transfer of knowledge, which is disseminated outside of universities and constitutes an important component of the system of companies' labour resources management.

## **2. EXPERIMENTAL SECTION**

From the position of assessment of the role of higher education and universities in the process of knowledge management in the conditions of the digital economy, it is important to correctly formulate the main directions

for the research. Given the recognition of education as the key to understanding the world and the basis for personality's cognitive development, an important direction is the topic of the influence of the educational system on intellectual development. In analysing the role of universities in intellectual development, it is also important to assess their influence on the generation and dissemination of knowledge. Approaches to remote, digital, and mixed training define the topicality of assessment of the transformation processes in higher education. Similar problems are considered within the study of the experience of self-education and life-long education, as well as the role of short-term courses and informal education.

The primary methodological basis of the research is theoretical approaches to the educational process and their transformation under the influence of modern trends. According to this, traditional theories of assessing the role of higher education based on behaviourism, cognitivism, and humanism in the conditions of the digital economy do not allow covering new processes and trends. The impact of higher education on intellectual development in the conditions of digitalization could be considered more broadly using the theories of connectivism, constructivism, active learning, and socio-cultural theories. Each of these theories views the educational process as an active interaction between its participant and external environment, which becomes more informatised and digitalised.

In view of the above, the research methodology includes the provisions of connectivism as an approach that involves the creation and development of ties between different information sources and humans, which form within the educational and labour process; constructivism, which involves active participation of the student in the educational process under the influence of new sources of information and communications; and theories of active learning and socio-cultural theory, which envisage active reaction of education seekers to the external environment's factors. Within digitalization, such theories are considered in the context of Industry 4.0 and University 4.0, which, in turn, allows emphasizing the close integration of digital technologies into production and educational systems.

Theoretical substantiation of the problem of the role of higher education in knowledge management in the conditions of the digital economy is formed based on analysis of scientific works and analytical materials, which study in detail its different aspects. These include the idea of training through formation of ties between different sources of information and humans within the theory of connectivism (Siemens, 2005; Sphero, 2023); analysis of challenges and prospects connected with the digital transformation of production and the need for formation of new competencies with employees (Rimskaya et al., 2021; Kokurkhaeva & Gazdieva,

2022; Zharkova, 2022; Dorzhieva, 2022); study of the opportunities for application of flexible approaches to the organisation of educational process for training specialists who can work effectively in the digital environment (Khuriev & Mambetova, 2024); the issues of managing the processes of receipt and transfer of knowledge in the sector of science and higher education (Litvinova et al, 2020; Bogoviz et al., 2023); genesis of theoretical ideas of knowledge management and readiness of university teachers to use them (Kalmykova, 2019; Kalmykova & Solovova, 2019); generalisation of current issues of management in the system of modern education and ways to solve them (Turginbayeva et al., 2018); description of the main models and tools of knowledge management in organisations (Suslov, 2012); analysis of statistical data and analytical materials that reflect the current state and trends of digital economy development in Russia and the world (Abashkin et al., 2024; Shugal et al., 2023); factors influencing the development the digital economy and education in this sphere (Shaengchart & Kraiwanit, 2022), strategies of adaptation of business structures to the digital transformation of the economy (Galoyan et al., 2023); conditions of using AI technologies in digital marketing systems and their influence on digital competences in the labour market (Makki, 2023). The above works cover a wide range of issues that are linked to knowledge management, training of digital personnel, and development of the digital economy, which is a sign of the relevance and interdisciplinary character of the considered topic.

The primary goal of this study lies in substantiating the theoretical provisions that characterise the role of the system of higher education in knowledge management given trends that are peculiar to the digital economy. This goal is achieved through analysis and generalisation of the trends of development of the digital economy, determination of the mechanisms and tools of influence of higher education on the intellectual potential of the country, and description of the processes of higher education transformation according to the demands of the digital economy, as well as their coordination with knowledge management in organisations.

### **3. RESULTS**

At the modern stage of world economic development, attention to technological competition and adaptation to new conditions, caused by the COVID-19 pandemic, which accelerated the processes of digital transformation, grows. The achieved level of digital transformation is a sign of its entering an active phase. Thus, according to experts, the share of the digital sector in the world GDP will grow from 22.8% in 2016 to 50% in the next 15–25 years. The global market of digital technologies will grow from USD 64.9 billion in 2021 to USD 165.5 billion in 2026; monthly global flows of data will grow from 230 exabytes in 2020 to

780 exabytes in 2026; the number of Internet users in the world continues growing and accounts for more than 60% of the world population (Dorzhieva, 2022).

The development of an information society in the Russian Federation for the period of 2017-2030 involves the formation of the digital economy, which is based on such elements of production as digital data, the processing of large arrays of information, and the use of analysis results. This facilitates an increase in the effectiveness of different production types. An important role in this process belongs to the development of science, equipment, and technologies (Zharkova, 2022). At present, the indicators of the digital development of Russia are different from the leading countries' indicators. Russia is somewhat behind in the number of patents in the sphere of disruptive digital technologies. An important task of digital economy development is training the corresponding personnel to achieve strategic goals and programmes and increasing Russia's contribution to the world's digital economy.

According to the statistical data of the Higher School of Economics (Abashkin, et al., 2024), sectors of the economy have different approaches to the policy of digitalization, which is connected with the method of their economic activities, share of material production, intellectual potential, etc. Thus, in 2022, the total volume of expenditures for the development of the digital economy in the Russian Federation equalled RUB 5,152 trillion, of which RUB 3,199 trillion – domestic expenditures of organisations for the creation, dissemination, and use of digital technologies and connected products and services. The other part is households' expenditures for the use of such technologies, products, and services. By the types of economic activities, the largest contribution to the development of Russia's digital economy ПФ in 2022 was made by the sectors of information and communications (29.5 %), financial sector (15.6 %), processing industry (12.5 %), and professional, scientific, and technical activities (10.8 %).

The key directions for domestic expenditures of organisations for the creation, dissemination, and use of digital technologies and connected products and services in the studied period were expenditures for the purchase of machines and equipment connected with digital technologies (35,2 %) and the corresponding software and its adaptation (17.7 %). The share of expenditures for training of employees, connected with information technologies, accounted only for 0.4 % of the total expenditures. The main digital technologies used in Russian organisations in 2022 were technologies of collection, processing, and analysis of big data (30.4 % of organisations) and cloud services (28.9 %). These sectors were in highest demand in wholesale and retail, information and communications, the financial sector, and the sphere of higher education.

The basis of intellectual resources in the digital economy is employees with skills in information and computer technologies. The total number of such employees in the Russian Federation in 2022 was 8.6 million, which was 4.1 % less than in 2021 and 5.5 % less than in 2020. 22.2 % of employees with the given skills are direct representatives of this sphere; of them, the largest group is software developers and analysts (39.9% of the total number of employees with skills in information and computer technologies).

Among the employees of other sectors of the economy, who actively use skills in information and computer technologies in their professional activities, the largest group is specialists in the financial sector (38.2 %), administration (17.1 %), and product sales and marketing (13.1 %). More than 55 % of all employees who actively use skills in information and computer technologies are involved in these sectors. The share of specialists with computer skills in the total number of employed in Russia is 2.7 %. For comparison, this indicator is 8.6 % in Sweden, 5 % in Germany, 3.9 % in Italy, and 1.4 % in Turkey.

Human resources of the digital economy was increased by 209,900 people through the system of higher education in 2022. Among them, the largest number of graduates were in the departments of IT, machine-building, and economics and management (Abashkin et al., 2024).

Formation of intellectual potential in the conditions of development of the digital economy through the system of higher education requires a large resource support and system approach, which can be achieved through the active use of ICT in the training process, an increase in the level of digital literacy of teachers and students, etc. As for the formation of digital skills in universities, 97 % of students and 99 % of teachers in Russia possess such skills. However only 12 % of teachers and 21 % of students possess skills in the use of programming languages and 6 % of students and teachers have skills in working with big data (Shugal et al., 2023).

Students and teachers have a much higher level of digital competence compared to a basic group of the population. However, the specifics of the digital skills of the participants of the educational process are rather irrational from the position of the digital economy. It is more adapted to the use during training and less adapted to the direct use of the main tools of the digital economy, such as big data analytics, the Internet of Things, blockchain, 3D printing, robotization, etc.

Theoretical substantiation of the “knowledge management” concept has a rather stable and recognised character, which treats this definition as a complex approach to the creation, processing, dissemination, and application of knowledge in organisations to achieve strategic goals and growth of their competitiveness. The formation of this concept was a reaction to the

dissemination of the ideas of information and post-industrial society in the conditions of the growth of competition and globalisation. Its basis developed from the desire to give knowledge a value expression, which would allow assessing the effectiveness of knowledge through the lens of the use of labour resources of organisations. In these conditions, a decrease in the contribution of material production to the structure of the world economy and an acceleration of technological progress led to an increase in the role of intellectual resources in all spheres of social development (Kalmykova, 2019). Against the background of the above processes, there took place a gradual transition from the philosophical treatment of knowledge, as a result of cognitive activities, to its increasing informatization. This was manifested in the formation of databases, knowledge banks, educational platforms, etc. Managerial technologies supplemented these processes with organisational and administrative methods and tools, which allows raising the level of manageability of the processes of acquisition, dissemination, and use of knowledge and assessing the effectiveness of their application in the interests of business or society. Processes that are connected with knowledge management form a unique life cycle and can be unified into five main directions: receipt of knowledge (1), adaptation to the conditions of organisations (2), reformatting and dissemination (3), service (4), and use (5) (Figure 1).

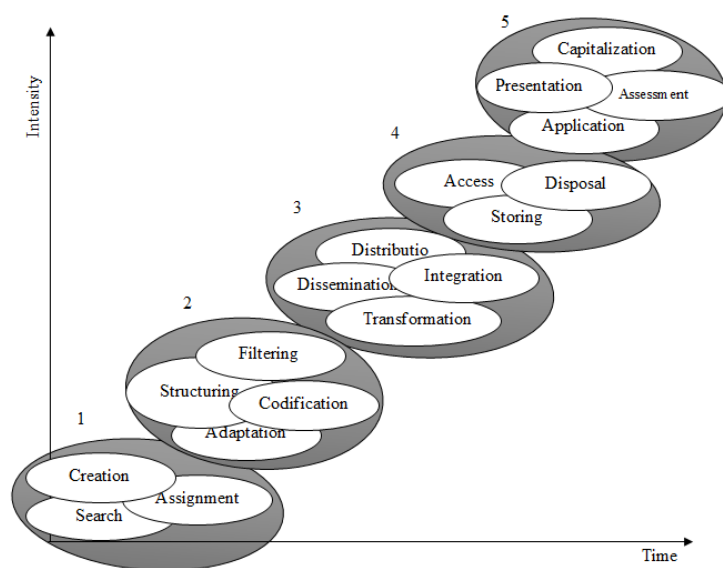
The specifics of this life cycle are that it can develop in a spiralling way, raising the level of the intensity of knowledge due to higher capitalization. Still, such an approach requires constant support for the system of knowledge management in the current and adaptive state.

An important factor in the development of the “knowledge management” concept was the division of all knowledge, to which the organisation has access, into formalised (explicit) and non-formalised (implicit). This vision started the process of catalogization of knowledge and information, which created preconditions for the automatization of processes that are connected with knowledge management in the organization and ensured a stable basis for their integration with machine tools within cyber-physical intellectual systems of modern times.

Informatization and digitalization of production led to a gradual transition to the knowledge economy, within which the main driver of development is intellectual resources combined with the human and organisational potential of companies. This situation raises the relevance of educational processes, including the general discussion of the problem of the search for a place for the system of higher education and universities. This discussion assesses the ability of higher educational establishments to ensure the intellectual needs of the economy and society through

the training of corresponding specialists, which is combined with the expansion of functional spheres of universities and the inclusion of the elements of

knowledge commercialisation into the scientific and educational components.



**Figure 1.** The model of knowledge management based on digital technologies

Source: Compiled by the authors based on Suslov (2012)

A new vision of the role of educational establishments is formed within the “University 4.0” model in the conditions of digitalization. This is manifested through their ability to form comprehensive educational platforms and ensure the generation of knowledge “about the future”, which is achieved due to the development of high-tech sectors and technologies for turning knowledge into reality (Kalmykova and Solovova, 2019).

At present, knowledge is assessed from the dynamic position – as abilities that need constant update. According to this, competitive advantages of organisations are formed based not on current knowledge but on the ability to generate, integrate, and regularly update knowledge as per the need. Ensuring these processes is possible due to interpersonal communications, which are combined with high-tech solutions (Kalmykova, 2019).

The intellectual development of the country is closely connected with the system of education. Despite the ambiguity of attitude towards modern education, it is education that forms the basis for mankind’s intellectual development. Schools, colleges, and universities form the main skills that are required by the labour market and that define the further development of humanity. At present, the system of higher education goes through transformation processes related to the change in the paradigm of the communicational and information

environment. Forms of socio-cultural communications and access to information change. Remote and hybrid education allows receiving a diploma without a physical presence in educational establishments, and cloud services offer unlimited access to information and knowledge. The main problem in these conditions is support for the rational creation of an educational process, which would integrate all achievements of digitalization with the continuation of the tradition of accumulating the scientific and intellectual experience in educational and scientific establishments. Preserving this tradition is one of the key demands for ensuring the processes of generation of talents in the mid-term and long-term.

Higher education cannot be viewed as repeater of knowledge and as a tool for obtaining a speciality. Its main difference, compared to lower levels of education, lies in the fundamental approach to generation, accumulation, transfer, and dissemination of knowledge. In the system of higher education, students receive systemic and wide knowledge, form a profound worldview, and get involved in the system of humanistic values – which, in the future, is the basis not only for employment but also for creative rethinking of their profession and full self-realisation. This view of higher education forms a principle of stable progressive intellectual development, according to which each next generation of students, using the achievements of their predecessors, raises or expands the level of knowledge. Autonomous or independent education gains larger popularity. Digital communicational and information

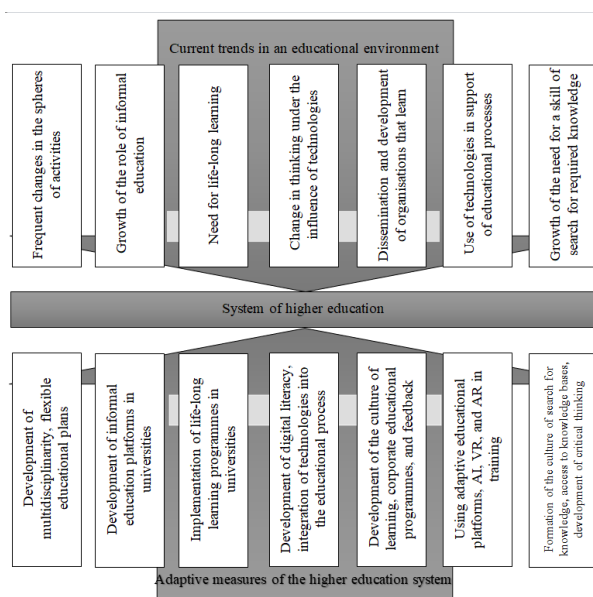
services, scaling, and aggressive marketing allow promoting the idea of the reduction of the role of higher education contrary to constant and dynamic independent learning with the help of short-term courses. Convenience and flexibility of such educational systems form their competitive advantage. Participants of such courses save their time and, in many cases, money. However, their knowledge does not have foundation on which it is possible to form and build interdisciplinarity and systemic and academic character.

Flexible short-term courses are an effective tool for knowledge management, but their role should be limited to an additional correcting influence, aimed at clarification and addition of knowledge, support for its relevance and dynamics. The main role in the formation of intellectual potential must remain with higher education establishments – universities.

Educational environment is formed under the influence of many multidirectional processes, which transform it and, at the same time, are transformed. This symbiosis in the conditions of digitalization deals pressure on the traditional system of education and dictates conditions

for its adaptation. The main trends (Siemens, 2005) are connected with attitude towards education, coordination of the educational process with objective labour conditions and personal development in new conditions, emergence of new opportunities, and change in education seekers' attitude under the influence of digital technologies (Figure 2).

In accordance with this, acceleration of the loss of relevance of knowledge predetermines the need for constant change in the form and character of activities. This, in turn, stimulates higher education establishments for interdisciplinarity and flexibility in the process of development of educational plans. An increase in the role of informal education is objective reality. Universities may also be involved in this process, creating platforms for informal education. A similar vision is inherent to the formation of the "life-long learning" concept. Here, higher education establishments may offer their programmes of such learning, starting from the moment of student obtaining a formal education.



**Figure 1.** Adaptive measures of the higher education system in response to the current trends in the educational environment

Source: Compiled by the authors based on Siemens (2005)

Somewhat deeper changes in the educational environment are seen in the change in thinking under the influence of technology. The tools of AI, big data, and the Internet of Things contribute to the fact that understanding of many processes and phenomena changes. From the position of universities, this requires further development of digital literacy and deeper integration of digital technologies into the educational process, including cloud services, technologies of AI, virtual and augmented reality, adaptive educational platforms, etc.

Collectively, the above processes transform the very perception of education, according to which the boundary between the teacher and student is erased: they study and develop together within one educational cycle. This conforms to the demands of digital transformation and is most fully realised within the concept of organisation that learns. Another important task of higher education establishments is developing the skill of searching for required knowledge in new conditions. The main measures in universities' adaptation here are the development of the culture of information search, critical thinking, and ensuring access to knowledge bases. This will allow ensuring the

openness of education seekers to new knowledge and ideas not only during their studies in the university but during their entire lives.

According to the theory of connectivism, learning takes place not through direct learning of information but inside a network that contains internal nodes and communities. Interaction within such communities allows the generation of new ideas and knowledge. At present, these opportunities are supplemented by the tools of machine learning, artificial intelligence, and cyber-physical systems (Sphero, 2023).

Thus, within Industry 4.0 and digital transformation, knowledge management must cover wider processes than just formalised training in student classrooms. The achieved technological symbiosis, which integrates knowledge and technologies within complex systems, offers different alternatives for knowledge management. The organisational model of knowledge management, which is achieved with support from universities, must have an adaptive innovative character (Khuriev and Mambetova, 2024). It must unify academic traditions and values with the flexibility of information systems and the potential of digital technologies. Development of these processes from the position of higher education establishments will allow reaching serious advantages in the development of the intellectual capital of the country and an increase in its competitiveness and innovative development.

#### **4. DISCUSSION**

The problem of identification of the role of higher education in knowledge management in the conditions of the digital economy has many debatable provisions, each of which requires additional research. This discussion must have a complex character, which would allow agreeing economic, educational, technological, and socio-cultural processes. Determination of the role and effectiveness of the modern system of higher education in the formation of the human capital of the country or organisation belongs to the most important tasks of scientific research. However, it cannot be considered in isolation from the processes of digitalization, inclusion, and commercialisation.

Assessment of the effectiveness of expenditures for higher education could be treated in the context of satisfying the needs of the labour market and from the position of prospective work for the expected demands of the labour market. This might lead to an effect of a gap between the market of educational services and the labour market. However, it is always expedient to evaluate the process of this character from the position of the real influence of higher education not only on the labour market but on the values of society and the

ability to ensure harmonious and comprehensive development and form new opportunities for talents.

The commercialisation of educational services of universities cannot be viewed in isolation from their scientific activities. This requires a deeper research methodology, which is characterised by the ability to assess the impact of fundamental science on applied solutions and the availability of the large volume of preliminary and intermediary work that is not fit for commercialisation.

However, the most relevant discussion from the position of determining the role of higher education in the conditions of the digital economy is its ability to ensure an increase in the digital literacy of society, form skills for the comprehensive use of the capabilities of digitalization, and integrate into the systems of development of human resources and intellectual potential of companies not only from the position of graduates' employment but also their further intellectual support during their career. The resolution of this problem requires clear mechanisms of the interaction of universities and organisations and agreement between educational components and demands of the labour market.

#### **5. CONCLUSION**

In the conditions of the digital economy, knowledge is the main resource, which ensures competitiveness and innovativeness of development. Universities are traditionally considered the main suppliers of intellectual resources in society. However, in the conditions of digitalization and informatization, the attitude towards the process of obtaining education changes, and the very mechanism of mastering and producing knowledge is transformed. Universities must adapt to new realities, integrating digital technologies into the educational process and developing digital competencies of students and teachers. This will allow ensuring training of personnel with the relevant set of competencies, who can effectively receive, disseminate, and use knowledge in the conditions of the digital economy.

With the transformation of the system of knowledge management, more attention is paid to informal education. However, this approach should be combined with classical higher education. Despite certain advantages offered by informal or independent education, it cannot provide academic, interdisciplinary, and systemic character, which is found in higher education. To ensure the possibility of future development of talents, higher education establishments must preserve their important role in the formation of the intellectual capital of society. For this, they must form an adaptive system of education, which would combine traditional and novel educational technologies.



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