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Assessment of Efficiency in Innovation by Reference to Analysis of Economical Measures During Drilling Processes

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Abstract

Formation of innovative strategy includes analysis steps, setting goals, developing policy options, the choice of the optimal variant, and finally creating the conditions for implementation of the strategy. During the implementation of innovative strategies for developing and implementing measures and tactical plans, monitoring the situation may arise in which the implementation of innovation, how highly risky activity at its core, will come into conflict with the investment policy. This, in turn, may or may worsen the financial position of the company, or lead to the abandonment of developed innovation strategy. Therefore, the stages of design innovation strategy should include the analysis of the financial limitations set by the chosen investment policy. The article describes the mechanism of formation of innovative enterprises of oil and gas strategy, the main component of which is the process of determining the strategic potential of innovative projects, of which the portfolio is formed and the future strategy projects.

Keywords

Innovation Strategy, Innovative Design, Innovation, Strategic Potential, Market Potential, Technical and Technological Potential Risk, Drilling Process, Economical Measures

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1. Introduction

Industrial and innovative development of the economy of Azerbaijan opens great opportunities for the development of the country. Successful implementation of promising innovative projects will achieve the competitiveness of the national economy in the future. Amid the global financial crisis, Azerbaijan needs to adopt policies aimed at efficient use of innovation potential, allowing to solve urgent problems of our time, associated with the creation of a competitive environment, the production of import-substituting products, increase exports, increase in labor productivity, increase production efficiency Generation and Energy Development of Azerbaijan is carried out according to Azerbaijan's development strategy until 2030, the Strategy of industrial-innovative development of Azerbaijan in 2005-2020, the State program of development of the Azerbaijan sector of the Caspian sea in the 2005-2020 as well as other sector programs. The main objectives of the implementation of the planned measures are the formation and strengthening of the mineral resource base of the country, promote investment and innovation, the creation of conditions conducive to the growth of economic and social stability of the AP.

2. Statement of the Problem

Innovation means developing a complex process of creation, distribution and use of innovation that contributes to the development and performance of entrepreneurial firms. In other words, under the innovation we mean new or improved opportunities to increase efficiency - methods, events,

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products and services. The founder of the research nature of innovation is I. Shumpeter, who gave the first the most complete description of innovation as a new scientific and organizational combination of production factors motivated by an entrepreneurial spirit, which is the main source of profit.

There are five basic forms of manifestation of innovation:

• Production of a new product or improve the quality of manufactured products, i.e. the introduction of products with new properties;

• opening of a new source of raw materials or the use of new raw materials or semi-finished products in the production process;

• focus on a new way of organizing production;

• the development of new markets or their appearance;

• introduction of new technology, new processes

Innovation is the result of investment in new equipment, in new technologies, production of new types of goods or services or to improve the properties of existing technology, technology, goods and services. Initially innovations themselves act as a commodity, such as patents, know-how, copyrights, rights to the invention. Innovator of the sale of its innovation the funds used to cover operating costs and profit. In turn, the profits from sales of the innovator can use to expand their production - the creation of new types of innovation.

On this basis, we can conclude that innovation, as a socio-economic category, investment and stimulating function.

The objectives of the innovation can be:

• finding new technical solution to the problem - the creation of the invention;

• Conducting research and development (R&D);

• the establishment of mass production of products;

• parallel training and sales organization;

• introduction of a new product on the market;

• consolidation of the new markets by constantly improving technology, improve product competitiveness.

In our view, investment and innovative aspect of the intensification of oil and gas production is a complex integrated system consisting of subsystems and subject to changes as a result of internal and external factors. Given that the investment process life cycle consists of several stages, investment and innovation process also includes steps - birthday ideas innovation, the emergence of innovation, implementation, dissemination volumes rise, reaching a peak of innovation and the decline of consumption level of innovation.

Thus, we understand innovative development - a complex system consisting of many subsystems, but having integrity and exposed to constant change due to internal and external factors hesitation.

In the oil and gas sector efforts carried out on the further development of the oil and gas sector - the identification of promising new oil and gas deposits, accelerated geological and exploration of new facilities, and the development of their commissioning. At the same time, the relevance acquired the old mine, using different methods of intensification will allow several times to increase the oil recovery.

Development of the oil and gas industry should be carried out in accordance with the laws of expanded reproduction - at the expense of development of new deposits and the effective use of the means of production. Due to the limited natural resources, extensive way of development of production has no future prospects, while intensive development contributes to the continuous increase in the volume of oil and gas. The main difference between the intensive development of oil and gas production is a qualitative renewal of production, which leads to the conservation of resources. Extensive same path of development involves a quantitative increase in production on the existing technical and technological basis. Since both types of production cannot exist in a pure form, depending on existing conditions of production, one can observe the predominance of one or other type.

3. Assessment of Efficiency

It is known that turning applied sciences which contain economics of oil industry field science, production power is becoming stronger in the present development level of material production and the roles of models take an important role as influence tools in this process. Run and usage of the models which are the main factors of science development are impossible to receive without models of development of field science in the current enlarging level which is becoming independent.

If there will be a positive change, from the point of applying innovation technologies on solving problems of drilling processes and if we accept this positive progress as φ_r and its special weight as φ_n as below:

$$\Delta\varphi = \varphi_n - \varphi_r, \quad (1)$$

In this formula (1) it is clear that in the result of applying investment technologies the real change level increases and this change level is as below:

$$\varphi_r = 1 - \Delta\varphi \quad (2)$$

This is an average numerical calculation which is based on mathematical statistics method. It means, if $(\varphi_n - 1)$, then $(\varphi_n - \varphi_r)$ and $\Delta\varphi$ are equal increase. We can see from the formulas that the increase is distributed equally, that means it meets demands of the selected function. According to the main point, the formulas perform the function of appreciating criterion.

A, B and V are the groups which characterizes the pit quality of the special weight level φ_r and the special weight of the influences of the groups λ_A, λ_B, and λ_V are changing. It means that the influence to the drilling routine of the pit is changing. We can find in which level $\Delta\lambda$ has changed by summing the changes:

$$\Delta\lambda = \lambda - (\lambda_A + \lambda_B + \lambda_V) \quad (3)$$

Due to the formula $\lambda_{ABV} < 1$ the decrease $\Delta\lambda$ is clear. It means, the routine of the pit drilling is less than the project painters. It is defined in a mathematical way as below:

$$6 = \frac{\lambda - \lambda_{ABV}}{\lambda} \quad (4)$$

The formula defines that when the pit routine is $\lambda = 1$, it is $(1 - 6)$ and it shows level of evolution of applying innovation technologies in order to improve parameters of the pit routine.

Solving the problems as opening up the spare sources which provide efficiency of production, determining the economic efficiency problems, appreciating the usage of in-production spares, fall into model's share. The method of establishment of the model which defines economic efficiency problems in the field of drilling is commented as below:

1) Formulation of the problem.

2) Primary comments and facts for solving the problem.

It is important to remember that, model is an economic-mathematical problem. Model should find out technical-economic problems with observation of natural situation. Observation must define all these:

- Full economic nature of problems;
- Drilling areas and elements of production process (primary and secondary areas);
- Character and objectivity of solving problems, or formulation sphere on subjective signs, influenced parameters, means it characterizes economic nature.

The problem must be seen as total of drilling pit problems, more clearly, groups of the objective and subjective problems which are forms of the process of raising oil from the bed to the surface. Because, the main thing of the drilling process problems is the influence and solution of it is measured by its special weight. The influences can be expressed in the parameter of the common two problems of the pit drilling field. It is based like this: there is an object for every drilling process and drilling run and expense elements are expressed in the parameters of the object. Model should define the content of drilling objects. More clearly, objects of a model are economic efficiency problems. These problems are:

1) Increasing the quality of drilling pit;

2) Decreasing negative influences to minimum while drilling process.

3) Removing obstacles which have opposite effects in the drilling pit process.

Solution of the noted problems improves technical-economic parameters. It should be remembered that, every separately taken economic efficiency problem can become physical sizes and these sizes can be summed. An "influence movement" of sizes should be learning by modeling. The main factors of the suggested model, are:

- Commercial speed index (I_1);
- Pit depth index (I_2);
- Productivity index of drilling products (I_3);
- Period coefficient of drilling machines (I_4);
- Material charge index (I_5);
- Change index of non-productive time (I_6);
- Change index of labor productivity (I_7);
- Special weight of unknown factors (we accept conventionally ψ=0.2).

In this case, we can express economic-mathematical model as below:

$$R = (I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7) * \psi \quad (5)$$

Combination of parameters which are easy to control and providing high quantity and quality of drilling by maximum using potential abilities of drilling devices are called efficient drilling routine.

If drilling devices cannot provide selected values of routine parameters, power of electrical engines cannot compensate the required extent, the length of the heavy drilling tubes is not able to perform required charge along the axis, hardness of down part of the drilling tubings is less than required extent, drilling pumps cannot work with expected productivity, then it is important to use all abilities maximum in this drilling routine. In this case, the quality parameters are highlighted but other parameters are assumed secondary importance. Quality parameters are side-cut of pit hallow

with required depth, correcting azimuth and distortions, drilling edge objects, taking rock examples and etc. There are three parameters in drilling:

1) Given charge to the ax along the axis (P);

2) Quantity (Q) and quality of drilling mixture.

3) Period numbers of the drilling ax (n).

The requirement below which is able to affect drilling routine, should be performed in order to make drilling efficient and in an optimal routine. Otherwise, we cannot get higher results.

- Selecting the correct drilling ax, by taking into account geological condition and physical and mechanical features of the rock that will be drilled.
- Selecting the correct routine parameters and performing the requirements of geological-technical table.
- Availability of increasing the mechanical speed of drilling based on defining the values of routine parameters.

We need to find out the proper connection among the routine parameters and define the influence on drilling tools and equipment in order to find the efficiency of drilling due to internal abilities. If the ax, drilling tool, equipment are selected properly to the optimal routine of drilling process, then the mechanical speed of drilling while the ax makes one move gets the largest value. Then:

1) Average mechanical speed of drilling

$$V_m = \frac{h_b}{t_b} \tag{6}$$

Here, h_b – movement of one axe, (meters);

t_b – time spent on drilling only in the depth of the pit, (hours).

2) Movement of the ax

$$h_b = \int_0^{tb} V_n \, dt_b \tag{7}$$

The dependence between the mechanical speed of drilling and the time of working of the ax is expressed as below:

$$V_m = V_0 * e^{-ktb}, \tag{8}$$

If we write the value of V_m in the expression h_b and open the integral:

$$h_b = \int_0^{tb} V_0 \, e^{-ktb} \, dt = \frac{V_0}{k}(1 - e^{-ktb}), \tag{9}$$

Here: V_0 – start speed of the ax movement, (meter per hour);

k – coefficient which characterizes the speed of deterioration of the ax teeth.

e – coefficient of natural logarithm.

3) The trip speed of the ax movement is expressed as below:

$$V_r = \frac{h_r}{t_m + t_k + t_t + t_q + t_{qe}}, \tag{10}$$

Here: h_r – the speed of the ax in one trip, meters;

t_m – the time spent on mechanical drilling only, hours;

t_k – the time spent on adding tubes while drilling.

t_t – the time spent on repairing while drilling.

t_q – the time spent on picking drilling tubings.

t_{qe} – the time spent on picking and sinking tubings.

It is clear that movement of the ax depends on the speed of destroying rock and work time of the ax in the depth of the pit.

In the drilling with rotor method there is a dependence between the mechanical speed of drilling (v_m) movement of the ax (h_b) and the time of movement of the ax in the depth of the pit, when the number of the ax periods is constant (n = const), the charge of the ax which is given among the axis. The routine parameters do not depend on each other in the drilling with rotor method. The main parameter among the routine parameters is mixture consumption in drilling with turbine method. In another word, change of mixture consumption (Q) causes the change of period number of the ax and the charge given to the ax among its axis.

4. Conclusion

Rotation speed is constant in electric drilling method. Here, we should replace the engine with another one, in order to change the rotation speed of the ax. We can reach the result that, drilling in the oil and gas pits qualitative in time and also achieving high technical-economic results in drilling, strongly depend on warning about difficulties which require material aids and solving them. Complex of the geological structure of beds, increase of pit depth, negative effect of high layer pressure and temperature, saline, existence of conductor and vulnerable layers, difference of complex pit structure and chemical working methods of drilling mixture have prior importance.

We can achieve all these noted ones only due to applying modern innovation technologies.

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