

# MECHANISMS OF PUBLIC-PRIVATE PARTNERSHIP BETWEEN EDUCATIONAL INSTITUTIONS AND OIL AND GAS INDUSTRY ENTERPRISES

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## ABSTRACT

*The purpose of modern education is to train highly qualified workers. It is possible to achieve such a result by enhancing public-private partnership, where students can receive not only theoretical but also practical knowledge, and the enterprises can "train" new workers. This is especially important in the energy sector, in particular oil and gas. This sphere provides the population with fuel products and is also a significant part of the state economy. This explains the importance of the public-private partnership in the field of education. However, the problem is that nowadays there is no clear structure of this mechanism. In this regard, the purpose of the research is to develop technological approaches for the implementation of mechanisms of public-private partnership of educational institutions. To achieve the goal, a set of complementary research methods was used. The most widely used methods were: the analysis of scientific and educational-methodical literature, the design of didactic theories, pedagogical experiment, the use of mathematical and statistical methods and application software products.*

*As a result, a didactic system for the implementation of public-private partnership of an educational institution with the oil and gas industry was developed.*

**Keywords:** Public-Private Partnership, Educational Institution, Oil and Gas Industry, Innovative Training, Modular Programs.

## INTRODUCTION

At present, significant changes in the fuel and energy complex are observed in Russia, which until recently was under the public ownership and state control. On the one hand, the oil and gas industry cannot be privatized, given its socio-political significance. At the same time, the management and financing mechanisms in the oil and gas industry have not been developed and implemented in the state control system. These are the mechanisms which could now ensure staff quality meeting the requirements of the technology-intensive oil and gas production.

Implementation of the concept of public-private partnership between educational institutions and enterprises in the oil and gas industry allows us to solve this problem (Uliantseva, 2012; Faraphonova, 2017; Shashkova, 2018). This makes it possible to create conditions for cooperation between the state and the business having common interests in the development of the oil and gas industry and the training of professionals without changing the form of state ownership (Nikitina, 2012; Mantulenko, 2014; Akyeampong, 2009).

The existing variety of types and methods of public-private partnership implementation is ensured by universal mechanisms that allow us to solve long-term tasks connected with the development of the knowledge-intensive oil and gas production, as well as with the development and adaptation of innovative technologies in the fuel and energy complex of the country (Ozhiganova, 2014; Eremin, 2010). It follows that the sphere of interaction between the two components—the state and the business—is a knowledge-intensive production, which for modern professional education in the conditions of historical development becomes a certain long-term project aimed at further development of the knowledge-intensive fuel and energy complex of the country.

Public-private partnership issues in education have been discussed in world practice for many decades.

This research considers public-private partnership strategies in education. The analysis shows that the proposed strategies strongly link PPP in education with privatization, which causes a decrease of the state role in financing necessary for further education development in the country. In the article (Lee, 2008) also explores issues of the innovation practice and public-private partnership in the higher education sector in the Asia-Pacific region.

In the article (Wong, 2015) looked at the Public-Private Partnership (PPP) in post-war education in Singapore and Hong Kong. The authors, having analyzed this direction, strongly urge scientists to study the sociopolitical prerequisites for PPP in the future. In the article (Verger, 2012), the authors also examine public-private partnership issues with the aim of eliminating disadvantages in the system of public education and mobilizing of new resources to increase access to education for all population segments.

Thus, the theory of public-private partnership in education over the years of formation and development acquired certain forms and content. It also allowed describing the mechanisms of public-private partnership. However, like any theory, it should be further developed through the use of innovative technologies and with regard to changing environment factors.

The analysis of the problem of content modernization of higher education and its compatibility with the fuel and energy complex activity has revealed a contradiction between:

- The growing role of business in increasing the quality of the trained specialists to meet the current labor market requirements, due to the imbalance of which the enterprises have recently born heavy losses and the existing mechanisms aimed at the effective use of the education budget.
- The labor market demand of qualified specialists for the country's fuel and energy complex and rather insufficient development level of the infrastructure and technological state sectors.

Acknowledging the practical value of the research in designing new educational technologies in the training of specialists for the knowledge-intensive fuel and energy complex, it should be noted that a deep analysis of existing theoretical approaches and accumulated experience is required at the present stage of vocational education modernization in order to find effective mechanisms for the educational activities of higher educational institutions in the framework of public-private partnership with the enterprises of the fuel and energy complex.

The contribution of our research to the world pedagogical science in *"Theory and Methodology of Vocational Education"* is that the proposed solution of the research tasks will facilitate the improvement of the public-private partnership mechanisms between educational institutions and enterprises of the fuel and energy complex. This cooperation will be based on projected changes in the economy and social relations, in order to strengthen the positioning of higher education institutions within production and educational clusters. The developed technological approaches, aimed at implementation of public-private cooperation with the enterprises of the fuel and energy

complex, can provide the advanced educational resources for the partnership in the development of modern technologies of the knowledge-intensive oil and gas production.

The purpose of the research is to develop technological approaches for the implementation of public-private partnership mechanisms between an educational institution and oil and gas complex enterprises on the basis of the innovative approach to methodological, educational, production, information and structural support of the educational process.

### **Research Objectives**

The improvement of bachelor professional training and insufficient theoretical and methodological, organizational and methodological foundations for the development of the public-private partnership system of an educational organization with the fuel and energy complex enterprises resulted into the following tasks.

Definition of the roles and place of public-private partnership of an educational institution with the oil and gas industry enterprises in the formation of a science-oriented educational environment.

- Identification of pedagogical conditions ensuring the innovative character of the educational process improvement, formation and maintenance of the staff policy of the region.
- Development of mechanisms of public-private partnership of vocational education institutions and FEC enterprises to provide modernized educational resources necessary for the development of modern production technologies of the knowledge-intensive production.
- Implementation of technological support of the innovative educational process in public-private partnership between educational institutions and enterprises of the oil and gas industry.
- Implementation of additional vocational education of the administrative-managerial and teaching staff of the university in the public-private partnership system.
- Development of diagnostics of the educational process quality.

### **METHODS**

A range of research methods has been applied to achieve the purpose of the research and to solve its tasks:

- Detailed analysis of scientific and academic literature (issues of psychology, pedagogy, sociology, etc.).
- Designing of didactic theories with the use of analysis and synthesis, systematization and abstraction, comparison and generalization of the research data.
- Studying and generalizing of the experience of the advanced universities of the world on the formation of professional competencies of students.
- A pedagogical experiment aimed at obtaining data on the level of job readiness of students (conversation, observation, questioning, studying documentation, testing, experts assessment).
- Use of mathematical and statistical methods and application software products to process the results of the pedagogical experiment.

The credibility and scientific basis for the results of the research stem from the fact that the theoretical positions are methodologically substantiated, diagnostic methods are developed that are adequate to the objectives, subject and object of the research, as well as the representativeness of the sample is ensured, quantitative and qualitative analysis of the experimental data is carried out.

A step-by-step quality assessment of the labor potential of the training process was conducted by statistical processing of quantitative and qualitative indicators of pedagogical research on ensuring network interaction between the university and enterprises in the oil and gas industry.

An experimental verification of the technological approaches developed in the research on the implementation of the public-private partnership model for the university and the enterprises of the oil and gas industry, including methodical, educational, production, information and structural support of the educational process, was carried out in our research using Mann-Whitney U Test. Diagnostics of the quality of the developed technological approaches was conducted through the achieved levels of elementary, functional and system readiness of the student in the modular-competence approach implementation.

Identification of the modular-competence approach influence on the professional competence formation of specialists was carried out in our research with the help of dispersion analysis. The analysis of the results showed the effectiveness of the set of conceptual provisions and the formulated hypothesis, the effectiveness of technological approaches in ensuring the professional development of specialists in the oil and gas industry.

## RESULTS

The enterprise of the fuel and energy complex was implemented in the following areas:

- Vocational.
- Financial and economic.
- Welfare and social security.
- Educational and material facilities.
- Scientific-pedagogical and staff support.

The employers were directly involved into the examination, assessment of the needs of modernization, assistance in updating and replacing the educational and production equipment of the educational institution. All this allowed.

1. Increase the investment potential of the educational structure.
2. Provide guidance to educational resources on the needs of enterprises, which perform founder or trustee (managerial) functions.
3. To develop valid scientific and pedagogical approaches, allowing to determine effective mechanisms of management and financing of vocational education institutions with due regard for the nature of work in modern fuel and energy complex.

On the basis of projected changes in the world economy successful solution of the problems under consideration in our research allows us to develop the system of public-private partnership between educational institutions and enterprises of the fuel and energy complex. The result-based provision of conditions in the system of public-private partnership was made up of programs of a vocational school with basic enterprises on the main directions and forms of mutually beneficial cooperation.

Research and methodological service ensured the result-oriented provisions to implement network interaction between a technical university and production units of oil and gas enterprises in the system of public-private partnership.

The activities of the research and methodological service were aimed at creating a science-oriented educational environment. It ensured the implementation of the region staff policy considering projected changes in the economy and social relations, aimed at strengthening the positioning of vocational education institutions within production and educational clusters. The main functions of this service considered in our study were:

1. Creation and development of innovative educational resources, including the development of proposals for curricula and programs.
2. Development, formation and distribution of innovative methods of practical training.
3. Skill improvement of the administrative and management staff and the teaching staff of the university in the process of implementation of the innovative management model of public-private partnership, which was carried out in the following areas:
  - a. Information and communication competence in the professional activity of the teacher.
  - b. Problems and prospects of remote education development.
  - c. Improvement of engineering and technical training of the university professors.
  - d. Mathematical and computer modeling of technological processes and production of the oil and gas industry.
  - e. Ecology and nature management in the fuel and energy complex.
  - f. Innovative technologies of practical training.

Public-private partnership and innovative (investment) projects as a way of solving the problems of socio-economic development of the region.

In the network interaction between the educational institution and the oil and gas enterprises, the research activities of the teachers and students were carried out in *"Engineering and technology of the fuel energy segment, including the development of deposits, transportation and storage of hydrocarbons."*

The location of an educational institution directly on the territory of the main resource base, network interaction with the advanced enterprises of the fuel and energy complex (YNAO) allowed to successfully implementing a practical approach in the preparation of bachelors. In the framework of network interaction with employers, affiliate and enterprise-based annual scientific and practical seminars were held in the following areas:

1. Repair and insulation works.
2. Services provided for the oil and gas industry.
3. Actual problems and possible solutions when carving lateral wells.

The network forms of educational programs were actively used. Scientific and methodological seminars included the following directions:

1. Psychological and pedagogical complex of general competency development in the professional training of the oil and gas industry specialists for working in the new environment of the Arctic.
2. Internet technologies in the educational process.
3. Professional staff training in the structure of higher education in the context of an innovative strategy for the development of the Far North and the Arctic shelf.
4. Implementation of the network form of the basic vocational educational programs.

As part of network interaction with the Department and enterprises of YNAO, the faculty members participated in training seminars: *"Implementation of the Federal State Educational*

*Standard (FSES 3+)*” and *“Science disciplines in vocational education.”* Within the framework of network interaction with the Department of YNAO and PJSC SIBUR Holding, the faculty members participated in the professional excellence contest *“I love science”* in the direction *“Chemistry is science, chemistry is life”*. Teaching staff and students also actively participated in training seminars and competitions (within university networking) on the problems of the Arctic and the continental shelf development. In the analytical work competition named after A.A. Pinskiy (HSE Institute for Education) the project *“Arctic, psychological health, professional longevity and education”* was presented. And the project *“Analysis of the importance of the oil and gas reserves of the continental shelf of Russia in the context of other Arctic states experience”* took part in the International intellectual competition for students and graduate students-*“Discovery Science University”*. Teachers and students also participated in the training workshop *“The Changing Arctic”* (National Open Education Platform-Tomsk State University). The technological support of the educational process in the public-private partnership between higher education institutions and enterprises of the fuel and energy complex was carried out in our research on the basis of the modular and competent approach. This approach was introduced in several stages.

The first stage is the educational process design with due regard for the subject level, which contributes to the development of the content of education, differentiated by levels.

The second stage is taking into account the requirements of the federal state educational standard and competencies.

The third stage is the development of modular programs and training modules with the help of the technological approach, which was the design of the pedagogical system elements.

The fourth stage is the implementation of the educational process at the training modules and the further improvement of the modular programs in real conditions.

The fifth stage was the implementation of the content-technological aspects of the application of the competent approach to modular learning. The main sub-stages were the analysis and evaluation, the development of recommendations for the educational process improvement.

In our research we will show as an example the application of the modular competence approach in *“Oil and gas engineering”* in the field of oil and gas industry modeling (Table 1). The purpose of studying modules of vocational training in modeling in oil and gas industry modeling was the development of modern statistical methods and models for increasing the efficiency of laboratory and field experiments, ensuring the reliability of the information base in the development of mathematical models of well drilling technological processes.

<b>Table 1</b> <b>CONTENTS OF THE MAIN PROFESSIONAL TRAINING MODULES FOR SPECIALISTS IN MODELING IN THE OIL AND GAS INDUSTRY</b>	
<b>Professional training module for specialists in modeling in the oil and gas industry.</b>	<b>Contents of the professional training module for specialists in modeling in the oil and gas industry.</b>
1. Application of probabilistic-statistical analysis in modeling in the oil and gas industry	
1.1 Probability Distribution Laws	<ul style="list-style-type: none"> <li>- Determination of the Weibull law parameters (determination of time from the moment of putting the wells into operation to the appearance of bottom water at the oil and gas field.</li> <li>- A description of the rock distribution or particles during different breaking processes, Poisson distribution.</li> <li>- Distribution density calculation of the probability of the number of liquid baths to be installed while eliminating pipe clamping from the influence of the pressure drops; application of exponential distribution.</li> <li>- Determination of the failure time of the wells due to the inflow of extraneous primary cement water, taking into account the operation period of wells.</li> </ul>
1.2 Statistical hypotheses test	<ul style="list-style-type: none"> <li>- Parametric and nonparametric comparison criteria (drilling through a new type of bits in wells with identical drilling conditions); determination of the differences in the setting time for cement with a water-cement ratio W/C-0.5. Investigation of differences in the viscosity conditions at 1% mineralization and at 1000C for two clay solutions treated with PFFC (0.5%) and Nitro Lignin (0.05%).</li> <li>- Verification of the hypothesis on the exponential law of the occurrence time of a drilling fluid at the wellhead with a density higher or lower than the nominal value in accordance with the geological and technical outfit.</li> <li>- A criterion for the number of points or the Rosenbaum criterion. Determination of differences in the time of setting for cement with a water-cement ratio W/C – 0.5.</li> <li>- Non-parametric Mann-Whitney criterion. Based on the measurements on the rig determination of the relative viscosity difference at 1% mineralization and at 100°C for two clay solutions treated with the viscosity reducers PFFC (0.5%) and nitro lignin (0.05%).</li> <li>- Verification of the hypothesis that a limited set of data belongs to the normal distribution law, the Shapiro-Wilk criterion, the verification of the measurement results of the water discharge of the fluid solution of its belonging to the normal distribution law.</li> </ul>
1.3 Dispersion, correlation and regression analysis	<ul style="list-style-type: none"> <li>- Multi-factor dispersion analysis of changes in the properties of Portland cement mortar (fluid loss, static shear stress, initial and final setting time, bending strength after 2 days) when mixed with different amounts of oil.</li> <li>- Kruskal Wallis one-way analysis of variance to investigate the curvature of the vertical well for drilling depth intervals from 2400 to 2850 m with three different layouts (A, B, C) of the drill string for samples of five wells; correlation and regression analysis types; formulation of the regression equation based on the results of experiments of the change in the strength of the cement stone of a two-day strength when tested for bending, depending on the sand content in the cement slurry and the hardening temperature.</li> <li>- Brandon's method of constructing models of compression strength change after 2 days of hardening for a cement slurry, consisting of cement, sand, slag and tripolite, depending on the hardening temperature of the samples.</li> </ul>

2. Experimental design techniques	<p>- Research on the phenomena mechanism, experimental search for optimal conditions. In order to determine the required fraction of the retarder <math>x_1</math>,% from the binder, the cementary slurry in the portland cement mixture at the temperature of <math>X_2</math>, comprised between 100 ... 120°C, an experiment was planned to construct a linear mathematical model with the setting time <math>t</math>;- The Plackett-Burman plan for <math>n=12</math> was used to estimate the significance of the water loss effect during 30 minutes, the drilling mud, the components, the total volume of clay, heavyweight, lime, calcium chloride, oxyd, carboxymethylcellulose, oil and graphite in cold conditions, taking into account the experimental planning matrix.</p> <p>- The assessment of the depression effect, drilling mud, water loss reducer, viscosity reducer, as well as on the method of perforation during the opening and determination of the productive horizon.</p> <p>- Selection of cementary slurry for cold conditions (the bottom hole temperature is 25 ... 30°C), consisting of a water loss reducer, an activator of the setting time and providing a minimum deviation from the initial setting time.</p> <p>- Optimization of the drilling mode parameters, i.e. choice of axial stress on the drill bit and speed of rotation, to maximize the mechanical speed of drilling. The axial stress and the rotational speed vary on two levels, using a complete factor experiment with an additional central point.</p> <p>- Cementing of wells with a downhill temperature of 100°C is necessary to choose a formulation of a sedimentation-resistant cementary slurry consisting of Novorossiysk portland cement, lignosulphate agents, hydrolyzed polyacrylonitrile and potassium bichromate and providing initial thickening time of 150 minutes.</p> <p>- According to the results of the hole drilling of the four previous wells, it is necessary to determine the desirable changes in the factors recorded during drilling in order to increase advance per bit.</p>
3. Pattern recognition methods	<p>Assessment of situations in order to predict the possible process and make a decision on the choice of managing impacts for the effective work. Indicators of the properties of working agents (drilling mud, plug-back mixture, etc.), performance characteristics of the equipment (mud pump rate, rotor torque, pressure in the elements of the circulation system, etc.), information on external influences (formation pressure and temperature, properties of rocks and fluids, angles of bedding, etc.), the nomenclature of the materials and equipment used.</p>

In addition to the main modules related to the application of probabilistic-statistical analysis in modeling and experimental design techniques, the module "*Pattern recognition methods*" has been added to the basic modules of the bachelor professional training in the oil and gas industry.

The necessity for introducing this module is due to the fact that in the oil and gas industry complex there are some problems related to the drilling of oil and gas wells, which need to be addressed promptly and qualitatively. The most important task is to assess the situation, which is to predict the nature of the process and then decide what measures should be taken to manage effective work.

The main tasks, according to the theory of pattern recognition, are:

- Discrimination or identification of the object.
- Classification of objects.

Each object has a certain set of characteristics (attributes), the quality of which can serve as:

- Indicators of the working agents' properties (drilling mud, plug-back mixture, etc.).
- Performance characteristics of the equipment (rotor torque, pressure in the elements of the circulation system, mud pump rate, etc.).
- Information on external influences (formation pressure and temperature, properties of rocks and fluids, angles of bedding, etc.), the nomenclature of the materials and equipment used.

As an image or a class of situations, it is possible to use a variety of concepts (stable or unstable section, successful or unsuccessful result, normal well state, cavings, sticking of strings).

Motivational support of the educational process allowed for two-way communication with all components of the public-private partnership system (Table 2).

<b>For the educational institution</b>	<b>For employers</b>
<ul style="list-style-type: none"> <li>• Modernization of educational standards and qualifications system.</li> <li>• Renewal of teaching equipment and facilities by contractual relations.</li> <li>• Creation of additional workplaces for practice and internship.</li> <li>• Mastering of new professional activities.</li> <li>• Professional development for teachers, practical instructors, supervisors.</li> <li>• Development of new payment mechanisms for teachers (on final financing, per capita financing, educational services, etc.)</li> <li>• Participation in the creation of a non-state form of property and a competitive environment.</li> <li>• Achieving the transparency of educational and production activities as a condition for attracting non-state investments.</li> </ul>	<ul style="list-style-type: none"> <li>• Mastering of international quality standards when profit growth is achieved on the basis of the professional growth of staff.</li> <li>• Optimization of own expenses for staff training among leading partners: employer, trade union, educational institution, government, and employee.</li> <li>• Formation of an effective system of search, selection and improvement of staff qualification.</li> <li>• Achievement of competitive advantages of organization, leadership in business based on the joint infrastructure potential.</li> <li>• Infrastructure is considered to be a resource that should be managed and developed in parallel with the company business.</li> <li>• Participation in the creation of infrastructure (partnership, corporate, etc.) property that has its tangible asset contributes to the sustainable development and business security through diversification of risks.</li> <li>• Infrastructure produces only one product-a service, the quality of which is determined by the consumer.</li> </ul>

The improvement of monitoring and quality diagnostics of the training for the knowledge-intensive oil and gas production as well as the quality of the training process as a whole was accompanied by the organization and internal and external evaluation of the vocational education quality and certification of young specialists (graduates of educational institutions). In order to improve the quality of the professional training of future bachelors practitioners have been involved in the educational process, practice opportunities have been expanded, and the practice-oriented approach of the training courses and practical training has been strengthened.

The observed growth dynamics of the main indicators of the developed system demonstrated the effectiveness of technological approaches on implementing the regional model of public-private partnership of the educational institution with the enterprises of the fuel and

energy complex concerning methodological, educational, production, information and structural support of the educational process.

This growth dynamics was monitored in the following directions:

- Current material and technical basis, corresponding to the new content of education and modern production and educational technologies.
- Curricular and methodological support for newly introduced modules and disciplines in innovative educational programs.
- Retraining programs of specialists and professional development of the faculty in the professions and specialties introduced in the framework of innovative educational programs, according to the requirements of employers.
- Educational environment, focused on the formation of a traditional value attitude to work and workers.

Experimental testing of the results of the interaction between the educational establishment and the enterprises of the fuel and energy complex on sharing of innovative educational programs based on a practical-oriented approach has shown the effectiveness of the innovative model of public-private partnership between representatives of education and industry. In addition, the presented technology of the educational process organization demonstrated a high level of education for future bachelors by expanding access to the resources related to the professional activity specifics, the way of training and the mechanism for educational co-financing.

The scientific novelty of the research is to develop technological approaches to implementing the model of public-private partnership between the educational institution and the enterprises of the fuel and energy complex on the basis of an innovative approach to the methodological, educational, production, information and structural support of the educational process.

The theoretical relevance of the study is to ensure the relationship between vocational training of students of a technical university with the production units of the oil and gas complex enterprises in the system of public-private partnership.

The practical relevance of the research results is that technological approaches to implementation of public-private partnership with enterprises of the fuel and energy complex have been developed, providing modernized educational resources for the modern technologies development of science-intensive oil and gas industry production.

The research hypothesis is that the position strengthening of vocational education institutions within the production-educational clusters should be carried out through the development of public-private partnership between professional educational establishments and enterprises of the fuel and energy complex on the basis of projected changes in the economy and social relations.

## DISCUSSION

In our study an innovative didactic system (in the target, substantive, procedural and organizational aspects) has been developed to implement the mechanisms of public-private partnership of an educational institution with the oil and gas industry enterprises.

Creation of the public-private partnership model allows us to provide:

1. For the state system of education (higher education): Testing and application of prospective organizational and legal forms of partnership with enterprises of the oil and gas industry; the expansion of the legal and regulatory framework of higher education due to the introduction of innovative technologies (Pakhomov,

2011; Kozlov et al., 2017); replication of advanced experience; introduction and development of modern models of educational, scientific and industrial integration mechanisms of multi-channel financing of educational organization and development of material and technical base of the educational institution; approbation and wide introduction of interaction mechanisms between educational institutions and employers; modernization of the management system in the sphere of innovation activity (consolidation of the content and methods of the education quality management).

2. For employers (fuel and energy complex enterprises): The participation of the enterprise representatives in the educational, scientific and management activities of the educational institution as the final consumer of the educational institution work and the investor (Haug, 2014; Becker, 2003); creation and improvement of educational standards, curricula and preparation programs of competitive specialists with due regard for labor market requirements; infrastructure creation and development on the basis of educational institutions, that will enable an innovative model of public-private partnership between the representatives of education and industry; attracting students and professors to the solution of scientific research tasks performed with the use of modern technologies of knowledge-intensive production of the oil and gas industry.
3. Adams' theory of justice: Stacy Adams showed that the motivation of an employee to perform work effectively is strongly influenced by the leaders of the organization and their fair evaluation of his activities and achieved results. Fairness is determined by the ratio of costs to previous estimates, as well as to estimates of costs and incomes of other employees of the organization. This point is especially important in public-private partnerships, because in this situation workers in two sectors (public and private) draw comparison among themselves (Boatright, 2010).
4. Modern motivation theories: Divided into substantive and procedural theories of motivation. The most famous in our country is the theory of A. Maslow. Porter and Lawler developed a systematic and effective model for motivating human resources. Most of today's methods of material and non-material motivation of human resources derive from the considered and other theories of motivation. Therefore, for systematic understanding of motivation as one of the most important management functions, modern managers and executives should know and be able to apply classical and modern theories of motivation to form professional competencies (Samara & Arenas, 2017).
5. In public-private partnerships, it is proposed to involve independent executives. Independent executive, unlike other members of the supervisory board, performs his functions independently and impartially. Besides participation in the implementation of the standard powers of the supervisory board, the independent executive has some special responsibilities—monitoring and analysis of the entire enterprise performance (Samara & Berbegal-Mirabent, 2018).

## CONCLUSIONS

The experimental testing of the research results confirms the proposed hypothesis, the fidelity of its conceptual positions and allows us to make the following conclusions:

1. The analysis of the current problem of improving the research work of the faculty and students allowed us to accomplish the following tasks: reasonable scientific and pedagogical approaches were developed, which determine the most effective organizational and economic mechanisms of management and financing of educational institutions in accordance with the peculiarities of labor in modern fuel and energy complex.
2. Technological approaches to realization of mechanisms of public-private partnership between an educational institution and the enterprises of the fuel and energy complex, including methodical, educational and production, information and structural support of the educational process, have been developed and implemented.
3. The program-focused provision of conditions for the implementation of the relationship between the training process of students and the production units of oil and gas enterprises in the public-private partnership system has been developed.
4. The design of regulatory requirements to the quality of education is based on the competences of a highly skilled specialist in the system of higher education, which is obliged to focus on the economy needs in labor resources.

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