The Use of Digital Technologies in the Personnel Management System of Enterprises of the Aerospace Industry

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***Abstract*—The authors investigate modern processes of personnel management at high-tech enterprises of the aviation and rocket and space industries in Russia. A comparison is made between the digitalization of individual processes taking place in companies and a complex digital transformation, which has a significant impact on the entire development strategy of the organization. The advantage of using modern digital technologies in mechanical engineering for the complex change of interrelated solutions at all stages of the aircraft life cycle is shown. The main tasks of enterprise personnel management services that appear in the process of digital transformation of business are outlined. The article describes the advantages that HR-specialists receive, using Digital-processes in their work, in comparison with traditional, often outdated, methods of working with personnel.**

***Keywords*—Digital technologies, digital transformation, personnel management, aviation and rocket and space industry.**

I. Introduction

The active development of Digital Technologies has led to large-scale changes in the management of all sectors of the economy and social policy, caused a large-scale digital transformation of our entire society. Currently, a wide range of digital services and products are being deeply integrated into modern cyber-physical systems of production processes. At high-tech enterprises of the aerospace industry in Russia, the main catalyst for digital development is the modern concept of the fourth industrial revolution. It provides for the ability of cybernetic systems to create a virtual copy of the physical world; the functionality of human-machine interaction via the Internet; performance by robots of especially dangerous and difficult tasks for humans; autonomous decision making by systems with artificial intelligence. As a result of the development of Industry 4.0, an increasing number of new professions appear, the latest project management methodologies are being created, fully digital divisions and the largest global infrastructures are being formed.

Digital transformation of enterprise management is a large-scale concept that affects all areas of production and business, including production processes, product line, services and integrated approaches to the application of solutions. The goal of digital business transformation is to create a new sustainable organization model that can work effectively in the digital technology cycle. This process requires not only knowledge of technology, but also an understanding of the basic principles of building next generation assets that can support and develop innovative business models.

II. Digital Transformation Of Production

Digitalization of business processes is the transition of companies to electronic platforms, in which all processes are adapted to the tools and technologies of the digital economy. Thanks to digitalization, the process of setting goals and assessing the quality of their implementation becomes automated, transparent, centralized, efficient and, most importantly, the accumulated structured information becomes its result. The next stage of business development is digital transformation, which provides for a qualitative change in the entire business model, from the company's strategy to the digitalization of all production processes. Digital transformation is a deep transformation of products and services, organization structure, development strategy, customer service and corporate culture. In other words, it is a revolutionary transformation of the organizational model. But a person is still at the center of a successful digital transformation strategy: there is no point in developing innovation for the sake of innovation. The term “digital transformation” itself is not entirely correct: it is people who transform organizations and manage business growth, and innovation gives them the opportunity to generate ideas, change the course of work and find new ones. The use of digital technologies in the personnel management system of enterprises of the aerospace industry. This is a whole path to engaging a set of capabilities and changing a number of processes, functions, models and more in order to use these

changes and opportunities of digital technologies and their impact on society as a whole in a strategic and priority way.

The aerospace industry is moving in the same direction: it is adapted to the new digital phase of development, thanks to significant structural changes in the industry itself and in related areas. At the enterprises of the «United Aircraft Corporation» and the State Corporation «Roscosmos», “smart” systems are emerging, the concept of a virtual design bureau is used, when engineers from several design bureaus and production sites work on the design of aircraft models in a single digital environment. In the aerospace industry, new additive technologies and composite materials are also successfully used, robots are used. Artificial intelligence is the first assistant in the accumulation, analysis and transmission of data in a unified format. It is noted that computer 3-D programs reduce the design by 2 times: all drawings made without paper are quickly adapted and transferred to special five-axis numerical universal machines. The digital transformation of the process of creating aviation and rocket and space technology is not just a fashionable trend, but a real change in the basic approaches in mechanical engineering. We are talking about a comprehensive change in all interrelated solutions at all stages of the aircraft life cycle - from the concept to the development of documentation, testing, launching into serial production, and support of operation. Digitalization of the strength calculation process using computer methods, digitalization of the creation of working documentation for solving design problems with the creation of three-dimensional geometric models - now almost no design work is performed at high-tech enterprises without the use of computers. An example of digital transformation is the creation of a “digital twin” of an aircraft or rocket - a virtual object on which the behavior of a real aircraft “in hardware” or its separate system can be simulated, the root cause of failure can be identified, the scenario of behavior in an emergency situation can be verified, or service time can be reduced.

III. DIGITAL TRANSFORMATION OF HUMAN RESOURCES

In the very near future, business will not really need large assets and labor reserves to support its life. In contrast, the company of the future is a mobile, fast-paced organization that can quickly develop and bring competitive products to market with a flexible structure. It can be argued that the HR structure of an enterprise plays one of the leading roles in the digital transformation process, because knowing what resources are available to a business, where to get them, and how to organize them for a specific task can become a key factor in competitiveness. The main task of HR in the process of business transformation is the creation of a new corporate culture, the formation of new values, which are expressed in the competencies and personal qualities necessary for employees in the new business environment. To do this, the HR leader must, first of all, transform himself, have a strategic vision, be an integrator of changes and find a way to help teams transform without losing the values and advantages of traditional business.

At the heart of a company's digital transformation are not new technologies per se, but new business models. The key to transformation is the emergence of new business models that reshape and create new digital markets and ecosystems. At the same time, specific leading companies are at the forefront of changes of this magnitude, introducing new technologies to achieve these goals. IT companies and startups are most actively implementing new technologies in HR: they are generally open to new solutions, understand the benefits they will receive, it is easier for them to start using technological products due to the peculiarities of the corporate culture. Timely digital transformation in industry is a strategic imperative for many countries, including Russia. Right now, Russian enterprises are presented with a special chance to reduce the significant gap with world leaders.

The impending digital revolution requires a rethinking of the rules of doing business: new management models that provide productivity, innovation, flexibility and adaptability are coming into competition. And the foundation for this transition is the transformation of human resources. In modern digital reality, new types of relations are formed between employees, managers and subordinates, a different corporate culture. A new environment based on digital technologies is not only modern methods and tools, but also a new standard of human relations with the world, which means new skills, a new level of responsibility, a new worldview. The Boston Consulting Group (BCG), an international management consulting firm, estimates that by 2025, 10 to 50% of all currently existing professions may change or disappear, and 19% of all workers may be replaced by robots by 81%.

Currently, all over the world there is a further change in the management paradigm associated with the transition from the concept of personnel management to a new concept of human capital management, aimed at active search and development of talents. Particular attention is focused on humanizing HR practices and caring for the employee of the organization. One of the principles of forming the corporate culture of an organization within the framework of the new management paradigm is the modern concept of "company - family". The implementation of this approach focuses on paternalism, common group interests of employees, taking into account the “life peaks” of employees, caring for the health and lifestyle of employees, as well as increasing the time for interaction between employees and their families. This factor also implies increased attention of the company's management to the development of new tools and methods of personnel training. The globalization of the economy, knowledge and technology, the internationalization of business reduces the importance of state borders as barriers to the movement of goods, services, capital and labor, and enhances international business activity and the mobility of modern workers. The needs of labor resources for the conditions and content of work change the holistic perception of work activity: autonomy and flexibility of work are becoming priorities, especially for young people. This factor increases attention to the creation of a variety of employee mobility programs (from the development of a system of mobile workplaces and special training programs for employees to international internship programs). An example of increasing the attention of HR specialists to the development of mobility programs can be the introduction of new positions at enterprises: specialist in international mobility of employees; International Diversity Management Specialist; mobility consultant.

Aerospace industry leaders are increasingly faced with the fact that the usual approaches and technologies of personnel

management no longer demonstrate the expected efficiency. In these conditions, increasing the efficiency of the company's functioning requires both the development and implementation of new personnel-oriented approaches to personnel management, new technologies and tools, and the modernization and adaptation of the already used tools for making and implementing management decisions. In modern conditions, a special phenomenon of the information space is the fact that information flows are increasing many times over. Intellectual capital becomes the foundation of an organization's commercial and professional success. Until the knowledge of individual employees becomes available to others, it is only their personal intellectual capital, but when it is brought to the general corporate level, it becomes the property of the entire company. Effective knowledge management in these conditions is an undeniable competitive advantage. For these reasons, projects for the creation of a knowledge management system have been initiated at the enterprises of the aerospace industry. The main idea of these projects is the formation of information content to support the work of employees. That is, depending on the qualifications and competencies of the employee, the specifics of the work performed by him at the moment, the knowledge management system should prompt him to the previous experience of similar work (in the form of links to similar design solutions, scientific and technical reports, data on the investigation of the causes of failures and malfunctions) , regulatory documents, the availability of information about promising research in the field of this work, provide links to colleagues who had experience of similar work or are now dealing with similar issues. Particular attention among the tools is paid to cognitive search, which should provide the most flexible finding and preparation of information analysis from all available sources - both from the enterprise information systems and from external systems using artificial intelligence technologies, ontology systems, semantic parsing of queries and returned results.

Each division of the company should act as a digitalization driver in its area of responsibility. The HR department can make decisions on the implementation of automation tools based on employee requests, business needs and based on current trends. Leaders of all levels and, of course, the HR department should contribute to digital transformation and evaluate the attitude of personnel towards it. In the context of digital transformation, the requirements for employees are changing, and HR specialists must work differently. Digital processes challenge traditional workplaces. This also applies to HR professionals: digitalization of this area reduces the burden on hiring and training interns. Thanks to new tools, specialists can communicate with candidates through mobile applications, social networks and cloud technologies. For example, a person before an interview does not fill out a questionnaire on paper that is familiar to everyone, but an electronic form. Thus, the employer quickly receives and processes information. Automation is firmly established at all stages of recruitment and training:

• video presentations that have replaced the group presentation;

• passing the quest instead of interviews;

• training through special portals.

HR digitization is yielding great results, namely reducing the burden on recruiters, staff turnover, and improving the hiring funnel.

In the personnel management system of an enterprise of the aerospace industry based on digitalization, the following tasks can be solved:

• reduction of losses of working time of employees, increase of labor productivity;

• increasing the attractiveness of the employer;

• decrease in staff turnover;

• reduction of administrative and management costs, optimization of the personnel structure.

The personnel department of the enterprise faces new tasks:

• improving the quality of HR services;

• reallocation of HR specialists' time from routine operations to tasks that are more important for the development of the Corporation (talent management, employer brand development, analytics, etc.);

• increasing the involvement and satisfaction of personnel;

• reduction of personnel costs (due to better quality expertise);

• optimization of the number of personnel services.

IV. Conclusions

As a result of the study, it can be noted that modern mechanisms of the digital economy are actively used at high-tech enterprises of the aviation and rocket and space industries, which are part of the largest Russian state corporations «Roskosmos», «ROSTEC» and «United Aircraft Corporation». The most important direction of increasing the competitive stability of the leading industrial enterprises of the industry is the transformation of human resources. The management of companies is required to develop a new development strategy that provides for the introduction of modern approaches to personnel management, focused on advanced digital technologies and HR analytics. The current nomenclature of positions and specialties is being revised, as a result of which many professions become unclaimed, and the greatest demand is for multidisciplinary specialists with competencies in related fields, and necessarily possessing information and computer technologies. The advantages of using digitalization in personnel management are shown. An initiative has been taken to introduce new projects for the creation of a knowledge management system for workers at the enterprises of the industry. A range of tasks has been identified that are already being solved on the basis of digitalization, and more complex and large-scale tasks have been set for the future.

References

[1] Digital Evolution Index 2019. https://newsroom.mastercard.com/ru/press-releases, 2019.

[2] G. Margarov and E. Mitrofanova Management of Ransomware Detection and Prevention in Multilevel Environmental Monitoring Information System. *NATO Science for Peace and Security Series C: Environmental Security*, pp. 125–131, 2020.

[3] G. Margarov, E. Mitrofanova and R. Gevorgyan Designing effective online surveys for engineering study programs development based on feedback from stakeholders. *IEEE Global Engineering Education Conference, EDUCON*, pp. 239–247, 2017.

[4] A. I. Tikhonov, A. A. Sazonov, S. V. Novikov, Russian Engineering Research, no. 39, vol. 4, pp. 349-353, 2019.
[5] V. M. Kraev and A. I. Tikhonov Risk Management in Human Resource Management. *TEM Journal: Technology, Education, Management, Informatics*. no. 8, vol. 4, pp.1185–1190, 2019.
[6] HR Digital: 2019 trends and technologies. https://yandex.ru/turbo/h/hr-elearning.ru/hr-digital-trendy-i-tekhnologii-2019-goda-o-kotorykh-govoryat-hr, 2019.
[7] 6 main HR trends in 2020. https://hurma.work/ru/blog/6-glavnyh-hr-trendov-v-2020-godu, 2020.
[8] V. M. Svistunov, E. A. Mitrofanova, V. G. Konovalova, A. E. Mitrofanova and Trubitsyn, K.V. The European Proceedings of Social & Behavioural Sciences. International Conference on Research Paradigsm Transformation in Social Sciences, no.35, vol.35, pp. 916-923, 2018.