



## The Role of Innovative Decisions in the Development of Oil and Gas Companies

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### ABSTRACT

This work describes the importance of developing and adopting innovative decisions in all operational segments of O and G companies. It gives a systematic presentation of the procedure of developing and making managerial decisions of an innovative nature that have a multilevel structure. A special place in the hierarchy of innovative decisions is given to the ones adopted to implement innovative foresight projects targeted to possible technological breakthroughs that can have a significant impact on the development and growth of key indicators in various operating segments of O and G companies. It also emphasizes the need to develop company innovative potential based on its staff. It is the staff with innovative habit of thought that can ensure the high efficiency of preparation and implementation of innovative decisions. The main requirements for innovators are also described herein below. Moreover, the problem of special training of this group (innovators) is touched on. One of the possible solutions of this problem is to develop the appropriate corporate training.

**Keywords:** Innovative Decisions, Foresight, Algorithm, Personnel, Innovative Potential, Corporate Training

**JEL Classifications:** J24, O31

### 1. INTRODUCTION

Innovative technologies that provide the companies that actively implement innovative projects in all business segments (from oil and gas exploration to downstream) with significant competitive advantages remain the basis for successful development of oil and gas business, and especially its production component. In an increasingly competitive environment, O and G companies are forced to implement advanced innovations not only of a technical nature, but managerial as well. They actively promote managerial innovations in all functional subsystems, and first of all in the subsystem of personnel management.

According to Peter Drucker, one of the most influential theoreticians in business management of the twentieth century, the main driving force of the new economy is innovation: "Each organization, not only in the business, needs one core competence: Innovations" (Drucker, 2006).

The strategy of modernization and innovation in all spheres of activity, from scientific to production, becomes the basis

of national socio-economic policy, including oil and gas industry.

Shmal, the President of the Union of oil and gas Industrialists of Russia, has noted at the seminar Innovative Processes in Oil and Gas Industry that Russia spends 0.86% of GDP on science, i.e. much less than in any developed economy. All Russian O and G companies, including GAZPROM, spend about \$250 million for the R&D per year. To compare, only SHELL spent more than \$1 billion for the R&D during the crisis of 2009. Russia is not included in the Country Innovative Index and Technology Index Top 25 (Shmal, 2013).

At the same time, the oil industry of Russia is currently using obsolete technologies and methods that can no longer provide the country with the required production, and its innovative extraction is in the initial stage only. Innovative oil production techniques will introduce fundamentally new methods of development of natural reservoirs and accumulated deposits, modern technologies and equipment. The future of the industry depends on new "breakthrough" technologies and equipment used by O and G

companies, and modern methods of developing complex and difficult fields.

Thus, in the oil and gas industry, process innovations will predominate to a greater degree, which will have a significant impact not only on the final outcomes of O and G companies, but also on the economy of the country as a whole.

## 2. LITERATURE REVIEW

At the present time, the problems of innovative development of the fuel and energy complex, including O and G companies, are being given a great deal of attention both in scientific circles and at the level of top management of industry companies. These problems are revealed in a large number of scientific works by such well-known Russian scientists as Bushuyev et al., 2016; Gromov, 2016; Bushuev et al., 2012; Shreier, 2011; Kryukov et al., 2003. Various strategic aspects of business are considered in the works of Ansoff of different time periods (Ansoff, 1979).

The role of innovation in business of vertically integrated companies is studied in the works of Tokarev, 2012; Shafranik 2005.

The role of process innovation in the activities of O and G companies is revealed in the works of such foreign scientists and analysts as Breschi et al., 2003; Nolan and Thurber, 2010; Tucker, 2015).

Now implementation of innovative solutions is not possible without creating a system of long-term forecasting (foresight) of scientific and technological progress in all operational segments of O and G companies. Various aspects of foresight technologies are considered in the works of Bushuev et al. (2012).

## 3. MATERIALS AND METHODS

### 3.1. Technology of Developing Innovative Decisions for O and G Companies

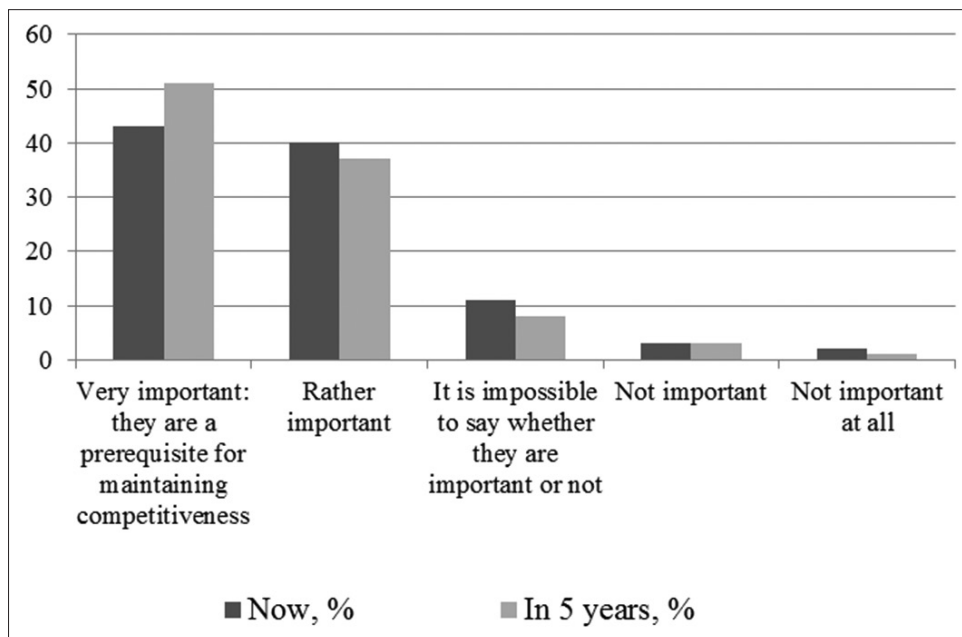
It is not possible to progress with a focus on modernization without science research — fundamental, sectoral, university, adjacent. Taking into account the current situation, development of oil businesses should be based on stimulation of innovation processes, making them a factor of technological and economic growth. This is confirmed by the perception of innovation activity as one of the key success factors by the top management of O and G companies (Figure 1).

It causes the urgency of developing the technology to prepare and justify managerial decisions in all subsystems of O and G companies. The procedure of adopting managerial decisions in O and G companies (Plenkina et al., 2013) is adapted for development and implementation of innovative solutions, Figure 2.

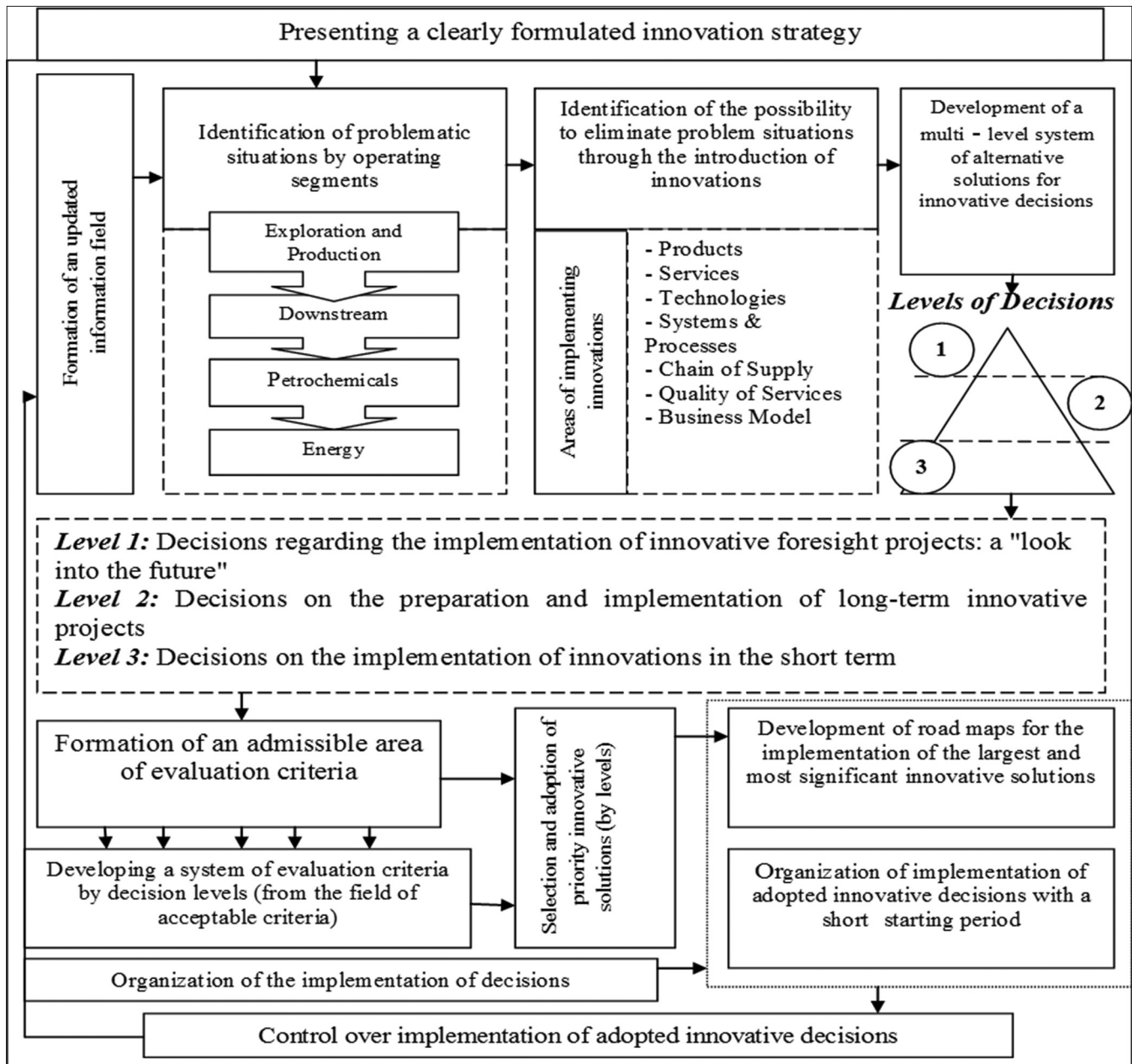
The whole system of preparation of innovative decisions should be based on the clearly formulated innovative strategy of the company and fit into the corporate strategy. The process of preparation of innovative decisions starts with formation of an updated information field regarding the innovations being implemented and possible for the implementation in all operating segments of the company. First of all, the emphasis should be laid on technological innovations, which is caused by the severity of problems associated with the increase in the share of hard-to-recover reserves, reduction of the oil recovery factor and changes in other important technological parameters of each business. Secondly, the possibilities of introducing managerial innovations should be considered.

At this stage, one should make a so-called “picture” of the situation in the company at a certain time point and choose the reasonable

**Figure 1:** Importance of innovation for the success of O and G Companies (According to the Top Management) (McNamara and Lyons, 2014)



**Figure 2:** The procedure of preparation and implementation of innovative decisions at the level of O and G companies



period of anticipation. The analysis of the generated information field will allow to identify deep holes in each business segment and the possibility to eliminate those through innovations.

The next step in preparation of innovative decisions is the development of the multilevel system of alternative solutions. The first level involves concentrating decisions on the implementation of innovative foresight projects; this is the so-called "looking forward" level. The share of alternative solutions related to this level will be relatively small, but they will be significant enough for the company, as they will lay its long-term development pathway and increase its innovative potential.

In order to describe the specificity of decisions made at the "looking forward" level, it is necessary to understand the technology of foresight and the concept itself, which is quite actively explained both in the national literature and abroad.

According to the foresight school of the NTI, the "foresight" refers to a social technology, the communication format that allows participants to agree a vision of the future and subsequent activities within the context (Peskov, 2016).

The works of the American researcher Martin (University of Sussex) defines "foresight" as systematic attempts to assess the long-term prospects of science, technology, economics and society to determine the strategic directions of research and new technologies that can bring the greatest socio-economic benefits (Martin, 1993; Kryukov, 2010).

The development of alternative solutions for implementation of foresight projects in O and G companies primarily involves selecting strategic directions for innovative development, as well as identifying technological breakthroughs that can have a significant impact on the development and growth of key indicators

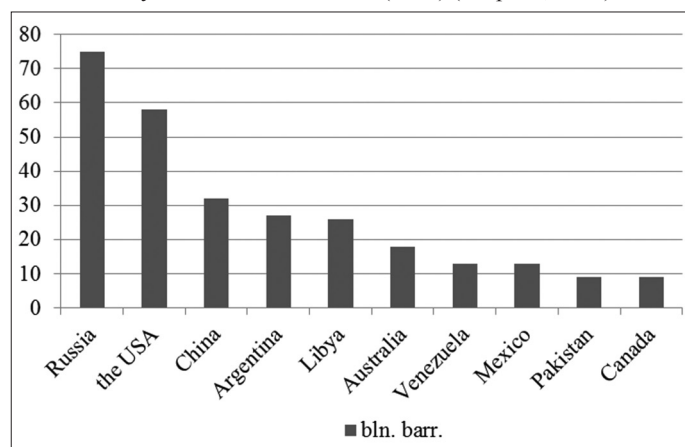
in various operating sectors of the company. This level of solutions is formed exclusively on the basis of expert assessment methods and opinions of qualified experts and analysts, forecasters. The requirement to involve experts is caused by the nature of alternative solutions at this level, namely, regardless of supposed implementation within the operational segment, solutions will be based on technologies that cannot be applied at the moment, and the entire field of their practical application is the area of future opportunities.

Since the foresight refers to forecasting of the intended effects, collection of knowledge about the future by decision-makers or those who can influence achieving goals plays a big role in choosing the methods of implementing thereof (Kryukov, 2010). For example, it could refer to innovative industrial parks and other research structures engaged in research in the field of innovative methods and technologies for the hydrocarbon extraction.

As an example of managerial decisions adopted at this level, it is possible to consider the decisions of large O and G companies taken recently to develop a full cycle of technologies for the development of hard-to-find shale oil. Thus, having recently started to invest into research in this area, GAZPROMNEFT is the first in Russia to use all the technology cycle applied globally for the development of shale oil. The up-to-date technologies of hydraulic fracturing of the reservoir have been tested in wells in the so-called Bazhenov Formation, which is classified as a shale oil deposit (Information and News Portal, 2016). The proper early diagnosing made by experts in forecasting to establish the really important upcoming trend helped the company to be ready for the production of shale oil being under the sanctions. According to a number of experts, Russia is the leader in oil shale resources (Figure 3) (Ampilov, 2010; 2015).

There are other examples of successful managerial decisions and selected technological development pathways. SURGUTNEFTEGAZ is the most experienced company in adoption and successful implementation of this type of innovative decisions. RITEK has recently developed thermal methods of oil recovery from oil shale, however, these methods are good enough for the extraction of heavy and viscous oils, but not very effective

**Figure 3:** Forecast of the Technically Recoverable Reserves of Shale Oil by Countries Source: EIA (USA) (Ampilov, 2015)



in the extraction of light crude. There are other positive Russian examples (Ampilov, 2015).

The second level of alternative solutions will cover the possibility of the company's participation in the implementation of long-term innovative projects. The share of these solutions will be naturally higher than at the previous level. At the last level, alternatives will be formed in terms of the implementation of innovations within the short term.

It should be noted that the role of experts will be quite high at each level of developing innovative solutions. Their participation will be necessary both to make the objectives tree and compare with alternative innovative solutions, and at the stage of their final choice, prioritization and priority of implementation.

When the multilevel system of alternative innovative solutions is developed, an admissible area of evaluation criteria should be formed. Its formation can also be started while preparing the alternatives.

Based on the established system of evaluation criteria, selection and adoption of priority innovative decisions (by levels) are carried out. Implementation order involves two directions:

- Development of road maps for the implementation of the largest and most significant innovative solutions;
- Development of short-term programs for the implementation of innovative projects.

Control over the implementation of innovative solutions is the final stage in the procedure of preparation and implementation of innovative managerial decisions at the level of O and G companies. Unsatisfactory results revealed at the verification stage give the algorithm of a cyclic character and suggest the possibility of return to the first stage with the aim to adjust the earlier decisions and prepare the new ones.

### 3.2. Development of Workforce Capacity as the Main Condition for Ensuring Effective Implementation of Innovative Decisions

No effective implementation of innovative managerial decisions in O and G companies is possible without a personnel innovation potential based on, first of all, talented and competent people. Activation of innovations is currently impossible without proper intellectual resources, i.e. qualified specialists and professionals with unique competencies to find solutions for complex non-trivial production tasks and participate in the process of creating new technologies with their experience, knowledge and innovative thinking. No further progressive development of business without such resources is possible (Armstrong, 2006).

All this predetermines the need to increase the importance and set special tasks in the field of training innovative-oriented personnel, i.e., training of a special group of innovators. Personnel that can be attributed to this group must comply with such requirements as high self-motivation, developed creative imagination, the ability to generate ideas and analytical activity, originality, creativity and breadth, encyclopaedism, logic, intuition, teamwork, and

high intellect. However, there is no integrated technology of mass training of innovators yet.

To solve this problem, O and G companies can take the path of expanding functions of their corporate training system. In addition to the standard components typical for any (including non-technology) company, the function of corporate training and staff development should have two extremely important interrelated components:

- Advanced training of personnel for the implementation of innovative projects and research projects within the company;
- Development of the personnel's ability to quickly find new engineering solutions.

Advanced training will minimize risks, contribute to the successful implementation of the innovation strategy and can lead the company into the leaders in a separate direction of technological development.

#### 4. RESULTS

While making this research, the authors made an attempt to systematize the role of innovative solutions for O and G companies and their importance in ensuring their progressive development.

Development of the appropriate integrated system of preparation and implementation of innovative managerial decisions at the level of O and G companies will create a real mechanism for the timely use of innovations, which will also provide the companies with increasing competitive advantages, leading positions in strategic and priority areas and, as a result, will allow to jump from routine maintenance of current operations to creation of new and improving applied technologies in the field of geologic exploration, development, extraction, and increase in oil recovery of layers.

The obtained results may be of interest both to the scientists and educators which study the theory of innovative solutions, and managers at various levels of management in the oil and gas sector.

#### 5. DISCUSSION

Implementation of the concept of innovative decision-making at the level of O and G companies presented by the authors is complicated by low awareness of the top management of the necessity and importance to use foresight technology (Martin, 1993). The same refers to the above while creating the perspective strategy for the development of companies within the production sphere of key operating segments, as well as to the need to harmonize the personnel training system aimed at developing competencies and gaining knowledge in the field of advanced hydrocarbon production technologies, which are still only at the level of scientific developments.

Bushuyev et al. have noted in their works that the current situation in the field of long-term forecasting of global scientific and technological development is unsatisfactory both from the organizational and the content point of view. In particular, the

forecasts based on the budget process in Russia and investment plans of large companies have low reliability and undeveloped methodology. To solve this problem, it is necessary to build the Russian system of long-term forecasting (foresight) of scientific and technological progress, based on the up-to-date achievements and experience of structural forecasting, which helps to identify the most important potential trends of technological development in the energy sector. At the same time, it will be crucial to assess the risks of implementation or failure to realize potentially promising scientific and technological solutions for the Russian O and G sector. Such risk analysis of long-term scientific and technological development of the energy sector will contribute to the formation of an innovative strategy for the development of the Russian O and G sector within the national innovation system being created today (Bushuev et al., 2012).

Existence of problems within the competence of the company personnel to use new production technologies is described in the works of Ampilov, 2015; Moskalenko, 2015; 2016; Andronova et al., 2014. Establishment of domestic production will require long-term hard work, and the result can be obtained only with the proper organization of work and availability of qualified personnel. We have neither the one nor the other in the necessary volumes and of the proper quality (Ampilov, 2015).

#### 6. CONCLUSION

In the summary, it should be noted that the goal of this study, as announced by the authors, to fully describe the role of innovative decisions in ensuring long-term development of O and G companies, has been achieved.

Creation of the integrated system of preparation and implementation of innovative managerial decisions at the level of O and G companies will allow to form a real mechanism for the timely use of innovations. Therefore, this will provide O and G companies with the strengthening of competitive advantages, leading positions in strategic and priority areas and, as a result, will allow to jump from routine maintenance of current operations to creation of new and improving applied technologies in the field of geologic exploration, development, extraction and increase of oil recovery of layers.

There are also some recommendations on the implementation of the author's vision and its further development in the field of ensuring the technological stability of the companies in the future. Firstly, this is due to the implementation of qualitative forecasting in the field of advanced technologies in all operating segments. Secondly, this is through the organization of a corporate training system in a way that would ensure timely training of personnel for the use of future technologies.

#### REFERENCES

- Ampilov, Y. (2015), Slancevaja neft' Rossii - Perspektivy Dobychi v Uslovijah Sankcij i Padenija Cen na Neft' [Shale Oil in Russia - Prospects for Production in Terms of Sanctions and Oil Price Collapse]. Oil & Gas Journal Russia, March: 24-30. [Date Views

- 05.11.2016]. Available from: <http://www.ogjruussia.com/uploads/images/Articles/March15/24-30.pdf>.
- Ampilov, Y.H. (2010), From Seismic Interpretation to Modeling and Assessment of Oil and Gas Fields. Netherlands: EAGE Publications.
- Andronova, I.V., Slepukhina, T.A., Suvorova, M.S. (2014), Vnedrenie Innovacij v Neftjanoj Kompanii: Bar'ery i Vozmozhnosti Preodolenija. Sovremennye Problemy i Perspektivy Regional'no-otraslevogo Razvitija [Implementation of Innovations in the Oil Company: Barriers and Opportunities for Overcoming]. Modern Problems and Prospects for Regional and Sectoral Development]. Tyumen: State University of Tyumen. p153.
- Ansoff, I.H. (1979), Strategic Management. New York: Wiley.
- Armstrong, M. (2006), A Handbook of Human Resource Management Practice. London: Kogan Page Publishers. p982.
- Blagodarja Sankcijam v Rossii Razrabotana Tehnologija Dobychi Slancevoj Nefti [Thanks to Sanctions: Russia Developed a Technology for Producing Shale Oil]. (2016), Polite People. [Date Views 03.03.2017]. Available from: <http://www.vegchel.ru/?newsid=28028>.
- Breschi, S., Lissoni, F., Malerba, F. (2003), Knowledge-relatedness in firm technological diversification. Elsevier Research Policy, 32, 69-87.
- Bushuev, V.V., Belogoriev, A.M., Apolonsky, O.Y., Borgolova E.A., Timatkov V.V. (2012), Ustojchivoje razvitie neftegazovyh kompanij: Ot teorii k praktike [Sustainable development of O & G companies: From Theory to Practice]. Moscow: Energy Information Center. p88.
- Bushuyev, V.V., Gromov, A.I., Belogoriev, A.M., Mastepanov, A.M. (2016), Energetika Rossii: Poststrategicheskij Vzgljad na 50 Let Vpered [Energy of Russia: A Post-Strategic Vision for 50 Years Ahead]. Moscow: Energy Information Center. p96.
- Drucker, P.F. (2006), Informacija, Kotoraja Dejstvitel'no Nuzhna Rukovoditelju - Izmerenie Rezul'tativnosti Kompanii [Information that is Really Needed to the Management - Measuring Company Performance]. Moscow: Alpina Business Books.
- Gromov, A.I. (2016), Perspektivy razvitija rossijskoj neftjanoj otrasli v uslovijah turbulentnosti na mirovom neftjanom rynke [Prospects for the development of the Russian oil industry in conditions of turbulence in the world oil market]. Moscow Drilling and Oil, 2, 6-10.
- Kryukov, S.V. (2010), Foresight: The forecast for the formation of the future. Terra Economicus, 8(3), 7-17.
- Kryukov, V.A., Shafranik, Y.K., Shmat, V.V. (2003), O Perehode Neftegazovogo Sektora Rossii k Innovacionnoj Modeli Razvitija [On the Transition of the Oil and Gas Sector of Russia to the Innovative Development Model]. Novosibirsk: IEEPP SB RAS.
- Kryukov, V.A., Shmat, V.V. (2005), Innovacionnyj process v neftebyche I narodnohozjajstvennye interesy: Garmonizirujushhij potencial institucional'nogo podhoda v gosregulirovanii otrasli [Innovative process in oil production and national economic interests: Harmonizing potential of the institutional approach in state regulation of the industry]. Russian Economic Journal, 3, 22-34.
- Martin, B. (1993), Research Foresight and the Exploitation of Science Base. London: HSMO.
- McNamara, D., Lyons, A.E. (2014), Orlovskiy Innovations in the Oil and Gas Sector. [Date Views 17.12.2015]. Available from: [http://www.pwc.ru/ru/energy-utilities-mining/publications/assets/innovation\\_survey2014.pdf](http://www.pwc.ru/ru/energy-utilities-mining/publications/assets/innovation_survey2014.pdf).
- Moskalenko, A.A. (2015), Mobile Personnel Training in the Context of Business Tasks Solution of Oil Company. European Science and Technology: In the 12<sup>th</sup> International Scientific Conference, Munich.
- Moskalenko, A.A. (2016), Improvement of work with personnel as a factor of increasing business efficiency. International Review of Management and Marketing, 6(4), 1-11.
- Moskalenko, A.A. (2016), Metodologicheskie osnovy formirovanija sistemy korporativnogo obuchenija personala neftjanoj kompanii [Methodological basis of formation of the corporate personnel training system for O&G companies]. Economics and Entrepreneurship, 1, 1104-1108.
- Nolan, P.A., Thurber, M.C. (2010), On the State's Choice of Oil Company: Risk Management and the Frontier of Petroleum Industry. Working Paper No. 99. Freeman Spogli Institute for International Studies.
- Osinovskaya, I.V., Plenkina, V.V., Lenkova, O.V. (2013), Algoritm prinjatija upravlencheskih reshenij v slozhnopostroennyh neftegazovyh strukturah [Algorithm for making managerial decisions in complex oil and gas structures]. Scientific Review, 1, 262-267.
- Peskov, D. (2016), Rapid for Sight Methods. Vol. 3. [Date Views 15.12.2016]. Available from: <http://www.srosovnet.ru/content/editor/Metodichka foresight.pdf>.
- Plenkina, V.V., Osinovskaya, I.V., Lenkova, O.V. (2013), Razrabotka Upravlencheskih Reshenij v Neftegazovyh Strukturah: Teorija i Praktika [Development of Managerial Decisions in Oil and Gas Structures: Theory and Practice]. Germany, Saarbrücken: LAP LAMBERT Academic Publishing. p93.
- Shafranik, Y.K. (2005), Neftegazovyj Faktor Rossii [Russia's oil and gas Factor] Moscow: Vtoroy Variant.
- Shmal, G.I. (2013), Tezisy Vystuplenija na Seminare v IMEMO RAN Innovacionnye Processy v Neftegazovoj Promyshlennosti [Theses at the Seminar Innovation Processes in the Oil and Gas Industry at IIEIA RAS]. [Date Views 10.02.2016]. Available from: [http://www.imemo.ru/ru/conf/2013/12032013/SHM\\_12032013.pdf](http://www.imemo.ru/ru/conf/2013/12032013/SHM_12032013.pdf).
- Shreier, A.V. (2011), Innovacionnyj potencial razvitija toplivno-jenergeticheskogo kompleksa [Innovation potential of energy complex development]. Journal of Legal and Economic Studies, 1, 36-39.
- Tokarev, A.N. (2012), Innovacii v Neftjanoj Promyshlennosti: Institucional'nye Aspekty [Innovations in the Oil Industry: Institutional Aspects]. [Date Views 12.11.2016]. Available from: <http://www.cyberleninka.ru/article/n/innovatsii-v-neftjanoy-promyshlennosti-institutsionalnye-aspekty>.
- Tucker, B. (2015), Innovation Thrives in the Oil & Gas Industry. [Date Views 15.11.2016]. Available from: <http://www.forbes.com/sites/billtucker/2015/09/23/innovation-thrives-in-the-oil-gas-industry/#1d857e2c49a7>.