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Problems of formation and development of the innovative potential of workers of light industry enterprises

Problemas de formación y desarrollo del potencial innovador de trabajadores de empresas de la industria ligera

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ABSTRACT:

The article considers the problems of formation and development of the innovative potential of workers of industrial enterprises through an example of light industry. The types of innovations appropriate for development in this industry were identified. The authors proposed a mechanism for managing the innovative potential of personnel of light industry enterprises with due account for industry specificity. The content of the basic elements of the innovative potential of workers in an industrial enterprise was studied, distinguishing educational, industrial-professional, scientific and creative-personal subpotentials. The level of significance of the main elements of the innovative potential for various categories of workers in light industry enterprises was determined. The authors developed a methodology for determining an integral indicator of the innovation potential using the multidimensional classification method.

Keywords: innovations, innovative potential of workers, light industry, product competitiveness.

RESUMEN:

El artículo considera los problemas de formación y desarrollo del potencial innovador de los trabajadores de las empresas industriales a través de un ejemplo de industria ligera. Se identificaron los tipos de innovaciones apropiadas para el desarrollo en esta industria. Los autores propusieron un mecanismo para gestionar el potencial innovador del personal de empresas de la industria ligera con la debida cuenta para la especificidad de la industria. Se estudió el contenido de los elementos básicos del potencial innovador de los trabajadores de una empresa industrial, distinguiendo subpotenciales educativos, industriales, profesionales, científicos y creativos personales. Se determinó el nivel de importancia de los principales elementos del potencial innovador para varias categorías de trabajadores de las empresas de la industria ligera. Los autores desarrollaron una metodología para determinar un indicador integral del potencial de innovación utilizando el método de clasificación multidimensional.

Palabras clave: innovaciones, potencial innovador de los trabajadores, industria ligera, competitividad de los

1. Introduction

In modern conditions of growth of competition, both in world and local markets, a problem of increasing the innovative activity of an enterprise acquires special urgency for commodity producers. With an increasing role of innovation in the development of enterprises at the present stage, the use of old management approaches becomes unacceptable. Effective management of innovation activities is possible on the basis of the development and implementation of a strategy that uses knowledge and achievements of scientific and technological progress both in engineering and technologies, and in the practice of organization and conduct of financial and economic activities of an enterprise. For an adequate assessment of the current state of the innovative activity of an enterprise and the choice of a promising strategy for innovative growth, it is necessary to develop a model for interaction between personnel management processes and innovative activity of an enterprise, an integral indicator of innovative growth, principles and directions of the formation of the innovative potential of an organization. In this regard, there is a need to develop the most effective innovation process management tools and models, which take into account the accumulated world experience and allow increasing the innovative activity of enterprises.

One of the conditions for ensuring the growth of the innovative activity is the formation and development of the innovative potential of workers. The process of managing the innovative potential of workers, considered as a necessary prerequisite for economic and innovation growth, requires a formalized system for making managerial decisions on a comprehensive assessment of the innovative potential of workers and the prospects for its use.

Russian and foreign scientists created a certain theoretical foundation for research of innovation activities of an enterprise. The works of the following scientists are devoted to the study of the concepts of "innovation" and "innovation process": Akhmetova N.N., Gusakov M.A., Safonov E.N., Semenov V.P., Fiyaksel E.A., Shlenov Yu.V. A significant contribution to the development of the theory and practice of innovative management was made by such research scientists as Kondratiev N.D., Mensh G., Porshnev A.G., Santo B., Twiss B., Fatkhutdinov R.A., Foster R., Freeman H., Schumpeter J., and others. Stages of the organization of the innovative activity of an enterprise were considered in the scientific works by Agaptsov S.A., Berens V., Vatolin A.K., Glazoli B., Doyle P., Egorov A.Yu., Kasaev B.S., Clark D., Kolosova T.V., Crossley R., Kuznetsova E.Yu., Quinn J.B., Lomakin M.I., Miller V., Neubauer H., Panov A.I., Safranova A.A., Stigler G., Trifilova A.A., Khavin D.V., Chernov V.A., Arrow K. and others. (Porshnev, Rumyantseva, & Salomatin, 2000; Arrow, 1962; Yesin,. 2013; Khavin, & Tabunov, 2014; Trifilova, & Korostyshevskaya, 2015; Genkin, 2011; Stigler, 2000).

Meanwhile, the problems of effective management of the innovative potential of workers of an enterprise have not been sufficiently studied; the authors suppose that the innovative potential of workers can be one of the factors that enhance the innovative activity of national industrial companies. Thus, the foregoing allows stating that the study devoted to identifying the problems of formation and development of the innovative potential of workers of an enterprise is of practical value and topical and will be of interest to a wide range of people.

2. Methods

The study purpose is to identify key problems and to find possible directions for the development of the innovative potential of workers of an industrial enterprise (by the example of a light industry enterprise). The theoretical and methodological basis of the research includes the works of modern national and foreign researchers, devoted to the study of social and economic problems of the formation and development of the innovative potential of workers of an industrial enterprise. The problems of the management of the innovative potential of workers are considered through the example of the light industry sector, for which the issues of

development of innovations and production of competitive products are especially topical. In the examination of the current state of the light industry sector, the following methods of statistical research contributing to the substantiation of the conclusions and recommendations proposed in the article have been used: the collection and analysis of statistical data (the share of light industry in the structure of Russia's GNP, the volume of production of basic products, the share of light industry exports in total exports of Russian fabrics and textiles, the level of imports of light industry products, the number of employees in the industry), grouping and generalization of results. The development of recommendations for determining and developing the innovative potential of workers of industrial enterprises was based on such research methods as abstract-logical and monographic ones. The basis of the methodological approach to solving the problems of the development of the innovative potential included the systemic complex study, the identification and generalization of the influence of all facts on the innovative potential of workers and the creation at an enterprise of a single mechanism for the formation of the innovative potential of workers with due account for the types of innovations planned for adoption (Aloyan, Petrukhin, & Novikova, 2014; Mashentseva, & Demidov, 2008; Sinyavets, & Rodina, 2016; Rosstat, 2015).

3. Results

Based on the study conducted, the authors identified the main problems of development of the light industry in Russia. The analysis of statistical data revealed that the competitiveness of domestic textile, clothing and footwear products remains low; the industry should increase the innovation activity and develop investments. It is determined that for the light industry sector, depending on the goals and objectives of innovative development, it is important to adopt the following types of innovations: basic (radical) technological innovations, involving the reengineering of the entire enterprise; improving (technological) innovations associated with the development of high-performance equipment, the use of new production technologies; organizational and managerial innovations involving the reorganization of management processes in the sphere of supply, production and marketing of products. The authors proposed a mechanism for managing the innovative potential of workers, substantiated the content of the innovative potential of workers of an industrial enterprise of the studied industry, distinguished and analyzed educational, industrial-professional, scientific and creative-personal potentials. The research proves that the level of significance of the constituent elements of the innovative potential of workers is significantly differentiated by the categories of employees of an enterprise. The authors proposed an algorithm for determining an integral index of the innovative potential of workers using the multidimensional classification method (Borovskikh & Kipervar, 2017; Borovskikh 2016; Korshunova & Ilyichev 2012).

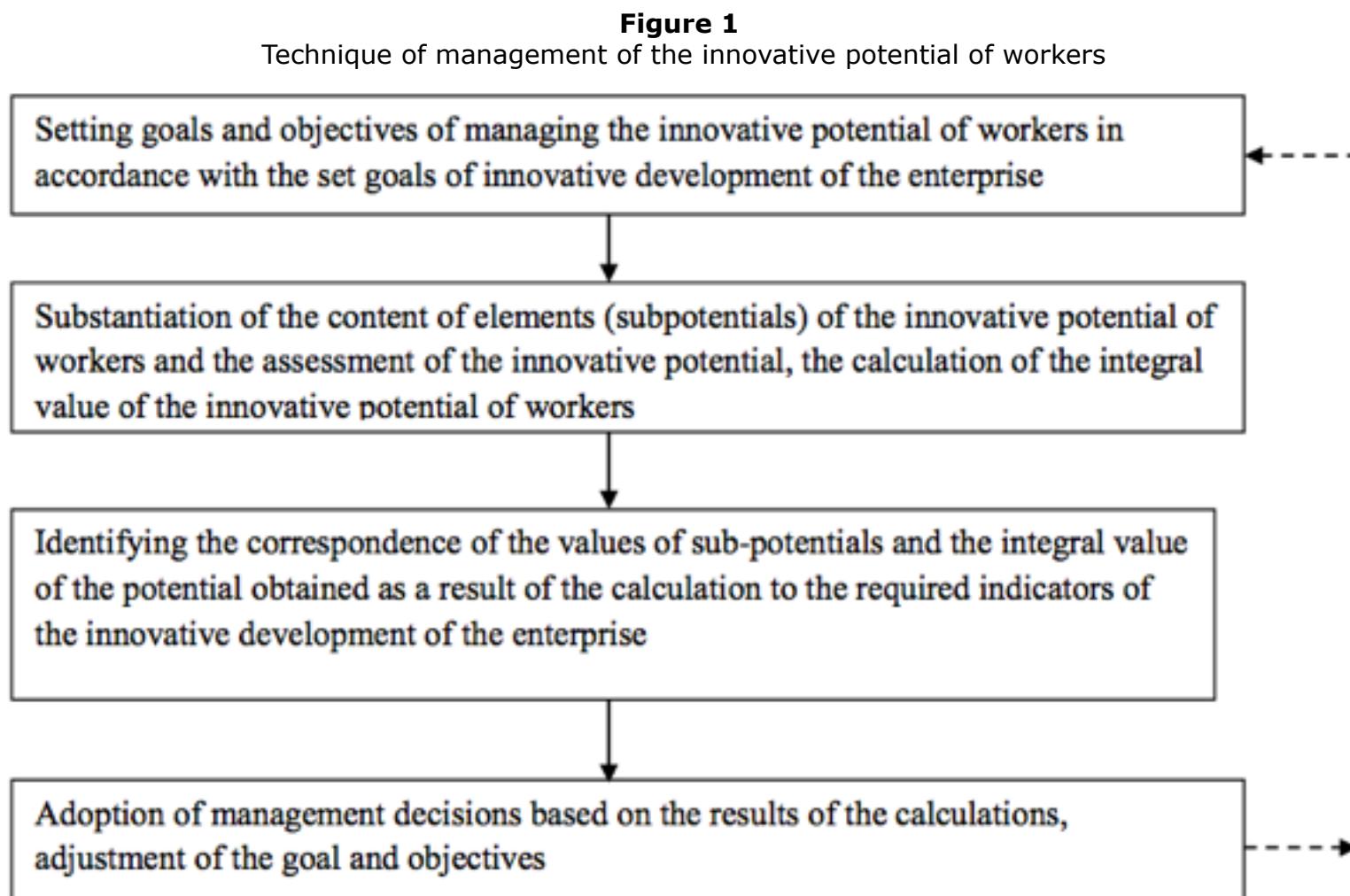
4. Discussion of research results

The innovative potential of workers is a part of the labor potential; it is manifested in the readiness to perceive new information, improve general and professional knowledge, the ability to generate new ideas that can be implemented at the enterprise, the adoption of non-standard solutions, development of new approaches and ways to solve traditional tasks, as well as non-standard tasks, which arise in the enterprise, the use of knowledge and skills for the implementation of improvements and innovations.

The innovation potential is an integrated economic category. In our opinion, educational, industrial-professional, scientific, and creative-personal subpotentials should be the main components (subpotentials) of the innovative potential of workers of industrial enterprises, including in the light industry sector.

At the level of a particular enterprise, the staffing solution in the context of the need to use the high-tech equipment is possible through the competent management of the innovative potential of workers, including planning, evaluation and organization of use and monitoring.

The conceptual model of the mechanism for management of the innovative potential of workers provides for the existence of a certain algorithm in managing the potential of this type (**Figure 1**).



An increase in the competitiveness of an enterprise and products, the development of new market segments, the production of new technological products meeting the requirements of buyers for quality and price can be considered the main objectives of the innovative development of an enterprise. Depending on the goals and objectives of the innovative development, an industrial enterprise can adopt the following types of innovations: basic (radical) technological innovations involving the reengineering of the entire enterprise; improving (technological) innovations associated with the development of the high-performance equipment, the use of new production technologies; organizational and managerial innovations implying the reorganization of management processes in the sphere of supply, production and marketing of products.

Depending on the type of innovations and industry types, it is necessary to substantiate the content of the elements of the innovative potential of workers, carry out the assessment of the innovative potential, calculate an integral indicator of the value of the innovation potential; in calculating this indicator, it is reasonable to use a weighted average estimates method.

At the final stage of the employee innovative potential management, it is necessary to determine the correspondence of the values of subpotentials and the integrated value of the potential, obtained as a result of the calculation, to the required indicators of the innovative development of an enterprise with due account for the type of innovations being developed and the objectives of the innovative development of an enterprise. The obtained results of the analysis allow making managerial decisions in the sphere of updating the content of the innovation potential and the ability to develop new types of innovations.

Obviously, the specific content of the stages of managing the innovative potential of workers is largely determined by the specifics of the studied region and industry.

Let us consider the problems of managing the innovative potential of workers by the example of the light industry, for which the problems of innovation development and production of

competitive products are especially topical. During the transition to the market economy in the Russian light industry there was a sharp deep decline in production, by volume the production has declined by more than eight times, a sharp decline in production volume was observed in all subsectors of the light industry. The main reasons for the decline were as follows: the destruction of vertically integrated links in the supply of raw materials and the sale of products, an increase in imports of cheap (often low-quality) products from Asian countries, low competitiveness of domestic products and a decrease in the purchasing power of buyers (Borovskikh & Kipervar 2017; Borovskikh 2016).

In general, the share of the light industry in the GDP in Russia is relatively small: for the period of 2001-2015, this indicator did not exceed 0.2%. The dependence of the light industry on imports sharply increased in the early 1990s and still remains significant; the share of imports of woolen fabrics in 2015 was almost 60%, silk – 95%. The share of imported garments in the structure of consumption is very high and varies from 80 to 95% in the regions of Russia. The level of state support for the light industry in 2014 amounted to 1.7 billion rubles in monetary terms, in 2015 – 1.5 billion rubles. Despite the measures taken by the state to support the industry, more than 75% of all light industry products are imported. In 2014-2015, one third of the world's light industry products were manufactured in the People's Republic of China. South Asian countries such as Indonesia, India, Pakistan, and Bangladesh have traditionally been among the world's leading manufacturers of light industry products. The countries of Western Europe and the United States of America also have the developed light industry, although they import raw materials from developing countries.

The share of exports of light industry products in total exports of Russian fabrics remained very low in 2014-2015: only 25% of the total production of linen fabrics in Russia, 3% – wool, 5% – textile clothes and footwear were imported (Yesin 2013, pp. 880).

The concept of the light industry development until 2025 provides for the creation in Russia of the steadily developing light industry integrated into the world labor division system and based on the country's natural competitive advantages.

Over the past decades, during the transition to the market, the number of people employed in the light industry declined by more than 70% and amounted to slightly more than 500 thousand people in 2016, while the number of employees decreased by almost 75%, office employees – by 60%. The share of employed workers at the beginning of 2016 was approximately 0.5% of all employed in the Russian economy (Yesin, 2013, pp. 20). The general decline in the number of workers in the industry for more than twenty years is largely due to the replacement of the labor force with labor automation tools, which corresponds to the global trend, as well as due to a decrease in the volume of production and sales of manufactured products. Due to the low level of wages, industry enterprises face the problem of constant personnel rotation, the need to retain specialists and attract young workers. It is important to note that in conditions of crisis and low consumer solvency, especially in textile and clothing production, the opportunities for a significant increase in wages are limited, as all this leads to an increase in the cost of production, which results in an increase in selling prices and a decrease in the competitiveness of manufactured products.

The introduction of new machinery and technologies in the industry, which are necessary for the creation of competitive products, entails an increase in demand on the part of light industry enterprises-employers for additional workforce with the necessary professional qualifications. The requirements for the level of professionalism and knowledge of the latest technologies, both in specialists and workers, essentially increase in the course and upon the results of reengineering activities, both at the enterprise as a whole and by certain types of production.

The personnel situation at enterprises of the studied industry is also aggravated by the fact that industry-related secondary educational institutions (especially professional technical schools), where workers were trained, almost ceased to exist. In training future graduates of a university for work in the light industry, the approaches to specialists and bachelors training have significantly changed – academic hours for "industry-related" disciplines have consistently

reduced during almost two decades. This is especially common for the training of future specialists and bachelors in economy, management, informatics, technology and design. It is evident that at the state level there is a need to develop an industry-related employment policy, to restore specialized vocational training at secondary specialized educational institutions and universities, to retrain workers, to adopt and implement new professional standards in the industry.

Based on the conducted analysis, the following features of the development of the light industry in Russia can be distinguished:

- 1) the traditional orientation of the economy of the country and most regions towards the development of manufacturing industries, most of which are engaged in the production of chemical and petrochemical industries, as well as towards the development of machine-building and military complexes, the low proportion of light industry products in regional GDP;
- 2) the use of obsolete technologies and equipment by existing textile and clothing enterprises that does not allow the production of competitive products,
- 3) a historically established reference point for the concentration of production and, as a consequence, support for the development of large-scale enterprises, including in the textile, clothing and leather sub-sectors, which, in the face of current problems with the sale of products and under-production, leads to unreasonably high production costs;
- 4) complicated and long-term adaptation of large-scale regional enterprises of the industry to the constantly changing demand for manufactured products in the market, as a result of which the manufactured products do not always satisfy the needs of customers, which is the reason for the loss of a certain market segment;
- 5) almost complete dependence of the country and the region on the import of high-quality, mainly foreign raw materials for the needs of clothing and leather production;
- 6) the availability of demand of domestic consumers at the regional level for higher quality products than those products available on the market and similar in composition (with a high content of natural fibers: wool, cotton, viscose) due to the existing natural and climatic conditions.

In our opinion, the main components (subpotentials) of the innovation potential of workers in industrial enterprises, including in the light industry, should be as follows: educational, industrial-professional, scientific, creative-personal subpotentials. The main elements of the *educational subpotential* are as follows: the level of education, the nature of education, the knowledge of foreign languages, and the capacity for self-education. It is very important that workers of light industry enterprises have *industrial-professional subpotential* when mastering innovations. If we specify the components of this potential, then they will be as follows: knowledge of professional data processing programs; knowledge of highly specialized technological issues; knowledge of professional and foreign experience in professional activities; the ability to work on processing units, technological machines and mechanisms; knowledge of modern techniques and methods for solving production problems; experience in doing business; the ability to apply professional knowledge in solving production problems. We cannot deny the requirement that workers should have *scientific subpotential*, which includes the following elements: the ability to extract and analyze the information from different sources; the ability to track scientific and technological innovations. *Creative-personal potential* of workers of the enterprise of the studied industry implies: creative thinking; capacity for innovation; the ability to generate new ideas; initiative, the ability to implement new ideas; the ability to master new technologies independently.

All workers of an industrial enterprise should have innovative potential in one way or another, nevertheless, the importance of the components of the innovation potential will be differentiated by the categories of workers (Rosstat, 2015; Borovskikh & Kipervar 2017; Borovskikh 2016). We determined the level of significance of the key elements of the innovative potential for various categories of workers of light industry enterprises; the results are

presented in Table 1.

Table 1.
The level of significance of the key elements of the innovation potential
for various categories of workers in light industry enterprises

Group of workers	Category of workers	Significance of the innovation potential elements*			
		Educational subpotential	Industrial-professional subpotential	Scientific subpotential	Creative-personal subpotential
Managers	Senior managers, top managers	+++	+++	+++	+++
Specialists	Specialists engaged in the development of the enterprise development strategy	+++	++	++	+++
	Specialists engaged in basic technological processes	+++	+++	+++	+++
	Specialists engaged in the development and improvement of manufactured products (services), the introduction of new technologies	+++	+++	+++	+++
	Specialists engaged in marketing and promotion of products (services) on the market, implementation of the market strategy of an organization (enterprise)	+++	++	++	+++
	Specialists engaged in solving financial and economic problems	+++	++	++	++
	Specialists working in the sphere of personnel management of an organization (enterprise) and the standardization of labor	+++	++	++	++
	Specialists engaged in the development and implementation of information technologies	+++	++	++	++
	Specialists engaged in legal work and claim settlement	+++	++	++	+
	Specialists engaged in	+++	++	++	+

	accounting and records management				
Workers	Workers of the basic technological profile on traditional production and technologies	+	++	+	++
	Workers of the basic technological profile working on new modern equipment with the use of new modern technologies	+	+++	+	+++
	Workers engaged in repair and maintenance of technological equipment and devices	+	++	+	++

* Note: + - low significance of the subpotential; ++ - average significance of the subpotential; +++ - high significance of the subpotential.

Determining the level of significance for each group and category of workers allowed calculating the specific weight of the subpotential in an integral aggregate indicator of the innovative potential of workers. In our opinion, it is advisable to use both individual and group assessment methods to assess the elements of the innovative potential of workers (Rosstat, 2015) (Table 2).

Table 2
Methods of individual assessment of the innovative potential of workers

Group of methods	Name of a method	Description of a method
Individual assessment methods	Questionnaire survey	The assessment of a worker is carried out based on a certain set of questions and the description; an assessment officer analyzes the presence and absence of a certain worker's features revealed in questioning.
	Method of standard assessment	An assessment officer fills in a special form, characterizing each aspect of the employee's work, with a score against each characteristic or a gap, and the final score is calculated.
	Testing	Based on testing results, workers' professional knowledge necessary to perform the work is revealed, as well as the knowledge of the processes ensuring the effectiveness of the work; the tests should be designed specifically for a specific group and category of personnel in a particular organization.
	Method of qualities assessment	A special form is filled in, those qualities that are most relevant to the activities of an employee are evaluated; the method is mainly used in assessing the employee's business qualities.
	Method of independent experts	The assessment of a worker is carried out by a special working group of specialists who were not familiar with him/her earlier; as a result, a final conclusion is drawn up and executed.

Group assessment methods	Method of committents	The work of a person is discussed in the group. The worker's activity is divided into separate components and an assessment officer determines the effectiveness of each activity on a certain scale. As a result, a list of works or processes, with which the worker copes successfully, satisfactorily and which he/she cannot perform, is drawn up. A variation of the method is a method of "360 degrees".
	Classification (ranking) method	An assessment officer classifies workers according to some criterion. First, an assessment officer selects the best worker according to the specified parameter, then he/she determines the next one after him/her, and so on until a complete classification (ranking) is made.
	Method of situational assessment	Workers are offered descriptions of the same situations, then questions are asked about their possible actions, after which integral points are determined. The assessment is based on pre-designed criteria.
	Method of assessment centers	To implement the method, an enterprise needs to have its own training ground, the assessed workers are offered business games and tasks in order to identify and assess the strengths and weaknesses of workers.

The methods presented are based on the assessment of the workers' willingness to propose improvements and innovations, to perceive and further use them in production activities. The assessment methods should be considered in a complex, as complementary to each other. The application of various methods in the assessment of the innovative potential of workers makes it possible to increase the reliability and objectivity of the assessment results ((Kushbokova, Shamurzayev & Misakov 2009; Nagornykh & Revenko 2011; Priporova 2014; Shlenov & Lebedeva 2016; Hospodářová 2008). The assessment of each element of the innovative potential of workers should be carried out with due account for specific features of the analyzed potential and the category (groups) of workers; therefore, the methods proposed for use will be differentiated (Table 3).

Table 3. Matrix of recommended methods of assessment of the innovative potential of workers, depending on the groups of workers and assessed subpotentials

Assessed potential element (subpotential)	Assessed group of workers		
	Managers	Specialists	Workers
Educational subpotential (ES)	Method of standard assessment	Method of standard assessment	Method of standard assessment
Industrial-professional subpotential (IPS)	Testing Method of committents	Testing Questionnaire survey Method of committents	Testing Questionnaire survey Method of committents
Scientific subpotential (SS)	Method of committents	Method of committents Method of independent experts Classification (ranking)	Method of committents Method of independent experts Classification (ranking) method

		method	
Creative-personal subpotential (CPS)	Method of qualities assessment Method of committents	Method of qualities assessment Method of situational assessment	Method of qualities assessment Method of independent experts Method of assessment centers

Based on the results of the assessment of the elements of the innovation potential in accordance with the methodology of managing the innovative potential of workers (Fig. 1), we propose to calculate an integral coefficient of the innovative potential of workers using the multidimensional classification method through the following formula:

$$C_{I.P.} = C_{E.P.} * EP + C_{I.P.S.} * IPS + C_{S.S.} * SS + C_{C.P.S.} * CPS, \quad (1)$$

where $C_{I.P.}$ is an integral coefficient of the worker's innovative potential;

$C_{E.P.}$ is a weight coefficient determining the importance of the educational potential;

EP is the level (value) of the educational potential;

$C_{I.P.S.}$ is a weight coefficient determining the importance of the industrial-professional subpotential;

IPS is the level (value) of the industrial-professional subpotential;

$C_{S.S.}$ is a weight coefficient determining the importance of the scientific subpotential;

SS is the level (value) of the scientific subpotential;

$C_{C.P.S.}$ is a weight coefficient determining the importance of the creative-personal subpotential;

CPS is the level (value) of the creative-personal subpotential;

Weight coefficients are recommended to be determined by the expert evaluation method; they will be significantly differentiated depending on the type of planned and used innovations, the type of enterprise activity, the level of innovation activity of economic entities in the industry and in the region. The values of coefficients can be taken for the general assessment procedure, depending on the importance of the subpotential (Table 1). For example, for top managers of an enterprise all four elements of the innovation potential will be of equally high significance; therefore, the specific gravity of each of the four subpotentials will be 0.25, which is a total of 1.0.

The problem of managing the innovative potential of workers at light industry enterprises becomes especially relevant as soon as the enterprise begins to master and use basic (radical) technological innovations related to the reengineering of the entire enterprise. We can offer, as an example of such innovations in the studied industry, the latest technologies for modifying and finishing natural and synthetic fibrous materials, using nanostructures, to give the products new unique properties. Radical innovations make demands, first of all, for the industrial-professional competencies of workers, as well as for educational competencies and creative-personnel personnel qualities.

Improving (technological) innovations related to the development of high-performance equipment, increasing the level of production automation, the use of new production lines, impose requirements mainly for the availability of the creative-personal potential of a worker, as well as for general competencies and personal qualities of employees (ability to learn, ability to generate new ones ideas, ability to find non-standard approaches to solving problems, etc.).

At light industry enterprises, where organizational and managerial innovations are introduced, the following organizational and functional competencies of workers will be especially in demand: computer, economic and legal literacy, organizational and managerial skills, foreign language skills, etc.

5. Conclusion

In conclusion, it should be noted that the development of scientific and technological progress determining the direction of the innovative development of industries is one of the key factors to increase the competitiveness of domestic products. In order to successfully introduce an innovative component into the light industry, careful preparation of both the production and the personnel component is needed through the development of programs and strategies for managing the innovative potential of the industry workers. The results of the assessment of the innovative potential of workers allow at the microlevel: conducting an analysis of the dynamics of the innovative potential of workers for a certain period of time; conducting a competitive analysis of the enterprise in comparison with other enterprises of the industry or region; taking into account the general innovative potential of workers when calculating the innovative potential of the whole enterprise; adjusting the program of personnel selection, hiring, rotation and advanced training; identifying "bottlenecks" in the personnel work of the enterprise when planning to master new production technologies. At the macrolevel, the results of the assessment of the innovative potential of workers will make it possible to adjust specialists training programs in higher and secondary specialized educational institutions and to plan the programs of advanced training of workers in the industry taking into account the innovative transformations.

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