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METHODOLOGICAL APPROACH TO IMPROVING EQUIPMENT RECONDITIONING CONTROL TOOL IN OIL AND GAS COMPANIES

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Abstract

The current importance of the issue represented in the article is dictated by the fact that nowadays oil and gas companies do not have the unified approach to managing the processes of equipment reconditioning. When forming the mechanism of equipment reconditioning, the specialists of oil and gas companies do not pay sufficient attention to the methods of economic and mathematical modeling. The purpose of the research is to develop the methodological approach to improving the mechanism of managing the equipment reconditioning of oil and gas companies based on the methods of economic-mathematical modeling when planning and organizing these processes due to the peculiarities of machinery operations and work management. The key research

methods used for this issue are system analysis method, complex analysis, economic-mathematical modeling. Research results: the mechanism of managing the oil and gas company is improved in the sphere of methodological support of planning and organizing equipment reconditioning. The materials of the article could be useful for scientists specializing in studying the processes of managing the equipment reconditioning in oil and gas companies, mechanisms of their implementation; as well as for the specialists of oil and gas complex, responsible for equipment reconditioning.

Keywords: **Equipment Reconditioning, Economic-mathematical modeling, Control tool, Management system, Oil and gas companies**

JEL code: **A10, A19**

INTRODUCTION

Establishing a Context

Oil and gas companies are the key element of the system of the Russian oil and gas complex. Nowadays a number of factors influence the activity of Russian oil and gas companies: on one hand, these are the factors preventing their stable growth, on the other hand, opening the prospects for their future growth. Among the factors is the restructuring of vertically integrated oil companies and, as a consequence, the allocation of non-core assets (transport, energy and repair services); business environment as a consequence of the sanctions imposed by some countries; the influence of international economic alliances on the decrease of oil extraction volume by regulating the oil barrel price.

Finding solution to the problem of increasing the efficiency of oil and gas companies functioning in many cases depends on optimizing the costs for the maintenance of the equipment used in corporate business processes. The authors of the article study the influence of the processes of equipment reconditioning (technical support, repair and modernization) on the activity of oil and gas companies.

The issues of equipment reconditioning at industrial enterprises were often discussed by the Russian scientists, a lot of ways of improving the work efficiency of plant and machinery were suggested. However, the authors put that there is no sufficient research of the methodological support issues of equipment reconditioning control tool that will help to give the grounds for the variants and ways of equipment reconditioning using the methods of economic-mathematical modeling. Besides, the authors think that it is not always justified to allocate the non-core assets apart from the companies of oil and gas complex.

Literature Review

The research of improving the methodological support of forming the mechanism of managing the process of equipment reconditioning in oil and gas companies, able to reach the necessary level of its work safety, should be started from analyzing the current national methods in the system of managing equipment reconditioning at the industrial enterprises, reported in the scientific and special literature.

Methodological and regulatory documents, regulating the national processes of reconditioning equipment were firstly developed for machine-building enterprises. Below there are ontological aspects of forming and identifying the methods of managing the equipment reconditioning in the companies of oil and gas complex, starting from the theoretical base of the methodology of equipment reconditioning in machine-building.

In the early 1930s Spiridonov [1] suggested the methodological approach for machine-building enterprises based on the system of after-inspection maintenance that included constant inspections of the equipment, accuracy checks. At the same time for the same industry Popov [2] suggested the method of organizing the equipment reconditioning as the system of standard maintenance. He suggested the system of cyclic maintenance of the equipment organized periodically due to the schedule planned in advance.

The first repair systems were based on the approach developed by Borisov et al. [3] in the mid- 1930s. They suggested the methodology of planning equipment maintenance at industrial enterprises via conditional units of maintenance complexity.

In the 1950-60s the Ministry of Oil Industry developed the Unified system of preventive maintenance scheduling the system of preventive examination and routine repair work.

In practice, it was the theoretical basis of the methodology of maintenance planning during the depreciation period.

In 1973, Central Institute of scientific and technical information and technical and economic research of chemical and oil machine-building formed the system of scheduled preventive repairs and technical maintenance of drilling equipment applied in the oil and gas companies of the USSR. Due to this system every equipment unit should have a day-to-day maintenance and, besides, regular scheduled examinations and various repairs. Similar to preventive maintenance and technical service, this system makes it possible not to cause the degree of wear, when its repair is technically impossible and wasteful.

In 1982, the Ministry of oil industry redeveloped and improved the system of technical support and scheduled maintenance. It included the main principles of organizing technical support and scheduled maintenance of drilling and oilfield equipment used in drilling and oil and gas extraction. Also, the operating standards and the structure of maintenance cycles of oilfield equipment were significantly expanded, the complex work

on the full repair of oilfield equipment was accomplished, the coefficients of the equipment standard inventory were introduced. Maintenance works were organized for the main types of equipment.

In 1986, the Ministry of oil industry developed the Unified system of preventive maintenance that is currently used by oil and gas companies. Unfortunately, mathematical apparatus was not widely used and as a result most of the developed standards did not have the sufficient scientific grounding.

At present moment in the new business environment the specialists of oil and gas companies face the challenge of increasing the efficiency of equipment. For equipment reconditioning (that includes the processes of technical service, maintenance and modernization) most of Russian enterprises of oil and gas complex repeat the experience of foreign oil companies focused on cooperation with the specialized service companies.

According to Pervov [4] "...in order to solve this problem, national enterprises use the experience of ten-twenty years ago. Control mainly is exercised through the schedule of preventive maintenance and planning the necessary budget. As for old equipment it is impossible to set the period of trouble-free operation, planning horizon is usually one year".

Establishing a Research Gap

There is no single methodological approach in the scientific literature, forming the system of managing equipment reconditioning in oil and gas companies. National and foreign scientists and specialists of oil and gas companies do not pay enough attention to forming the mechanism of equipment reconditioning based on economic-mathematical modeling.

Aim of the Study

Taking the above-mentioned into consideration, the authors suggest improving the elementary structure of equipment reconditioning management in the sphere of methodological support to make it meet the modern business environment.

Creating the efficient system and management mechanism, providing decision-making and its implementation in the sphere of equipment reconditioning is the key problem of Russian oil and gas companies. The specialists of modern oil and gas enterprises responsible for equipment reconditioning use databanks with all the current information necessary for decision-making, modern national and foreign software (the most popular in Russia are SAP PM, IBM Maximo, among the national ones are – Galaktika TORO, TRIM, 1C: Enterprise 8 "Control of equipment maintenance and service" [5] and the developed infrastructure, but do not use the methods that help to make the scientifically grounded decisions. The research accomplished by the authors in oil and gas

companies proves that the use of economic-mathematical modeling when planning the work of equipment reconditioning helps to make efficient decisions about the type of work to choose and the way of organizing work due to the necessary quality level and optimal cost.

METHODOLOGICAL FRAMEWORK

Research Materials

In the “Energy strategy of Russia for the period up to 2030” it is mentioned that the wear of oil complex equipment is about 70%. The equipment of oil and gas companies producing hydrocarbons is usually functioning in aggressive natural and climatic conditions. The management of oil and gas companies organizes equipment reconditioning and change, but the steps taken do not fully provide operational efficiency, technological modernization and optimal structure of the costs.

The business processes of oil and gas companies should have good-quality equipment that can function without any risks to stop for the urgent maintenance. Therefore, the main research material is improving the mechanism of equipment reconditioning management in developing the methodology for planning this kind of work. The application of this tool will help the oil and gas companies to plan the equipment reconditioning or change efficiently and at minimum costs, give the grounds for rationalize particular type of works.

Research Methods

The following methods were used in the research: theoretical: system analysis method, complex method; empirical: the concept of rational behavior of market players, comparison, measurement; theoretical-experimental: method of economic and mathematical modeling; method of mathematical statistics.

The main research methods are:

- System analysis method that at the stage of problem setting made it possible to study the functional interaction of all the company departments and services, responsible for equipment reconditioning when organizing its maintenance or after maintenance service;
- Complex analysis method made it possible to take a wide range of planning and management aspects of equipment reconditioning in Russian oil and gas companies;
- The method of economic and mathematical modeling made it possible to give the grounds for the managerial decisions on the issues of equipment reconditioning when planning the maintenance and modernization, and choosing the way of their implementation;
- The concept of rational behavior of market players made it possible to make the

conclusions about the optimal choice of the equipment reconditioning method, increasing its operation period, the quality of maintenance and the costs of oil and gas companies, when the managerial decisions were made about the reconditioning of the equipment accomplishing hydrocarbon production.

EXPERIMENTAL BASIS OF THE RESEARCH

The experimental bases of the research are the Russian oil and gas companies.

Research Stages

The research was accomplished in two stages.

The first stage of the research was the theoretical and empirical grounding of the necessity to apply the mathematical modeling in managing the enterprises of oil and gas complex. It was developed by the authors in 2005-2011 [6,7]. The following results were achieved:

- The methodological approach to improving the system of reconditioning the active part of the key assets (oil equipment) was developed based on economic-mathematical modeling, it made it possible to take into account the exploitation features, natural and climatic conditions of equipment functioning, etc. with the help of economic-mathematical model. As the optimal test there was used the max cash-flow equal to the difference of profit from the equipment use and the costs on it's reconditioning for every year of the research period. As a result, for every equipment unit the planned strategy of its full or partial reconditioning was developed, that made it possible to achieve the minimum aggregate (cumulative) expenditures for the equipment reconditioning in the cost of production (1 ton of oil or 1 m of mining) [6];

- Methodological approach to the efficient reconditioning of the key assets was developed by forming the optimal strategy of exploitation and equipment change. To determine the optimal exploitation period and the time of equipment change, it was suggested to solve this problem by the method of dynamic programming with the help of economic-mathematical model. In the situation of the full equipment change the max profit was taken as the objective function, the profit being made during n years. Afterwards the strategy of equipment reconditioning or change was determined due to the criteria of maximizing the profit from equipment exploitation.

When changing some elements of equipment, minimal costs for its maintenance were taken as the optimal criteria. When using the variant of minimizing costs, there was considered the strategy of organizing maintenance of not the whole equipment but only some parts. When some parts were repaired, the whole equipment was not withdrawn from the production process. Using the suggested algorithm and the strategy of equipment reconditioning the enterprises of oil and gas complex can keep the costs for every equipment type and its elements, make database with the information for every

equipment unit taking into account the length of its use [7].

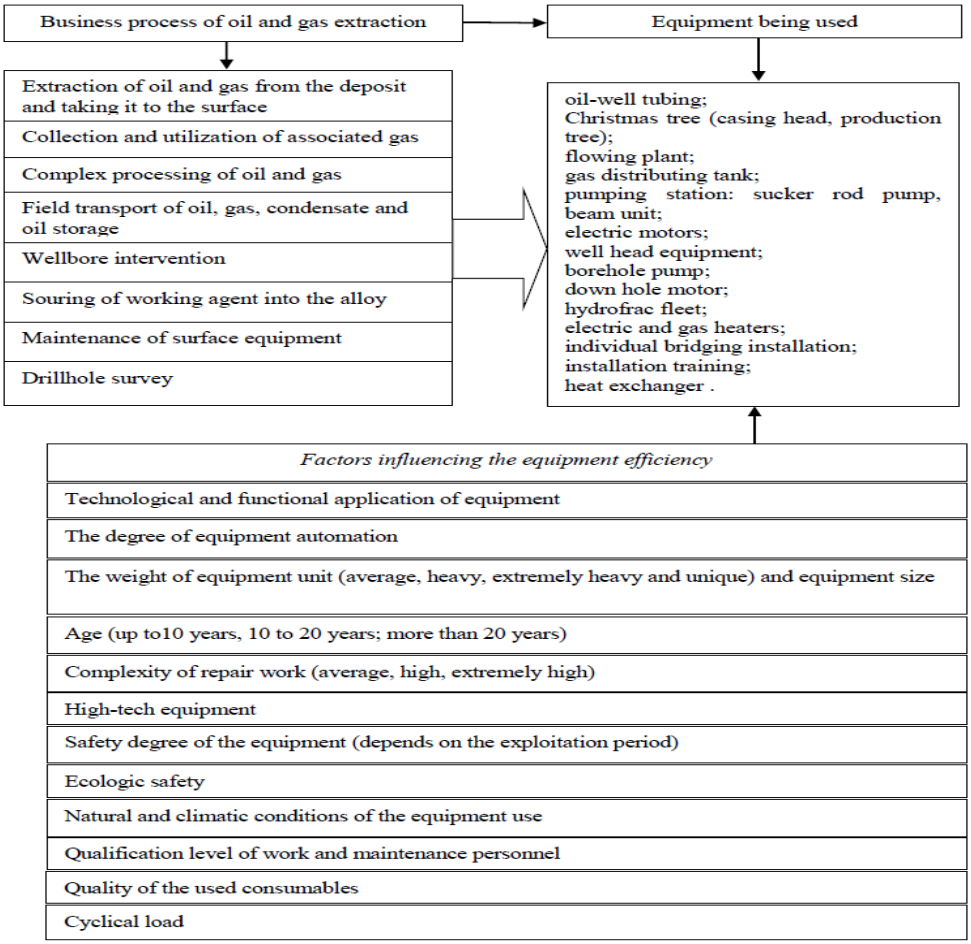
As for the second stage, this topic was continued with the focus on developing the methodological approach to improving the mechanism of managing equipment reconditioning in oil and gas companies based on the development of economic-mathematical models.

RESULTS

The developed economic-mathematical models are the basis to form the mechanism of managing the equipment reconditioning in oil and gas companies that is extremely vital in modern economic situation.

The business processes of oil and gas extraction and necessary equipment are represented on Map of technological application (Figure 1).

Figure 1: Map of technological application of oil and gas equipment. Source: compiled by authors.



Here are also the factors influencing proper operation of equipment. Keeping the following factors will help to reveal the degree of the efficiency of every equipment unit due to restrictions coming from environment and the equipment functioning.

The suggested methodological approach to improving the mechanism of equipment reconditioning in oil and gas companies is based on the principles of continuity, coordinating the work of equipment reconditioning, creating the optimal structure of reconditioning process management. The reconditioning process includes the following sub-processes: technical service, current, midlife and major repair and modernization.

The sub-processes of technical service are accomplished due to the system of preventive maintenance standards and according to the authors' opinion do not need to be optimized. In the article the authors pay attention to the sub-processes of repair and maintenance.

The most important decision for the management of oil and Gas Company is finding the moment to stop using the equipment. In this case, it is necessary to make the decision about its change or repair. Besides, in the case of repairing, it is necessary to choose the maintenance type due to the criteria of minimal costs for the certain quality level.

The methodological approach suggested by the authors and based on applying the method of economic-mathematical modeling helps to give the grounding for decision-making. It consists of two stages. At the first stage, the specialists of the department of chief engineer should give the grounds for the necessity to organize equipment maintenance and change. At the second stage – to find the variant of equipment reconditioning with the minimal costs but for the necessary quality level: using own staff of the department of chief engineer in oil and Gas Company, resources of a subsidiary or outsourcing.

At the first stage in order to rationalize the decision to repair some old equipment unit or to change it for a new one, it is recommended for the specialists of the department of chief engineer to use the economic-mathematical model (1).

$$f_n = \min \begin{cases} \dfrac{\Delta C_{old}}{\Delta P_{old}}; \\ \dfrac{\Delta C_{new}}{\Delta P_{new}}; \end{cases} \tag{1}$$

Where:

ΔC_{old} – cost increase for the maintenance of equipment that should be changed in a time period t;

ΔP_{old} – performance improvement of the equipment that should be repaired in a time period t;

ΔC_{new} – cost increase for the maintenance of equipment that is planned to be bought in a time period t;

ΔP_{new} – performance improvement of the equipment that is planned to be bought in a time period t.

The methodological approach to developing this model is in evaluating and comparing the unit costs increase for the maintenance calculated for the specific unit performance of the old equipment unit (that should be changed) and a new one (that is planned to be bought).

Unit costs increase is calculated for the specific unit performance of the equipment (ΔC_{old}: ΔP_{old}) for the time period t = n+1-n (T=1,..., n) in the following way:

- For the equipment to be changed $\Delta C_{old} = C_{old,n} - C_{old,n-1}$).; $\Delta P_{old}= (P_{old,n-1} - P_{old,n})$.; Unit costs $_{old}= \Delta C_{old} : \Delta P_{old}$
- For the equipment that is planned to be bought $\Delta C_{new} = (C_{new,n+1} - C_{new,n})$.; $\Delta P_{new}= (P_{new,n} P_{new,n+1})$.; Unit costs$_{new}= \Delta C_{new} : \Delta P_{new.}$

As a result this correlation can be more, less or equal 1.

The managerial decision concerning the equipment maintenance or change is taken in the following way:

- If the difference between the unit costs for the specific unit performance for the old and new variant is >1, it is more reasonable to make a decision on changing the equipment (buying the new one);
- If the difference between the unit costs for the specific unit performance for the old and new variant is <1, it is more reasonable to make a decision on repairing the equipment;
- If the difference between the unit costs for the specific unit performance for the old and new variant is =1, the decision is made by the export method after analyzing the following indices:
- Forecast minimum period of equipment exploitation after the maintenance, years;
- Forecast length of the maintenance work, due to the schedule, hours;
- Distance from the place where equipment is located to the maintenance center, km.
- In oil and gas companies, the decision about equipment modernization is made based on the export report of the chief technical staff of the company. The equipment to be modernized should be repaired and be in a working condition.

At the second stage, company specialists are recommended to apply the economic-mathematical model in order to give the grounds to the way of organizing the maintenance: using own resources, resources of a subsidiary or outsourcing, (2):

$$C_{reconditioning} = f(w,q,d) = \min \begin{matrix} f_1(w,q,d) \\ f_2(w,q,d) \end{matrix}$$

$$f_3\,(w,q,d) \qquad (2)$$

Where
f_1 – the way of organizing maintenance using the own company resources;
f_2 – the way of organizing maintenance using the services of daughter company specialists;
f_3 – organizing maintenance by service companies.
w – wear of equipment (the assessed amount of depreciation);
q – geographical remoteness of the equipment that need to be repaired;
d – the degree of equipment modernization.

As a result, when the decision is made for every single equipment unit, there should be one type of equipment reconditioning:

$$\begin{aligned} f_1(w,c,d) &= C_{p1} \rightarrow \min \\ f_2(w,c,d) &= C_{p2} \rightarrow \min \\ f_3(w,c,d) &= C_{p3} \rightarrow \min \end{aligned} \qquad (3)$$

Where
$C_{p1} = f_1$ – costs for organizing maintenance using own resources;
$C_{p2} = f_2$ – costs for organizing maintenance using subsidiary's staff;
$C_{p3} = f_3$ – costs for organizing maintenance via outsourcing.
C_{p1} – costs for organizing maintenance using the own company resources can be calculated taking into account the possible increase of equipment exploitation period, geographical remoteness of the equipment that need to be repaired, the possible decrease of the standard period of equipment maintenance.

The possible increase of equipment depreciation period Dw is calculated by the formula:

$$Dw = \frac{w_p}{w - w_T},\ Dw \leq 1/5\ W \qquad (4)$$

Where
w_p – the time of equipment efficient work guaranteed by the maintenance provider after equipment maintenance;
w_T – the time of equipment work from the start of exploitation to the current moment;
w – depreciation period (standard period) of equipment exploitation.

As a rule, the increase of equipment depreciation period leads to the decrease of the aggregate costs for equipment maintenance that is why, with the increase of Dw we have the decrease of C_{p1}.

The period of possible decrease of the standard period of equipment maintenance Db is calculated by formula:

$$Db = \frac{b_{p1}}{b_1}, \quad (5)$$

Where
b_{p1} – real time spent on the maintenance of equipment unit using the company's own resources;
b_1 – standard time of equipment maintenance due to the plan of the system of equipment preventive maintenance using the company own resources.

As a rule the increase of equipment repair period leads to the increase of the aggregate costs for equipment maintenance, that is why with the decrease Db we have the decrease of C_{p1}.

Geographical remoteness of the equipment that needs to be repaired q has direct influence on the aggregate costs for the repair through the transportation costs.

The formula for evaluating the costs for equipment reconditioning using the company owns resources should include the evaluation of:

- Repair costs due to the plan of the system of preventive maintenance,
- The quality of reconditioning work measured by the time of equipment efficient work that is guaranteed by the maintenance service specialists after the equipment maintenance;
- The distance of transporting the equipment to the place where it is going to be repaired.

The evaluation of maintenance costs in this case is calculated by the formula:

$$f_1 = C_{SPM}\left(\frac{w_p}{w - w_T} + \frac{b_{p1}}{b_1} + \frac{l_{p1}}{l_1}\right) \quad (6)$$

Where:
w_p – the guaranteed time of equipment efficient work after the repair, years;
$w_т$ – the time of equipment work from the start of exploitation to the current moment, years ;
w – depreciation period (standard period) of equipment exploitation, years;
b_{p1} – real time spent on the maintenance of equipment unit using the company's own resources, hour;
b_1 – standard time of equipment maintenance due to the plan of the system equipment preventive maintenance**,** hour;
l_{p1}- real distance up to the place where maintenance is accomplished, km;
l_1 – standard distance of equipment transportation according to the planned maintenance cost estimates, km;

C_{SPM} – cost due to the plan of the system equipment preventive maintenance.

In order to make the managerial decision on the suitable type of equipment reconditioning, the specialist should compare the maintenance costs for every maintenance type: using own company's resources, the resources of the daughter or service companies, and ask the following information from the companies offering maintenance:

- The period of equipment efficient work after maintenance;
- Maintenance length;
- Geographical location of the maintenance center.

Additional information helps the owner of the equipment to choose the optimal variant of its reconditioning, simultaneously taking into account the cost, quality and length of maintenance.

All the above-mentioned makes it possible to make a conclusion that the approach developed by the authors provides the optimal choice of equipment reconditioning in oil and gas companies that helps to increase the length of its exploitation and simultaneously ensure low maintenance costs.

The introduction of the developed methodological approach in the company suggests the following stages of experimental work:

1. Identification of the content and the sequence of work on equipment reconditioning and change.

To give the grounds of the managerial decision, the specialists of chief engineer department together with the specialists of planning-economic department provide information to the management of company with the equipment list and the costs planned for its reconditioning. The following indices are used in decision-making:

1. Aggregate costs for the equipment repair and maintenance used in the current and previous time periods;
2. Average machine capacity of the equipment used accordingly in the previous and current time period;
3. Aggregate costs for the repair and maintenance of the new (planned to be bought) equipment in the current and future time period;
4. Average capacity of the new equipment accordingly in the future and current time period.

Analyzing the data upon as a result of calculating the economic-mathematical model (1), the management makes the decision on the necessity to organize the work on oil and gas equipment reconditioning and change.

The specialists of the department of chief engineer carry on all the necessary work on repair, modernization and technical service. Work reports are submitted to the planning-economic department, information is input in the program containing the data about the maintenance costs and exploitation costs for every equipment unit. Information on every equipment type is accumulated in the data bank that is constantly updated with the information about maintenance and exploitation costs for every equipment unit.

Costs analysis (cash flow) of the equipment maintenance is formed in the period reports (quarter, half a year, year) and submitted to the oil and gas company management for planning the future budget.

2. Identifying the content and the sequence of work on the equipment reconditioning method.

The management of oil and gas companies makes the decision on the choice of the optimal variant of organizing equipment reconditioning based on the calculations of the economic-mathematical model (2). In order to apply the developed economic-mathematical model in the real conditions of the oil and gas company, data for the model indices is needed. Database, necessary for calculations is formed by the planning-economic and chief engineer departments.

In the situation when the oil and gas company does not have a license on a particular type of activity for equipment reconditioning, this activity will be accomplished by licensed companies.

In decision-making it is also necessary to take into account whether it is economically reasonable to transport the equipment. The remoteness of the equipment from the maintenance center, costs for its tearing-down and assembly after the repair increase the transportation costs. Consequently, the reconditioning costs will increase. In case when it is impossible to transport the equipment, it is necessary to look for another way of its reconditioning without transportation.

When accomplishing equipment reconditioning it is necessary to take into account if there is maintenance service in the structure of company. Nowadays, in most cases these structural divisions are the non-core assets, and in company there is a group of servicemen able to prevent the crash situations while waiting for the specialized service companies.

Five oil and gas companies participated in research. The analysis of research results made it possible to make a conclusion that the improved mechanism of equipment reconditioning was successfully introduced in the research objects.

DISCUSSIONS

The authors conducted the research of the scientific literature on the issues connected with the equipment repair and maintenance in oil and gas companies. Results are the following.

Isaksen et al. [8] describe in detail the factors that influence the intensiveness of equipment break downs in oil and gas industry. They prove the necessity to introduce the new technologies for the repair and modernization of equipment in oil and gas industry. Hohl et al. [9] describe the safety structure and the support of oil and gas industry. In their research, they prove that in view of the measurements and results obtained from the examinations, a database is prepared for each equipment or structure, which is periodically updated in order to keep control of the said database. The following work shows the examples of application or studied cases of these procedures to masts and pressure vessels used in the oil and gas industry.

Pogrebnyak et al. [10] studied the practical experience of introducing the rolling planning at one of the “Rosneft” enterprises. ...“It is proved that the use of rolling planning will not only help to increase the accuracy of planning, but will decrease the repair period and losses”. Gobyr [11] suggests the model to manage the maintenance service of oil and gas companies that helps to increase company efficiency and manage the technical service of the equipment in oil and gas companies by strengthening management functions such as accounting and control, planning and forecasting, motivation and stimulation. Zakirova et al. [12] demonstrated the necessity to improve modern technologies to train staff which uses oil and gas equipment, in order to improve the level of industrial safety and work conditions at workplaces. Voronova [13] determines the main trends of introducing the nanotechnologies in the repair, exploitation and service of oilfield and down-hole pumping equipment based on the results of the accomplished experimental and industrial work organized on the production assets of “Tatneft”. Bykov et al. [14] studied the approaches used by “IrkutskNIIkhimmash” for providing safe exploitation of equipment and buildings in chemical and oil and gas sectors in the framework of introducing the leading technologies of technical support and service at the enterprises. To provide the constant control of the condition of static industrial equipment, when changing it to the exploitation based on actual technical condition, it is suggested to use the permanently installed systems of diagnostic monitoring.

As for the issues of improving the mechanism of managing the equipment reconditioning at industrial enterprises (including oil and gas companies), there is no sufficient attention to this problem in the national literature. The research accomplished by Sharapkina [15] proves the inefficiency of the modern mechanism of managing the technical re-equipment of machine-building enterprises active nowadays in Russia. It is evident from the poor dynamics of investments in fixed assets, high deterioration of fixed assets, the growing number of money-losing enterprises in machine-building, there are no necessary conditions for developing the investment activity of machine-building

enterprises. The scientist developed the recommendations for developing and improving the mechanism of managing equipment reconditioning for industrial enterprises. Poleshuk [16] formulated the main principals of improving the organizational and economic mechanism of managing the reproduction of fixed assets. Galieva [17] suggested the mechanism of decision-making used to identify the service period of the active part of the fixed assets.

Analyzing the works of the scientists devoted to the issue of the renovation, reproduction, technical re-equipment of fixed assets, we make a conclusion that there is no sufficient attention to the issues of improving the methodological support of the mechanism of managing the equipment reconditioning. In this research the improved mechanism of managing the equipment reconditioning in oil and gas companies can become the element of the concept of pro-active system of managing the equipment reconditioning and renovation. The achieved results will help to provide the efficient equipment for the business process of hydrocarbon extraction based on high-quality reconditioning organized in time. The research results can be continued in the research devoted to improving the theory and methodology of managing the assets of the enterprises of the Russian oil and gas complex based on using the pro-active principles.

CONCLUSION

The problem of reconditioning the oil and gas equipment functioning in the aggressive natural and geographical environment is of key importance for the enterprises of any country engaged in oil extraction. Providing the efficient stable development of such enterprises in many cases depends on the presence and current condition of the system of managing equipment reconditioning and renovation.

But, starting since the second part of the XX century the development of the system of equipment reconditioning is accomplished differently in Russia and abroad. Foreign oil and gas companies think that it is economically reasonable to introduce the non-core assets, with service companies being responsible for equipment reconditioning. Russian oil and gas companies use both traditional methods of equipment reconditioning due to the developed system of preventive maintenance, and outsourcing the reconditioning work.

We do not argue the efficiency of outsource the reconditioning work, but at the same time think that choosing the variant of equipment reconditioning or renovation, and the way of managing this work, is mostly determined by operation of each particular enterprise.

When giving the grounds for the variants of equipment reconditioning in oil and gas companies, choosing ways for organizing this work, many authors miss the use of the economic-mathematical modeling method.

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