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DIGITAL MOBILITY OF HUMAN CAPITAL IN THE CONTEXT OF PROJECT MANAGEMENT

E. R. Schislyaeva (a)*, D. A. Lipis (b), E. A. Panova (c), K. S. Plis (d)
*Corresponding author

(a) State Marine Technical University, Lotsmanskaya str., 3, St. Petersburg, Russia, schislyaeva@corp.smtu.ru
(b) State Marine Technical University, Lotsmanskaya str., 3, St. Petersburg, Russia, dlipis@smtu.ru
(c) State Marine Technical University, Lotsmanskaya str., 3, St. Petersburg, Russia, panova@corp.smtu.ru
(d) State Marine Technical University, Lotsmanskaya str., 3, St. Petersburg, Russia, plisskristina@gmail.com

Abstract

The prospects for economic development of any country should be determined and implemented within the framework of the general basic trends emerging in the modern world. One of the conditions for increasing the competitiveness of the modern digital economy is the development of human capital. Its importance in the conditions of globalization of the world economy and modern level of civilization development as a factor of social and economic development at the national, regional and transnational levels is steadily increasing. Human capital mobility is of particular importance in connection with the implementation of global projects and regional development programmes. The main goal of the research is to analyze the evolution of the concept of human capital mobility in the construction of a digital economy, implementing and using the project management, as well as determining the means and methods to support the digital mobility of human capital. The authors consider the peculiarities of the existing means of supporting the mobility of human capital, as well as the emphasis on advanced information technology solutions that form the infrastructure of the digital economy, necessary to support the digital mobility of human capital. As a result of the research, the concept of "digital mobility of human capital" was introduced, the necessity of its development in the formation of the digital economy of the Russian Federation was confirmed, and features of ensuring the digital mobility of human capital, taking into account the use of means and methods of project management, were considered.

Keywords: Digital economy, human capital, mobility, project management.

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1. Introduction

One of the leading global trends today is the implementation of the Industry 4.0 concept. This concept, in contrast to the concepts of "Industry 1.0" (mechanization, the use of steam engines), "Industry 2.0". (Conveyor production, use of electric machines), Industry 3.0. (Automation, application of information technologies and production equipment with control of numerical software) (IBMdatamag News Desk, 2014) does not provide for the creation of fundamentally new general-purpose technologies and includes the development and improvement of methods for the application of information technology and electronics, already created in the framework of the implementation of Industry 3.0.

Industry 4.0 includes the comprehensive digitalization of all types of assets with their simultaneous integration into an integrated digital ecosystem and the inclusion of all participants in the product value chain. At the state level, the implementation of the Industry 4.0 concept is represented by projects to create a national digital economy implemented by leading countries. So, program documents that determine the development of the economy of the Russian Federation provide for the formation of a modern digital economy of the Russian Federation. These documents include the National Program "Digital Economy of the Russian Federation" (The passport of the National Program, 2018). The specified program provides for the creation of an information technology infrastructure for high-speed transmission, processing and storage of data, reference data processing centers, as well as a number of other activities aimed at the formation and development of digital technologies and competencies. The instruments for implementing the program "National Digital Economy of the Russian Federation" are federal projects and federal targeted programs.

Modern digital technology tools, such as information technologies for life cycle management (PLM - Product Life Cycle Management) (Orozco, Grisales, Bedolla, D'Antonio, & Chiabert, 2016), enterprise resource management systems (ERP – Corporate Resource Management), customer relationship management solutions (CRM – Customer Relationship Management), cloud technology, broadband technology. Data and others allow us to take a fresh look at the concept of mobility of human capital and introduce the concept of digital mobility. The opportunities of distributed, parallel, collective work provided by advanced solutions in the field of information technology allow flexible and quick formation of teams for implementing programs or projects in a single integrated virtual environment without the need for physical movement of labour resources (Savvides & Stengos, 2008). With this approach to organizing work, an important factor, in addition to information and technological infrastructure, is the correct application of management technologies, one of the most important of which is project management, as well as standardization, unification and regulation of business and technology processes, data structures, data transmission and storage formats in digital form, development of common glossaries, classifiers and codifiers.

According to PricewaterhouseCoopers research, the development of digital competencies is a key factor for the successful implementation of the Industry 4.0 concept, the inability to find the specialists necessary for digitalization can be the biggest limitation, which leads to the need to develop new approaches to attract staff training, new competency models, and professional training programs, retraining and advanced training of staff (additional educational programs) capable of digital

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transformation into the scale of the enterprise, project, industry and the state as a whole in Abaho, as well as the need to implement a package of measures to increase labour mobility.

2. Problem Statement

The main objective of the study in this work is the formation of the concept of digital mobility of human capital as one of the key factors for the successful creation of a modern digital economy (Singh & Finn, 2003), as well as identifying the features of its provision in the context of project management with a comprehensive analysis of existing information and technological support tools for the approach under consideration.

3. Research Questions

The authors set up the task to form the concept of digital mobility of human capital. Based on this, the following questions were formulated:

3.1. What are the features of ensuring mobility of human capital in modern conditions of building a digital economy?

3.2. What advanced solutions in the field of information technologies that form the infrastructure of the digital economy are necessary to support the digital mobility of human capital?

3.3. What is the relationship between digital mobility of human capital and advanced management technologies in general and project management in particular?

4. Purpose of the Study

The purpose of the study is to analyze the evolution of the concept of mobility of human capital during the development of the digital economy, analyze the implementation and use of project management and determine the means and methods of supporting digital mobility of human capital.

5. Research Methods

The main research methods were collecting, analyzing and summarizing the current documentation and project management manuals. We analyzed the publicly available information on the digital economy and its construction methods, on the mobility of human capital, on the main trends in the labour market in our research. As part of the researching process were analysis of the official websites of information technology solutions development companies, analysis and generalization of the experience of the authors of this work.

5.1. The necessity to ensure mobility of human capital for the development of the digital economy

The labour market of the Russian Federation, as well as individual constituent entities of the Russian Federation, is characterized by a disproportion in the distribution of the population, including uneven labour resources. Because of inter-district migrations in recent years, three federal districts

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(Central, North-Western and Southern) acquired, and the rest lost hundreds of thousands of residents. Migrants arriving in the three federal districts were concentrated to a large extent in individual regions of the Russian Federation. The main flows of internal labour migration are directed to three constituent entities of the Russian Federation - cities of federal significance Moscow and St. Petersburg, as well as the Moscow Region (Trubin, Nikolaeva, Myakisheva, & Khusainova, 2018). In a number of subjects there is a significant outflow of the able-bodied population. This is observed not only in individual constituent entities of the Russian Federation, but also in entire federal districts. The non-proportional distribution of labour resources is not only territorial, but also professional (qualification) in nature. This phenomenon is one of the most important negative factors for the development of the regions of the Russian Federation. the creation of innovative production, prevents the growth in the number of highly productive jobs, prevents the increase in the number of highly qualified specialists, and becomes one of the key obstacles to the creation of a national digital economy.

The most important categories of the labour market are supply and demand. The conjuncture is determined by the ratio of supply and demand and may be equilibrium, deficient or excessive. Demand in a particular market is determined by the number of services that can be purchased for a certain amount within a specific time period. Demand for labour resources is formed by employers creating new jobs, as well as a list of jobs occupied by employees who do not have the appropriate qualifications (Chagina, Garbuzyuk, & Plis, 2017). The flexibility of the labour market is a versatile concept, it affects the interests of all parties to labour relations. It provides new opportunities for the subjects of labour relations. From the point of view of the employer, flexibility mainly leads to a reduction in the cost of attracting personnel, dismissing employees, as well as maintaining stable employment of personnel and provides a comprehensive increase in the efficiency of the enterprise. From the point of view of employees, the great flexibility of the labour market leads to dynamic changes in the forms and system of remuneration, the evolution of working hours, the emergence of new forms of employment, which helps optimize the livelihoods of individuals. Mobility in the labour market, which implies the possibility of staff relocation (Schislyaeva & Panova, 2014), reflects the willingness of an employee or unemployed person to change their status, type of employment, employer, professional affiliation, including in connection with a change in place of residence. Mobility includes moving staff. These can be intergenerational or intergenerational movements, organized or unorganized, horizontal or vertical, external or internal, one-time or frequent, forced or voluntary, etc. The movements may not include a change of place of residence or include such, provide for a change in employer, profession, specialty etc. Relocation allows take into account the interests and needs of a single enterprise in relation to labour mobility in detail and more efficiently. The personnel relocation takes into account both the movement of personnel, proceeding both from the needs of the enterprise and from the needs of the labour resources themselves. Relocation is considered to be the mobility of highly qualified specialists, therefore, usually relocation is of a point nature in the company.

In the context of the current stage of the of the Russian Federation economy development , the mobility of human capital take a particular importance in connection with the implementation of global projects and regional development programs. The creation of fundamentally new types of equipment (for example, the icebreaker LK-120 “Leader”), the design and construction of large infrastructure and

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industrial facilities (for example, the shipbuilding complex "Zvezda" in the Far East) require the involvement of many highly qualified specialists whose physical movement is in place work, often not possible, requires a lot of time, not economically feasible. In the context of the current stage of development of the economy of the Russian Federation, the mobility of human capital is of particular importance in connection with the implementation of global projects and regional development programs. The creation of fundamentally new types of equipment (for example, the LK-120 Leader icebreaker), the design and construction of large infrastructure and industrial facilities (for example, the creation of the Zvezda shipbuilding complex in the Far East) require the involvement of many highly qualified specialists whose physical movement to the place of work , often, not possible, time consuming, not economically feasible. At the same time, for a number of works, for example, design and engineering, the presence of an employee in the office is not a prerequisite (unlike, for example, the worker performing part processing on the machine). In this case, it is necessary to take advantage of modern digital technologies, with the use of which it is possible to form flexible "virtual work teams" consisting of many geographically distributed employees of the necessary qualifications united within the framework of a single integrated digital environment for the joint implementation of a project.

It is important to note the attention to the problem of ensuring mobility of human capital by the state authorities of the Russian Federation. For example, in the framework of the implementation of the Decree of the Government of the Russian Federation of April 9, 2010 year, No. 220 (Decree of the Government of the Russian Federation, 2010), it is envisaged to involve leading scientists from other regions in work in educational institutions of higher education, as well as in scientific organizations, (Decree of the Government of the Russian Federation, 2010) projects are being implemented to attract specialists to enterprises of the Far East, and programs for creating innovation clusters, technology parks, business accelerators, etc. The development of integrated cluster structures with a high level of investment attractiveness, significant infrastructural and human resources, integrated into global value chains, providing faster growth rates of the economy is one of the priorities of the Russian Federation. For the successful operation of clusters, technology parks, business incubators and other integrated structures, highly qualified personnel is needed, the involvement of which is possible through the implementation of the concept of digital mobility using advanced digital and information technologies.

5.2. Life Cycle Management and Modern Management Practices

The concept of managing the life cycle of complex technical products, facilities and structures has been known for a long time, there are a number of tools that exist and are successfully applied by leading enterprises and organizations of the Russian Federation. The most functional and modern tools currently can be considered: Dassault Systemes 3DExperience software platform (Dassault Systemes SE, 2019), PTC Windchill data management system (PTC Company, 2019), Siemens PLM Software Teamcenter software package (Siemens Digital Industries Software Company, 2019). In addition to these software products, on the domestic market there are a number of systems with more limited functional capabilities, which include domestic developments (for example, developments by the Russian company Ascon). All these can be combined with the concept of data management systems (PDM - Product Data Management). The main functions and the main purpose of such solutions is to provide control over the

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process of creating, storing, organizing, converting and the ability to effectively apply product data throughout its life cycle from concept to disposal by all participants in this life cycle. The listed products, and first of all, the most advanced ones, are able to perform these functions in full, giving significant advantages in the development (design), production (construction), operation, maintenance and repair. Each of these systems can be a support and data management center for the entire product life cycle. At the same time, life cycle management and its data support should be separated. The creation of a unified life cycle support center is possible using any of the listed systems (taking into account the limitations in some of them on the volume of stored information and its presentation formats), while it may not be possible to form a unified life cycle management center for an object (product, structure). For example, if the customer of the product, having ordered and received it from the manufacturer, after putting it into operation, sold it or does not use any information technologies in life cycle management. The presence of a high level of data support can contribute to a higher capitalization of the product (in modern conditions, for example, for some products it is mandatory to provide the customer with interactive electronic technical guides. Organizational and managerial decisions in the field of production (manufacture, construction), operation, maintenance and repair, reconstruction (re-equipment) of objects, structures, and products are implemented as part of project management processes, project portfolios and (or) programs, as well as management processes operational activities. At the operation stage, products and operational management processes are decisive, as well as project management methods and program management approaches based on them (GOST R 54871-2011, 2011). Support for data management is very important for such stages of the life cycle as development (design), manufacturing (production, construction), maintenance, repair, modernization, disposal, etc. At the same time, the role and importance of management technologies (such as project, program, project portfolio management) and operational management technologies should not be confused with data life cycle support methods (including methods for maintaining the relevance of data (product information model) at all stages of the life cycle). The significant difference between the support of the life cycle and the management of its stages is taken into account by all developers of modern PDM-class systems and platform solutions. For example, today almost every PDM class system has a specialized functional module for managing requirements, projects and programs of one or another functionality, as well as interface modules for working with specialized software complexes for managing projects, programs and project portfolios (a number of which will be analyzed in this research).

In the context of ensuring digital mobility of human capital, the systems under consideration provide access for all participants in the life cycle, regardless of their location, to relevant and reliable data, formalization and management of business processes related to the creation and use of this data, the possibility of holding meetings and discussions based on digital (including three-dimensional) data, access to regulatory and reference information, the formation of unified catalogs of materials, components, equipment, the management and storage of all digital data (including product models created using computer-aided design systems (CAD – Computer Aided Design), documents (contracts, presentations, videos, etc.), images, virtual results engineering analysis (calculations) (CAE - Computer Aided Engineering), the results of experimental studies), etc. It should be noted that advanced systems can work on mobile platforms (Android and IOS), which is especially important in the context of the

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development of broadband Internet and the growing popularity of the use of mobile devices for solving business problems, as well as the availability of cloud versions (for example, this reduces the requirements for computing power, suitable for performing virtual engineering analysis, requirements for the availability and qualifications of personnel serving the company's information technology infrastructure).

5.3. Standards, project management best practices, specialized project management tools

In accordance with the widespread opinion for a field of knowledge such as project management, the concept of standards differs somewhat from that in other areas. Project management standards are a set of “best practices”. They reflect the idea adopted by most experts in this subject area about the most effective actions and (or) decisions. These standards and “best practices” should not be taken as guaranteeing success under all possible circumstances, they are only the result of summarizing the experience of many companies – world leaders in their fields. But there is a general opinion of the professional community that the complete disregard for the recommendations contained in modern standards of project management is almost guaranteed to disruption of the project and / or program. Taking into account modern ideas about project management, national and international standards (for example, ISO) should be highlighted.

The documentation of the International Project Management Association (IPMA) (IPMA Editorial Committee, 2006) is slightly different from the standards mentioned. From a formal point of view, it is not a standard of the project management methodology; however, the content of these documents does not contradict the other standards considered in this work (Vukomanović, Young, & Huynink, 2016). The specific feature of domestic industry is largely determined by the conservatism of the tools and methods used, including management methods, which cannot be offset by the cost of introducing costly advanced information and technology solutions in this area. For example, terminology, as well as methods for managing programs and projects, are used by domestic industry in a very limited volume and, often, very formally. Many business processes are not documented or documented very superficially. The motivation of a significant number of employees of scientific organizations, research centers, design bureaus and industrial enterprises is not focused on ensuring production efficiency in general and on reducing the time for project implementation with a minimum number of adjustments (this is due to the peculiarities of financing and organization of acceptance of work performed under state contracts and state defence order). In this regard, the role of advanced management methods for integrated structures (corporations, associations, holdings) and domestic industry enterprises is very large and is an important reserve for ensuring their efficiency and competitiveness.

Existing project management standards are not equivalent, but each of them covers almost all issues of project management, there are no contradictions between them. Moreover, each standard is focused on only one or another set of project management issues. For example, the PMI PMBOK standard (Project Management Institute, 2012) covers the goals and products of the project, the PRINCE2 standard is more focused on addressing the issues of managing the project implementation environment, the P2M standard addresses in more detail the issues of managing changes and project innovations, as well as various aspects of the organization of interaction between project participants. Among the

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widespread project management standards, the ISO 21500 (GOST R ISO 21500-2014, 2014) and PMI PMBOK standards more than others meet the practice accepted in the domestic industry.

The practical experience of project management in industrial enterprises is based not only on the use of certain standards, processes and methods, but also on the practical experience of providing them with the support of the functional capabilities of advanced information technology solutions. Currently, in addition to universal multifunctional platform information technology solutions, including project management functionality (PLM, ERP), a whole class of software products has been formed that is specifically designed to provide solutions to project management issues in large industrial companies (investment companies, construction or energy corporations) etc.). These products are in international terminology available from Enterprise Project and Portfolio Management (EPPM). These software systems provide support for a variety of project, program and / or project portfolio management processes in accordance with recognized international management standards, they have virtually no restrictions on the amount of information processed, support the ability of multiple users to work simultaneously with one project, and realize the communication capabilities of project participants and have developed functionality of business intelligence. As a rule, all such software solutions provide the possibility of applying a wide range of tools and capabilities, and also support methods for managing the time (for example, the critical path method) and the cost of projects (including the formation of a direct cost budget, the utilized volume method, etc.). A characteristic feature of these software systems is the ability to take into account the need for labour, production and material resources not only for individual projects, but also for the entire set of projects within the framework of programs and (or) project portfolios. At the same time, a significant part of EPPM solutions implements the functionality of integrated resource planning and the application of simplified methods for their optimization (mainly by the method of resource leveling, which only allows smoothing peak loads by postponing the start of work to later dates). An exception is the Spider Project, software that can use more flexible algorithms to optimize resource requirements. The indicated optimization algorithms are oriented by highly qualified employees of the planning department and allow it to be used as a system of direct work management in complex projects with many participants (for example, construction projects).

The use of project management tools and methods is a prerequisite for the effective implementation of the concept of digital mobility of human capital. Indeed, managing a large number of geographically distributed employees is much more difficult than managing a team located in the same office and this requires standards for organizing the implementation of projects, as well as means to support the implementation of these standards.

6. Findings

As a result of the research, the concept of “digital mobility of human capital” was introduced, the necessity for its development in digital economy of the Russian Federation was identified and confirmed. In the research, the authors considered the main means of information and technological support, as well as the features of ensuring digital mobility of human capital, taking into account the use of project management tools and methods.

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7. Conclusion

The development of digital mobility of human capital in the formation of the digital economy of the Russian Federation along with the improvement of management technologies, the introduction and application of advanced information technology solutions, the improvement of the regulatory framework is a prerequisite for increasing the competitiveness of the Russian economy, ensuring the economic security of the state, increasing labour productivity and quality of life population. The implementation of the concept of digital labour mobility opens up new opportunities for creating projects of varying degrees of complexity, as well as for developing highly skilled labour resources and increasing the efficiency of their application.

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