

CRISIS PERSONNEL MANAGEMENT IN HIGH-TECH ENTERPRISES

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Abstract:

High-tech enterprises play a big role in the scientific and technological development of the Russian economy. In spite of many help from the government, they are increasingly faced with the challenges of the crisis, which are caused by unfavourable environmental factors. For their successful functioning and development requires a reorientation of approaches to a variety of management areas, one of which acts as personnel management. It is from the effectiveness of human resource management strategy depends the formation of the competitiveness of high-tech enterprises, the ability to achieve long-term goals and implementation of the overall strategy. For high-tech enterprises the personnel management strategy should be adapted to the unstable economic growth, the turbulence of the environment, instability of the conjuncture. It should also take into account the specifics of these companies, the high costs of research and development, innovations in production technologies and the final product. Therefore, the main tools of optimization of staff should act soft measures to reduce personnel in the crisis.

Introduction

The aim is to generalize the theoretical foundations and practices of systematization the methods of crisis management personnel in the high-tech enterprises and analysis of the existing models of implementation of HR strategies. It is proposed to build the technology of building mutually beneficial relationships between the staff of high-tech enterprise and its management in the crisis in Russia.

Today, the speed and scale of the economic and geopolitical changes indicate the need for adequate adaptation of personnel management model to the needs of the company's development, strengthening and enhancement of its potential in terms of turbulence and volatility in market conditions, the limited human, technological and financial resources, as well as the extremely unfavourable external economic environment. It requires the formation of new rules of formation and functioning of personnel management strategies it as a system in a crisis.

The purpose of the publication is based on the analysis of available scientific literature and the results of human resource management practices in Russia and abroad. The study is based on systematic and dialectical approaches, general scientific and special methods. The principles of

evolution will act as the main methodological principles. The theoretical significance of this work is due to a subject novelty and to the lack of analogues of the conducted researches. The empirical framework used in this research work, can be used as a historiographical material in the further development of the issue of profound problems. In this work were used statistical data of the Russian Statistical Agency, the materials monographs author of the article, such as "Innovative activity in Russia: strategic directions and mechanisms", "Modern enterprise in the innovation economy: theory and practice", "Innovative Processes in the Russian Economy", "Features of human capital management in the interests of innovation development of economy of the region" and the article "Justification of reorganization of work measurement system as a factor in improving productivity and sustainable economic development".

As an empirical basis of research acted major Russian science-intensive enterprises science Korolev city. Among them PJSC "Rocket and Space Corporation "Energiya"" and Corporation "Corporation Tactical Missiles". Information on their activities and work with the staff was taken from open sources of information and also on the basis of the results of research graduates bachelors and specialists, prepared the final work by the author of the article.

1. High-end enterprise: essence, management features, problems and prospects of development

An analysis of global trends shows that the high-tech and high-tech manufacturing now occupy a decisive role in the scientific and technological development of the economies of most countries. They materialize the main part of the results of research and development and thus formed the demand for achievement on the part of consumers of science and technology. The scale of the high-tech and knowledge-intensive sectors is largely characterized by scientific, technical and economic potentials of the country. In addition the state high-tech industries are becoming one of the conditions for successful integration of any country in the emerging global system of world economic relations. Given the trend of reorientation of the Russian economy from the export of hydrocarbons to the creation of high-tech, there is need for a reorientation of approaches to knowledge-based production management.

Problems of development and distribution of high technologies are relevant because of their special importance for the sustained development of economy and society, as they contribute to and deliver improved living standards due to the intensive factors: labour productivity growth, reducing the relative level of consumption and more efficient use of non-renewable natural resources.

Belonging to the category of industries it is characterized by high-tech science-intensive production index, determined by the ratio of the volume of R & D expenditure (VR&D) to the volume of gross output of the industry (Vgoi):

$$(VR\&D / Vgoi) \cdot 100\%. (1)$$

It is believed that indicator for high-tech industries should be 1.2-1.5 times or greater than the average for the manufacturing industry. The world statistics industries and enterprises are classified into high-, medium- and low-technology-based coefficient data values. An important role in the classification of industries and enterprises took the Organisation for Economic Cooperation and Development. To date, there is absolutely accurate classification of industries by the degree of technological and research intensity, so in this study will be used by the approaches proposed by the OECD. In this classification are used two main approaches:

1. Classification by sectors of high technology. The main criterion - the intensity of innovation in the production process.
2. Classification of manufactured products. The main criterion - the research intensity of the final product. Both of these classifications are often do not coincide with each other.

Due to shortage of analytical materials about the high technology enterprises in Russia and the lack of uniform criteria for classifying enterprises into this category, it seems appropriate to consider the general trends in the innovative development of the country. The share of innovative products, works and services in the total volume of shipped goods, works and services amounted to 8% in 2015, and intellectual property valued at more than 400 billion roubles (see table 1). However, despite the positive value growth of a number of indicators characterizing innovation, there are deep-seated problems of scientific and technical sphere.

Table 1: Main innovation indicators of the Russian Federation

№	Index	2012	2013	2014	2015
1	Innovative activity of organizations (the proportion of organizations implementing technological, organizational and marketing innovations in the reporting year, the total number of surveyed companies), percent	9,3	9,5	10,4	10,3
2	Share of organizations implementing technological innovations in the reporting year in the total number of surveyed companies, percent	7,7	7,9	8,9	9,1
3	Shipped goods of own production, works and services by own forces, billion roubles, including innovative products, works and services billion roubles	20,711	25,794	33,407	35,944
		934,59	1243,71	2106,74	2872,26
4	The share of innovative products, works and services in the total volume of shipped goods, works, services, percent	4,5	4,8	6,3	8,0
5	Expenditure on technological innovation, billion roubles: - At current prices - In constant 2000 prices	399,12	400,80	733,82	904,56
		114,99	101,12	160,29	182,12
6	The share of expenditure on technological innovation in the total volume of shipped goods, works, services, percent	1,9	1,6	2,2	2,5
7	The proportion of organizations implementing organizational innovations in the reporting year in the total number of surveyed companies, percent	3,2	3,2	3,3	3,0
8	The proportion of organizations implementing marketing innovations in the reporting year in the total number of surveyed companies, percent	2,1	2,2	2,3	1,9
9	The proportion of organizations implementing environmental innovations in the reporting year in the total number of surveyed companies, percent	1,5	4,7	5,7	2,7

Source: calculated by the author according to the State Statistics Committee Russia

It should be borne in mind that at the present time there is industrial development VI technological structure, which includes nanoelectronics, genetic engineering of animals, interactive multimedia information systems, high-temperature superconductivity, etc. At the same time due to the general low technological level of the production base, the impossibility

of manufacturing many kinds of high technology industrial products, for which there is strong domestic demand, increases dependence on foreign supplies of finished products. This problem is exacerbated by the depressed state of science and the low level of innovation activity. This imbalance between the volume of production of high-tech products and technologies and their imports are great even in the strategically important regions of the country.

Given the importance of knowledge-intensive enterprises to the country's economy remains an open question about the data management features of the economic entities. Despite the existence of common approaches to the management there is the specific characteristic of the management of R & D (Khrustalev, 2002), namely:

- The complex nature of management, allowing to solve all the problems of the creation of technology from research and development work to production and operation.
- Management of high scientific and technical level of production, which has no foreign analogues or inferior to them.
- A large amount of R & D carried out by research institutes, design bureaus and plants, with the result that the last significant manufacturing capacity loading performance of experimental samples of the products, their fine-tuning during the time of production because of the design changes and modifications. This pattern of production requires the establishment of strong links between the actors of the art, an organic compound into a unified business structure.
- The dominance of technology changes in the process over a fixed production and the consequent need for regular updating of fixed assets, the development of research and experimental base.
- A significant length of the full life cycle of technology, reaching for some types of its more than 20 years, making it difficult production management because of the lag time effect control actions and increases responsibility for the choice of development strategy.
- The diversity of research and development and diversification of production.
- High dynamics of development of production, manifested in the constant renewal of its elements (objects of research, development and production, technology, circuit design and structural design, information flows, etc.), changing the qualitative and quantitative indicators, improving research and production structure and management. Dynamic time release products complicate the task even load and the use of production capacity.
- Extensive intra- and inter-sectoral co-operation due to the complexity of high-tech products and specialization of enterprises and organizations.
- A high degree of uncertainty (entropy) in the management of the latest developments, in which decision-making used by predictive estimates technologies of the future.
- The creation of qualitatively new products, as a rule, carried out in parallel with the development of the main components (circuit design and design decisions, physical principles, technologies, etc.).
- Intensive investment process - a key factor in achieving the goals of research and development of high scientific and technological level, accompanying the implementation of major projects.
- The presence of unique collectives with a large proportion of scientists and highly qualified engineering and technical personnel and production and industrial employment in total employment in the development and production.

Thus, the high-tech enterprises have a number of features of management, and in particular, human resources management as the main resource of the formation of new development, R &

D and technology. Given the current trends in the onset of the crisis requires a reorientation of approaches to personnel management for building a path of sustainable development of these enterprises.

2. The approaches to crisis management personnel of high-tech enterprises

Crisis management is the process of forms, methods and procedures aimed at socioeconomic rehabilitation of financial and economic activities of the enterprise, establishment and development of the conditions for exit from the crisis. It comprises a body of knowledge and analysis of practical experience, aimed at optimizing the mechanisms of regulation systems, identification of hidden resources, and the potential development on a complex stage of development. As rightly pointed scientist Arutyunov Yu, crisis management specifics associated with the need to make complex management decisions in conditions of limited financial resources, a large degree of uncertainty and risk (Arutyunov, 2015).

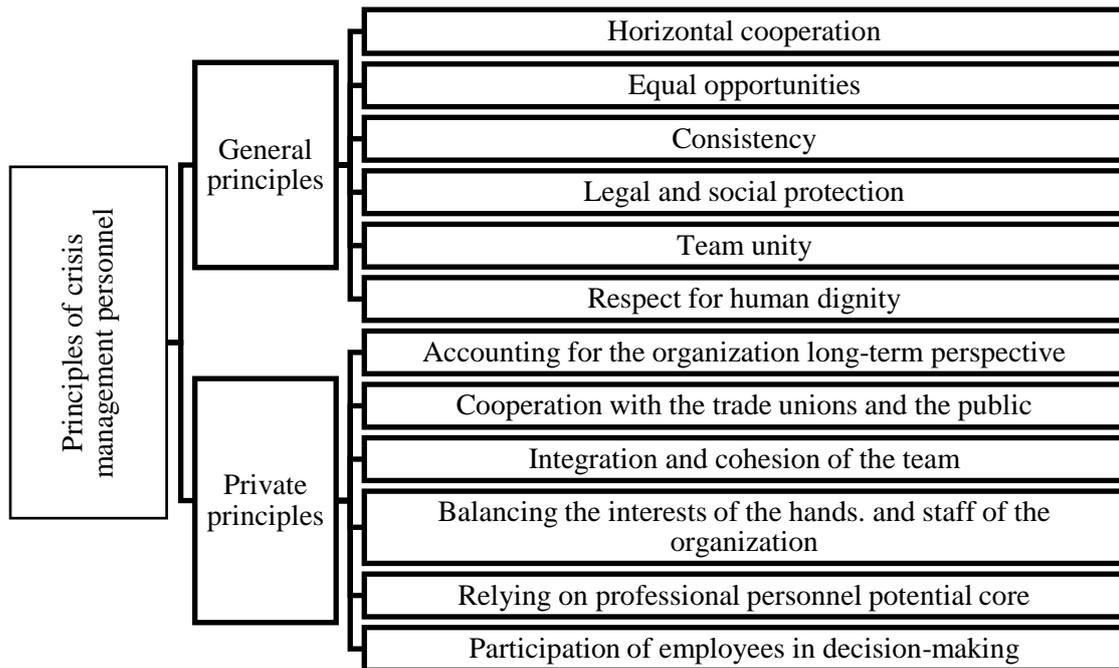
Polysemy of the economic, especially the managerial understanding of crisis management is due to the dual nature of any crisis, which simultaneously creates and destroys, forms preconditions and prepares conditions for further development and release from the old business strategy (Bezdenzhnykh & Galai, 2015). Overcoming crises arising in the enterprise is impossible without an active work with the staff and building an adequate strategy for personnel management. The activities of personnel services at this stage include: diagnosis of the staff of the company, reorganization strategies and personnel support program reorganization, reduction of staff, programs to improve productivity, resolve conflicts, especially aggravated during this period. Currently, during the crisis, companies can count on the patience of the staff willingness to help the most of their company to overcome this difficult situation (Bazarov, 2012).

In crisis management role of human capital is manifested in the following factors. Firstly, in the prophylaxis of crisis situations, the quality of human capital affects the number and nature of the errors in decisions on their perception of the temporal development of cyclic signals, objective assessment of the situation, the design of anti-crisis activities. In the presence of the human capital the likelihood of a deep and devastating of crisis declines. Secondly, during the crisis, human capital acts as a stabilizing factor. Educated people deeper understanding of the events surrounding reality and, therefore, react to them with fewer elements of panic, slackness, indiscipline. Many believe that this is determined by the individual's nature, his character. Agreeing in part with this, it is obvious that many personality traits, such as confidence, self-discipline, efficiency, generated in the process of acquisition of professionalism, the implementation of education, manifestation of corporate culture, ie, all that reflects the concept and the reality of human capital. Thirdly, when you exit the crisis, human capital plays a significant role in accelerating this process. There are important such its features as professionalism, enthusiasm, future-oriented thinking, which provides general education, innovation.

In the crisis management is very important harmony of the two qualities of human capital: its role as an object and as a management tool. In an effort to alleviate the crisis or to resolve it in favour of the development of the organization, it is necessary to promote the development of human capital, to invest in education, healthy lifestyle, and so on., to motivate creativity work, to create social and psychological conditions, to form the traditions and values, to contribute to the accumulation of experience, to improve the level of corporate culture (Belyaev and Korotkov, 2015). One of the main problems of modern management is to determine the crisis

personnel management principles. Principles of human resources management - rules, provisions and norms to be followed by managers and specialists in the management process - reflect objective tendencies, social and economic laws, scientific advice of social psychology, theory of management and organization. According to the author, the principles are effective when they interact and complement each other, when integrated into a coherent system, shown in figure 1. Thus, human resources management in a crisis state of organization is a versatile, well-planned and thoughtful work, based on a system of scientific principles, art and savvy entrepreneurs and managers.

Figure 1: *System principles of crisis personnel management*



Source: Rybkin, 2014

Personnel management tasks in crisis (Rybkin, 2014):

- The formation of the team managers who can develop and implement a program for the survival and development of the enterprise.
- The preservation of personnel potential of the nucleus of the organization: managers, professionals, workers, of particular importance for the enterprise.
- Restructuring human resource capacity of the enterprise in connection with the organizational changes in the course of restructuring, the implementation of innovative investment projects, diversification of production and the reorganization of the company.
- Reduction of socio-psychological tension in the team.
- Social protection and employment of redundant workers.

HR management methods in a crisis at the enterprise aimed at overcoming resistance to change on the part of staff. The most common methods of work with the staff in the conditions of crisis management are the following: forced, adaptive, resistance, control, crisis, and combinations thereof. Comparative characteristics of methods are shown in table 2.

Table 2: Comparison of methods of overcoming resistance

Method	Benefits	Disadvantages	Conditions of use
Forced	Speed changes	Big resistance	Most of urgency
Resistance management	Weak resistance	Complexity	The average maturity
Crisis	Weak resistance	Hard shortage of time. The risk of failure	The existence of threat
Adaptive	Weak resistance	Slowness	Partly urgency
The combination of techniques	Adapting to conditions	Difficulty in managing	Combination

Source: author

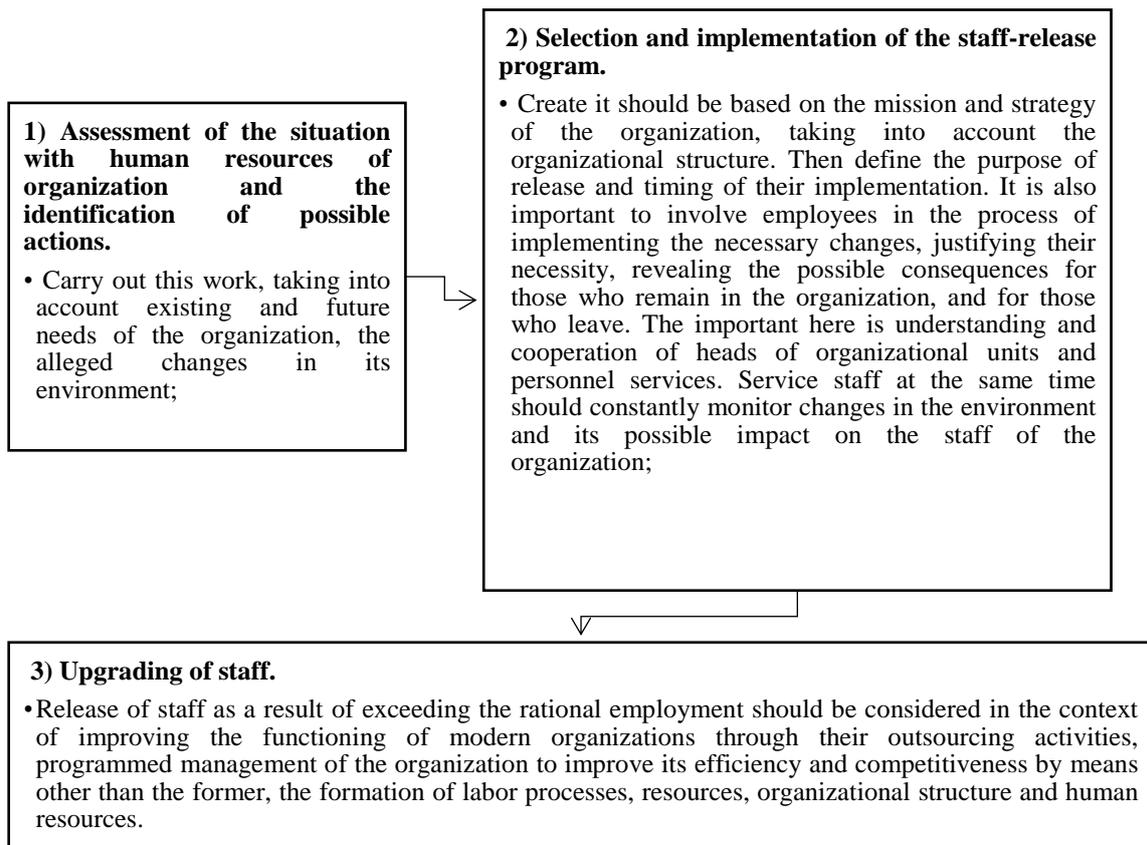
In the process of diagnosis of the condition by choosing a particular method, in addition to these areas of their effective application is necessary to consider two main parameters: time horizon and professional, psychological, technical readiness of personnel to strategic changes in the organization. In order to ensure a proper level of crisis management personnel, managers need to pay attention to the planning and development of human resources strategies when working with him. The main measures are attracting new employees and professionals, re-training of employees in connection with the use of new programs and technologies, development of the guarantee system (social, legal, etc.) or organization system of employment of employees at realigning the company.

Of particular importance in the system of anti-crisis measures of personnel management processes play a release of staff and management of the program. The main stages of human resources programs, taking into account the scientists proposed models Bychkov reflected in figure 2 (Bychkov, 2012).

The release of the staff, especially if it is part of a broader program (outsourcing), creates the conditions for the introduction of new methods of work organization, promoting creativity of employees; enhance employee motivation to work; expanding the scope of communications; the introduction of new staff selection system; an objective evaluation of staff; investing in staff development. Therefore, the release of the personnel is not simple reduction of number of employees by their mechanical dismissal. This is a much more complex process that should organically fit into the strategy of development of the organization (Bychkov 2012).

In the formation of readiness of the personnel to anti-crisis measures two interconnected aspects are important: the formation of skills, knowledge and experience activities (the willingness of staff to act in crisis situations is often more important than professional experience in general) and the formation of psychological readiness. Thus, an important factor in the company out of crisis is a systematic approach to human resources management, which finds itself in the distribution of functions and powers in the selection of crisis management principles in the development of a new human resources policy, in the development and implementation of management decisions.

Figure 2: System principles of crisis personnel management



Source: author

3. Directions headcount optimization of high-tech enterprises in the conditions of crisis

As an empirical basis of research were major Russian science-intensive enterprises science city Korolev. Among them PJSC "Rocket and Space Corporation "Energia"" and Corporation "Corporation Tactical Missiles ". Information on their activities and work with the staff was taken from open sources of information and also on the basis of the results of research graduates bachelors and specialists, prepared the final work by the author of the article.

On these knowledge-intensive enterprises marked decline in the number of personnel. So, in PJSC "Rocket and Space Corporation "Energia"", in 2011 the number of employees amounted to 15201 people, in 2012 - 14955, 2013 - 14409, 2014 - 14356, and in 2015 reached the mark of 14157 people. In spite of the progressive development of these enterprises, notes the changes HR strategies. The most relevant areas within the areas of headcount optimization in terms of crisis prevention and rapid control headcount appears in several versions, which are limited to the specific features of macro-factors and internal environment of the organization.

The author has analysed the main areas of anti-crisis activities and high technology enterprises risk (for example, Russian space industry mechanical engineering) and the potential for changes in headcount. The analysis showed that most of the crisis factors associated with increased competition and unstable situation leads to a decrease in the number of employees, on the other hand, the increase in demand and the availability of advanced development may help increase. One of the new types of risk stands the risk of a black swan, which is characterized by unpredictable place new processes. In the works of many scientists and experts, authoritative

in the field of personnel management (Genkin & Nikitina, 2013), the calculation of the labour force (Sinyavets, 2011) of headcount optimization (Vesnin, 2015) There are many strategies for building a crisis management personnel strategy, however, as the analysis shows the enterprise, available technologies poorly applied in relation to the RSC "Energy" and JSC "Corporation" Tactical Missiles "" for several reasons, among which are such as having unique positions, the need to maintain and continuously replenish scarce highly skilled personnel, high the degree of safety and protection of confidential information leaks, the presence of objects of high security on a national scale, strong links and co-operation organizations, which is part of the organization, and others. Thus, the tools associated with the outsourcing and out staffing personnel, reduction and elimination of the number of staff are at variance with strategic objectives of the corporation and may lead to high economic cost and expenses. Therefore, the most urgent, in my opinion, it is the identification of reserves to improve productivity and internal factors of an intensification of production, which would allow to keep the staff at the instability of the economy of the country and the continuity of the processes of diversification of products and the search for new consumer niche consumer products and services in the field of technologies for space exploration.

The author believes that the disclosure of internal reserves to increase productivity is impossible without a reorientation of approaches to regulation of labour system. The last 20 years of this system at these enterprises has been neglected. Specialized units have been disbanded and abolished, altered function setters and labour norms engineer, stopped work on the creation of local regulations on labour, excessive force, decentralization of data units in the organization. Thus, RSC "Energy" and Corporation "Corporation Tactical Missiles" and other large high-tech companies have the greatest interest in the improvement of work measurement system that can be realized through the introduction of a number of activities. According to the author, the most practical application can get the following actions:

- policy formation on labour management in the valuation of high-tech enterprises;
- improvement of the organizational and functional system of regulation of labour management structure of high-tech enterprises;
- development and implementation of integrated programs to improve the performance of high-tech enterprises units in order not to reduce the staff on the basis of the valuation of labour.

The proposed anti-crisis measures in the framework of human resources management strategies and improvement productivity, as the author suggests, will contribute to a positive effect and will lead to greater efficiency. After the improvement of work measurement system of high-tech companies need to work out the "soft" approach by reducing staff more loyal manner without the direct involvement of the administration. The organization creates certain conditions when the dismissal becomes a necessary step. Soft types of cuts that are most applicable in the RSC "Energy":

1. Exclusion of the "natural" way.
2. Soft "contractile action.
3. The number of employees fired without management.

With natural attrition own staff resigns, the task of the corporation serves to prepare the conditions for such measures. It is necessary to introduce the practice of "freezing vacancies" or method of time limit recruitment of new employees. At this time, some workers can retire, thus there will be a natural reduction in staff. If we talk about the soft reduction against RSC "Energiya", here the most useful the following methods:

1. The use of pre-term benefits for employees close to retirement age.

2. Transfer of the employees in the subsidiaries.
3. The Corporation may promise to lay off workers in the future prospects of a good compensation and subsequent employment.

Thus, the main focus is the optimization of the staff to improve the work system of regulation of labour management services and the use of soft measures reducing staff.

Conclusion

One of the essential components in the crisis is the formation of the personnel management system high-tech enterprises, providing its transition from the critical state in a competitive. Status of human resources, including managers, is often essential, explicit or disguised restriction to solve the problems faced by organizations. On this basis, the personnel management system, formed in the transitional period for the enterprise, should allow timely identification of potential problems and opportunities associated with the state of human resources; reasonably plan activities; to carry out the operational management of their implementation. Also, the presence of a system of crisis personnel management to talk about is a solid enterprise management style, which is in a state of crisis, when it is necessary to accept and carry out risk management solutions. Thus, as a result of the study revealed that in the framework of crisis management personnel the most effective instrument of regulation and optimization the number of staff acts as the improvement of work measurement systems, and the use of soft measures of reduction of workers.

References

- Arutyunov, Y. (2015). *Crisis Management: textbook*. Moscow: Unity-Dana.
- Bazarov, T. (2012). *Personnel management. Workshop [electronic resource]: studies. allowance for students studying in the field of "Human Resources", "Management of organization"*. Moscow: Unity-Dana.
- Bezdenzhnykh, V., & Galai, A. (2015). *Crisis Management - Theory and Practice: A Training Manual*. Moscow: Altair, MGAVT.
- Belyaev, A., & Korotkov, E. (2015). *Crisis Management: textbook*. Moscow: Unity-Dana.
- Bychkov, V. (2016). *Human Resources: Textbook*. Moscow: Norma: SIC INFRA-M.
- Genkin, B., & Nikitin, I. (2013). *Human Resource Management: Textbook*. Norma: SIC INFRA-M.
- Khrustalev, E. (2001). The problems of organization and management in high-tech sectors of the Russian economy. *Management in Russia and abroad*, 32(1), 12-18.
- Rybkin, M. (2014). *Crisis management of the enterprise: teaching practical manual*. Ulyanovsk: Ulstu.
- Sinyavets, T. (2011). Theoretical aspects of optimization of personnel management system. *Bulletin of Omsk University. Series: the economy. Publisher: Omsk State University*, 24 (2), 78-84
- State Statistics Committee Russia. Retrieved from <http://www.gks.ru>.
- Vesnin, V. (2015). *Human Resource Management. Theory and practice: the textbook for high schools*. Moscow: Prospect.