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Chuvash Republic Electrical Engineering Industry Development Problems

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ABSTRACT
The purpose of the research is to identify the problems of the development of the electrical engineering industry in the region. This research uses an integrated approach, as well as a statistical-economic method and a method of logical-semantic modeling of problems, which make it possible to give a comprehensive description of the development of the electrical engineering industry in the modern economy. As a result of the analysis, the problems of the development of the region's electrical industry were identified and justified: inefficient use of production and human resources; steady dependence on imported products; insufficiently high level of knowledge, skills of staff; emigration of highly qualified personnel. The method of logical-semantic modeling of problems, which showed that the main problem-cause is the problem of inefficient use of production and human resources, and the primary problem-consequence is the problem of sustainable dependence on imported products. Methods for solving the identified problems were also developed: improving the quality management of enterprises; the formation of a knowledge economy; R&D support; continuing education of enterprise employees; active interaction of educational institutions and enterprises; creating conditions that satisfy the needs of workers in the electrical engineering industry.
Keywords: *Electrical engineering industry, development problems, government regulation, knowledge economy*

1. INTRODUCTION

The relevance of the research is due to the presence of problems in the electrical engineering industry of the region and the lack of structured information related to methods for solving them. In the region's electrical engineering industry, there are constraints that prevent it from fully developing. The development of the electrical engineering industry depends on what qualitative and quantitative changes [1] will occur both in the military and industrial sectors of the economy, as well as in the civilian. To some extent, innovations in the electrical engineering industry are an indicator of the development of the whole society. Achievements of electrical engineering determine the direction in almost all areas of the economy [2]. Such an informal assignment of directives also contributes to a change in the lifestyle of the population [3]. Thus, knowledge of the processes of development of the electrical engineering industry is favorably reflected in the development of strategic documents for improving the industry. Determining the problems of development of the industry allows us to identify trends and directions in which the electrical engineering industry of the region is developing. This will help to understand in which development programs of the industry should attract more financial resources, and in which it is necessary to reorganize production. When forming methods for solving problems, it is important to take into account the current conditions in which the industry is located, and also take into account forecasts of federal and regional departments. In this regard, the identification of problems in the development of the industry, as well as the development of methods for solving them, are relevant.

Based on the foregoing, the aim of the study is to highlight and justify the problems of development of the electrical engineering industry in the region in modern conditions, as well as the formation of methods for solving them.

During the study, the following tasks were solved: identifying problems in the development of the region's electrical engineering industry in modern market conditions; determination of the circle of economic agents involved in the development of the electrical engineering industry in the region, and analysis of their activities; analysis of forecasts for the development of the electrical engineering industry; development of methods for solving development problems in Chuvash Republic electrical engineering industry.

2. METHODS

The methodological basis of the study is a comprehensive approach. In the research process, the following methods were used: analysis of normative documents and products of activity, content analysis, method of thought experiment, forecasting, analysis of the results of the activities of the electrical engineering cluster and public servants involved in the development of the electrical

engineering industry, analysis of functioning electrical engineering cluster, analysis of state programs, retrospective economic analysis, analysis of statistics data.

3. RESULTS

Based on the analysis, it was found that the enterprises of Chuvash Republic electrical engineering cluster have the potential, which in the future, if used correctly, will help compete with the world's leading electrical engineering conglomerates.

Based on the analysis, the following development problems in Chuvash Republic electrical engineering industry can be distinguished:

1) The problem of inefficient use of production and human resources. Despite the fact that some enterprises in Chuvash Republic electrical engineering industry have certificates of conformity to the ISO 9001 quality management standard, the overall level of improvement in the quality of organizational processes is significantly lower than the level of foreign corporations in the production of electrical engineering products, for example, General Electric, Alstom, Siemens.

2) The problem associated with increased energy costs [4; 5]. Achievements in R&D depend on the level of energy consumed. For example, significant progress in research with large amounts of information [6] in cloud computing cannot occur without creating new or improving old methods of energy production. The low energy intensity can be explained by various reasons related to the features of the energy used and the nature of labor [7].

3) The problem of technology wear. Obsolescence of technological processes in the production of electrical engineering products occurs literally in real time. Foreign companies attract a significant amount of resources in the development of innovative technologies. The motives for such investments are different - basically, companies strive to be proactive in order to take possession of most of the market.

4) The problem of sustainable dependence on imported products. In 2015, the level of import dependence in the electronic industry was 80%.

5) The problem of the level of knowledge, skills of staff. The proportion of graduates of higher educational institutions engaged in labor activities, but who cease to expand the range of competencies and go deeper into the sphere of their professional activity, is still high enough to correspond to the share of foreign specialists engaged in self-education in their area of specialization.

6) The problem associated with the emigration of highly qualified personnel. The growth rate of emigrants with higher education is growing every year. In 2016, 43 516 people with higher education left the Russian Federation, including 121 doctors of sciences and 223 candidates of science. Mostly they move to the countries of Western Europe, North America, and also to Israel, since, basically, jobs are created there that require high qualifications and offer high incomes, especially in new sectors of the economy.

Thus, we can say that Chuvash Republic electrical engineering cluster has a number of difficulties that must be overcome in order to enter the world market and occupy high positions. Mainly, the existing problems are connected with the fact that investors are not in a hurry to invest in the development of the industry (for advanced developments, technical re-equipment, elimination of physical and moral depreciation of fixed assets, etc.), even despite the high financial returns in the medium and long term.

The analysis showed that the primary problem that requires stabilization is the problem of inefficient use of production and human resources. Also, the most significant problems-reasons are the problem of the level of knowledge, skills of the staff and the problem associated with the emigration of highly qualified personnel. The main problem-consequence is the problem of sustainable dependence on imported products.

Based on the analysis and analytical data of the information departments, the following are methods for solving development problems in Chuvash Republic electrical engineering industry.

1) The problem of inefficient use of production and human resources.

1.1) The widespread introduction and focus of organizations of the electrical engineering industry on the effectiveness of the quality management system.

An important step to achieve the effectiveness of a quality management system is the use of a process approach and risk-based thinking [8], as well as interconnections with other standards intended for management systems.

1.2) Formation of the knowledge economy.

A gradual transition to a knowledge economy based on innovation [9] as an engine of progress in the stages of the economy and knowledge as an ordered information. Development of new methods for converting information into knowledge. Improving the knowledge management system by the electrical engineering cluster.

2) The problem associated with increased energy costs.

2.1) The development of electrical engineering in the field of energy-efficient technologies.

2.2) Search for new technological solutions in the field of electric power industry development.

2.3) Use with maximum efficiency of alternative energy sources.

2.4) Reducing the high energy intensity of production [10].

2.5) Intelligent energy consumption. The development of intelligent energy networks. Finding solutions for decentralized and renewable energy.

3) The problem of technology wear [11].

3.1) Investments in R&D, in particular through a risk-based approach of venture capital funds.

3.2) Improving the scientific and technological policy.

3.3) Creation of new technical and technological solutions. Increased activity of experimental developments.

4) The problem of sustainable dependence on imported products.

4.1) Support for domestic manufacturers of electrical engineering products in the form of import substitution

and various benefits [12] (reduction of certain types of taxes, simplification of administrative procedures, etc.).

4.2) Implementation of plans for import substitution of electrical engineering products.

At the moment, at the federal level, the Ministry of Industry and Trade of the Russian Federation has compiled a list of priority and critical types of products, services and software in terms of import substitution and national security.

4.3) Creating a favorable investment climate.

One of the forms for attracting investments is the creation of the territory of advanced social and economic development (TOSED). In Chuvash Republic, the special legal regime for entrepreneurial activity in the implementation of investment projects for the production of electrical engineering equipment is applied to the Kanash TOSED. Now there is a process of creating an industrial park [13].

5) The problem of the level of knowledge, skills of staff.

5.1) Development of a continuing education system.

In order to realize human potential and increase the competitiveness of companies [14], continuing education of employees should become an important part of the organizational structure of enterprises in Chuvash Republic electrical engineering industry.

5.2) Active cooperation of enterprises in the electrical engineering industry with universities and colleges.

Such collaboration [15] allows universities and colleges to better understand which theoretical and practical areas of science to emphasize in order to prepare students for the most productive work activities. In Chuvash Republic educational institutions and the electrical engineering cluster interact in the form of concluding agreements on joint cooperation, as well as students completing internships.

5.3) Implementation of the competency-based approach. Education and training of competent specialists, who, unlike qualified ones, not only possess certain knowledge, skills, but are also able to implement them in their work. In most areas [16], educational institutions of Chuvash Republic apply the federal state educational standards of higher education 3 ++ (GEF HE 3 ++).

5.4) Creation by enterprises of their own scientific and educational centers in order to implement programs to improve classification. In Chuvash Republic electrical engineering industry Scientific-Production Enterprise “EKRA” LLC implements 80-hour educational programs on relay protection and automation.

6) The problem associated with the emigration of highly qualified personnel.

6.1) Creating conditions that satisfy the needs of workers in the electrical engineering industry: the acquisition of high-tech equipment, increasing the level of employees' wages, etc.

6.2) Realization of the creative potential of employees.

The search for effective solutions in organizing space and expanding the tools of workers in the electrical engineering cluster. The choice of a suitable personnel management structure for the enterprise, focused on its economic development. A divisional or matrix management structure of the company has a positive impact on enhancing the creative potential of employees with further improvement and adaptation to its goals and objectives.

4. DISCUSSION

In the context of the onset of the fourth industrial revolution, the fifth and sixth technological modes, the formation of a knowledge economy, the adoption of enhanced measures to maintain an innovative geo-economic climate is of fundamental importance. The development of an innovative economy is facilitated by an intensive factor of economic growth . State support has a great influence on the formation of the electrical engineering cluster, which in a certain way affects the life of both the whole society as a whole and an individual citizen in particular [17]. The electrical engineering cluster, in turn, must set itself the tasks associated with the continuous development of the industry, so as not only to keep up with other countries, but to stay ahead of them through the development of new products, scientific discoveries and the use of high technologies.

In modern conditions, educational institutions can assist in the development of the knowledge economy through the generation of new ideas, innovative technologies and developments. The stimulation of scientific communities is an important part of investment and entrepreneurial forms of activity, since intellectual capital is a strategic factor that determines the prospects for the development and enhancement of a country's competitiveness. The development of innovative high-tech business is facilitated by regional research and educational centers. It is necessary to pay attention to the fact that the cultivation of innovative type talent will occur faster with the effective interaction of the higher education system and employers, as well as in the search for new forms of integration and mutual interest between the higher education system, industrial complexes, business, public institutions and state authorities. The network interaction of educational institutions and enterprises acts as the main factor in the formation of the scientific and pedagogical staff of workers and professional personnel, who are the driving intellectual force in the development and implementation of civil and industrial strategic and tactical initiatives [18; 19]. In order to achieve technological parity, for example, within the framework of the National Technological Initiative, a higher school should work ahead of schedule based on the close connection of education, science and production. For example, Chuvash State University. I.N. Ulyanov, you can trace the logical desire of the educational institution to become one of the leaders of the scientific and educational complex of the Volga Federal District through the creation of scientific laboratories, basic departments and other structural units. The extensive growth of graduate students who contribute to the development of the electrical engineering industry is gaining a certain measure of intensity, which is reflected in

the dialectic law on the gradual transition of quantity into quality.
At the same time, it is necessary to think about the problem of absolutization of the principles of economocentrism [20] in the context of the proposed ideas. It makes sense to conduct axiological researches of goods and services that are more effective than other products and solutions.

5. CONCLUSION

Based on the analysis, the problems of the development of Chuvash Republic electrical engineering industry and their solution methods are identified. The following conclusions can be drawn from them:
1) Improving the quality management of organizations and the formation of a knowledge economy contribute to the efficient use of production and human resources.
2) Intelligent consumption and solutions in the field of energy-efficient technologies help to reduce energy costs.
3) R&D and venture funds help solve the problem of technology wear.
4) Import substitution and a favorable investment climate contribute to independence from imported products.
5) Continuing education, as well as the active interaction of educational institutions and enterprises (Storper, Venables, 2004), contribute to raising the level of knowledge and skills of personnel.
6) Creating conditions that satisfy the needs of workers in the electrical engineering industry reduces the outflow of highly qualified specialists, both from the region and from the country.
In the aggregate, the solution of the identified problems will help to increase the technological level of development of the enterprises of the electrical engineering cluster and the standard of living of the population, both in the short, medium and long term. In theoretical terms, the results of this study can help with their use in the preparation and improvement of programs for the development strategy of the electrical engineering industry in the region. In practical terms, they can be useful for economic agents associated with the electrical engineering industry, for example, when implementing plans and making decisions in strategic planning.

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REFERENCES

[1] C. Christensen, The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, Boston, MA, Harvard Business Review Press, 1997

[2] Ishihara Tadashige et al., Analysis and Modeling of the Development Economy in the Least Developed Countries, System Modeling and Optimization. Springer Berlin Heidelberg, 1984

[3] Z.V. Ivanova, Prospects of Developing Socially Responsible Business in the Market of Electrical Products, Russian business, 6 (2) (2011) 59-64

[4] L. Hilty, B. Aebischer, ICT innovations for sustainability, Heidelberg, New York, Dordrecht, London, Springer, 2015

[5] L. Souchon, B. Aebischer, J. Roturier, F. Flipo, Infrastructure of information society and its energy demand, European Council for an Energy Efficient Economy Summer Studies Proceedings, pp. 1215-1225, 2007

[6] V. Milovidov, Information asymmetry and big data: should ginancial market paradigm be revised? World Economy and International Relations, 61(3) (2017) 5-14

[7] V. Milovidov, Innovation, Sustainable Growth, and Energy: Is Leap Forward for Civilization Possible? Foresight and STI Governance, 13(1) (2019) 62-68.

[8] A. Ezrakhovich, Quality of an organization and common sense of the standard ISO 9001:2015. Part 4, Quality Management Methods, 8 (2019) 16-21

[9] D. Abuzyarova, V. Belousova, Zh. Krayushkina, Y. Lonshcikova, E. Nikiforova, N. Chichkanov, The Role of Human Capital in Science, Technology and Innovation, Foresight and STI Governance, 2 (2019) 107-119

[10] A.A. Galimova, Energy-saving technologies: an integrated approach to the problem of relations between power engineers and consumers, Electrical Engineering: online electronic scientific j. 4(1) (2017) 41-42

[11] T.S. Bronnikova, A.V. Kanishchev, Forecasting the innovative development of the electrical industry using trend model, Economic Analysis: Theory and Practice, 46 (349) (2013)61-64.

[12] N.A. Khechoyan, The objective conditions of need and the possibility of creative development of electrical industry in Russia, Economics: Yesterday, Today and Tomorrow, 2018, vol. 8, no. 8A, pp. 267-275.

[13] N.V. Vladimirova, Creation of the territory of advanced economic development in the Chuvash Republic, Scientific journal, 2019, no. 6, pp. 45-46.

[14] I.M. Aliev, Continuous professional education, News of St. Petersburg State University of Economics, 2016, pp. 86-89.

[15] M. Samudram, N. Mahendhiran, Santha Vaithilingam, Keynes and Wagner on Government Expenditures and Economic Development: The Case of a Developing Economy, Empirical Economics, 36(3) (2009) 697-712

[16] A. Gurarii, Educational standards as a flexibility indicator for the educational system: a comparative analysis, Culture, personality, society in the modern world: methodology, experience of empirical research, Yekaterinburg, Yekaterinburg, pp. 866-875, 2018

[17] M. Storper, Keys to the City: How Economics, Institutions, Social Interaction, and Politics Shape Development, Princeton, Princeton University Press, 2013

[18] A.F. Dyakov, V.V. Platonov, Restoration of higher school intellectual capability – the basic condition for formation of Russia tomorrow, Jenergetik, 5 (2014) 3-7

[19] E.P. Ilyasov, The interaction of universities and employers in the development of market relations in the economy and the problem of employment of graduates of vocational education institutions, Uchenye zapiski Kazanskogo gosudarstvennogo universiteta, 150(4) (2008) 208-221

[20] S.Z. Semernik, Economocentrism as a risk factor in the modern society development, Logos at Praxis. Vestnik Volgogr. gos. un-ta, 7(2) (2015) 47-53