The Level/Preventive Approach to Solving Technical and Economic Tasks as One of Directions in Development of the Enterprises of Oil Refining and Petrochemical Industry

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Abstract. In this work, as a tool of strategy generation in development of industrial enterprise, a methodological approach is considered, that allows the choosing the best path of development among many solutions of technical and economic tasks, taking into account both the interests of enterprises and of society as a whole.

1. Introduction
The industrial enterprises operating in the market environment are characterized by directing the available resources to the production sectors which would bring the maximum return. The perfect choice in effective use of production resources is the one, which possesses the lowest value of lost opportunities [1].

In developing the strategy, the senior managers of the company constantly face with the problems of further development, which are described by means of five well-known concepts of marketing: production rationalization, product development, intensification of selling efforts, marketing concept and societal marketing concept. In recent years, for the purpose of ensuring the competitiveness of production, a special importance was gained by the future-proof marketing concept.

The choice of a specific conception of the further development of industrial enterprise is predetermined by the emerging bottlenecks of the company. In particular, the reduction or the lack of demand for certain types of products and the weakening the competitiveness of the product or company. In general, this choice is predetermined by the negative impact of factors of macro- and micro-environment on the activity of the enterprise.

Let us consider in detail the reasons leading to the emergence of technical and economic problems in the industrial enterprise as well as the ways of their solution on the example of oil refining and petrochemical industry [2].

In the manufacture of petrochemical products, there are the following main production-branch stages: 1) crude oil production; 2) oil refining with the purpose of obtaining petroleum as fuel; 3) manufacturing of petrochemicals.

A common characteristic for the considered production stages is as follows:

1) general technological approach to equipment: heat exchangers, distillation columns, reactors, furnaces, etc.; 2) urgent need in use of auxiliary materials as catalysts, solvents and filters for
transformation of raw materials into semi-finished or finished products; 3) similar structure and composition of secondary production: maintenance, mechanical, transport and building services.

At each stage are built the manufacturing wastes which in case of application of high-tech equipment can be used as raw material (trapped oil), either as sources of energy (heat and combustible waste energy) or as by-products (associated petroleum gas).

Let us consider the features of each production stage.

At the stage of crude oil production, one of the major objective problems in crude oil production is the decline in the quality of the extracted natural resource (high water cut, high content of sulfur compounds and solids, complicated geological and climatic conditions of production, etc.).

To subjective causes of the slowdown in crude oil production are as follows: 1) the policy of closing up of fields geological exploration implemented in the last decades does not allow the entering of greenfields in the development. The geological exploration should be conducted so that the opened oil deposits would provide the required amounts of oil production for its subsequent processing at domestic enterprises. It is commonly known that in the last decade there has been a decline in investment activity in exploration of oil fields (up to 5% of all investments); 2) the privatization of former state-owned oil companies and creation of private oil extraction companies that implement the economic policy based on the known approach in economic science: maximum profit with minimum expenses (the maximum benefit taking into account minimization of expenses). The implementation of this principle is embodied in the increase in the share of oil exports and the shortage in the share of oil supplied to the domestic market. The peculiarity of the Russian Federation is a significant underutilization of production capacity of oil refineries.

Thus, the economic situation in oil production of the Russian Federation is determined by the political situation.

To resolve this problem, it is necessary that the income from the use of mineral resources would have made a greater contribution to the formation of revenue part of state budget. For this purpose, it is necessary to develop a legislative framework by means of nationalization of mineral resources or by setting quotas on the export of oil.

Dynamics of mining fuel and energy resources in the Russian Federation is shown in Table 1 [6].

Let us consider the following production-branch stages – crude oil refining and petrochemistry and select the following groups of problems faced by enterprises of oil refining and petrochemistry:

1. Decrease in gross profit; 2. Increase in production costs; 3. Decrease in competitiveness of the products on quality parameters compared with international manufacturers.

The causes of above problems are identical to the reasons for existence of cyclical development of the economy. As is known, there are external and internal reasons for economic fluctuations.

The external reasons include:
- wars, revolutions and other political events;
- the discovery of large deposits of gold, uranium, oil and other valuable resources;
- the development of new territories and the consequent migration of the population, fluctuations in the population of the globe;
- powerful breakthroughs in technology and inventions, which allow drastic changes in the structure of social production.

The internal causes of cyclical development of the economy are as follows:
- the actual service life of fixed capital;
- personal consumption, whose reduction or increase affects the volume of production and employment;
- investing, i.e. investment of capital in the expansion or modernization of production as well as in creation of new jobs;
- economic policy of the state, expressed in the direct and indirect effects on demand and consumption.

Table 2 shows the dynamics of the major types of oil products.
Thus, the entity can have either separate local technical and economic problems, or in most cases a set of interdependent shortcomings in production activity.

The resolution of problems identified in the framework of traditional technologies is not always beneficial for the company. Therefore it is necessary to consider also other ways of solving technical and economic problems.

**Table 1.** Extraction of the fuel and energy natural resources, million tons.

| Type of natural resource | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|-------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Coal, million tons      | 395  | 263  | 258  | 270  | 256  | 277  | 282  | 299  | 310  | 314  | 329  | 301  | 322  | 335  | 357  | 351  | 356  |
| Peat, million tons      | 73.0 | 13.5 | 4.1  | 4.6  | 3.0  | 1.5  | 2.0  | 1.9  | 1.7  | 1.7  | 1.2  | 1.2  | 1.3  | 1.5  | 1.2  | 1.5  | 1.1  |
| Oil including gas condensate, million tons | 516 | 307 | 324 | 348 | 380 | 421 | 459 | 470 | 481 | 491 | 488 | 494 | 505 | 512 | 519 | 522 | 525 |
| Gas combustible natural (natural), milliardm3 | 641 | 595 | 584 | 581 | 595 | 620 | 633 | 641 | 656 | 653 | 666 | 583 | 651 | 671 | 655 | 668 | 639 |

**Table 2.** Production of main types of oil products, million tons

| Product types | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Primary refining | 298  | 182  | 173  | 179  | 185  | 190  | 195  | 208  | 220  | 229  | 237  | 237  | 250  | 258  | 250  | 258  | 272  |
| Motor gasoline | 40.9 | 28.1 | 27.2 | 27.6 | 29.0 | 29.3 | 30.5 | 32.0 | 34.4 | 35.1 | 35.6 | 35.8 | 36.0 | 36.7 | 36.0 | 36.7 | 38.2 |
| Diesel fuel    | 76.2 | 47.3 | 49.2 | 50.2 | 52.7 | 53.9 | 55.4 | 60.0 | 64.2 | 66.3 | 68.9 | 67.2 | 70.0 | 70.3 | 70.0 | 70.3 | 69.4 |
| Heating oil (total output) | 94.0 | 61.4 | 48.2 | 50.3 | 54.2 | 54.6 | 53.6 | 56.7 | 59.3 | 62.7 | 63.9 | 64.6 | 69.6 | 73.2 | 69.6 | 73.2 | 74.4 |

**2. Methods**

We propose a level/preventive approach of solving technical and economic problems.

Implementation of level approach is as follows. As it is known, the technological structure of enterprises of the industries considered is interconnected: the products of some production sites, process plants and workshops act as components of raw materials, semi-finished products, auxiliary materials, fuel and energy resources for other production stages.

The same situation is with by-products or production waste of some enterprises act as components of material resources for other companies. Not always the financial and production capabilities of entity allow the resolving of technical and economic problems sufficiently profitable.

Therefore, at the first stage we propose to identify the companies which will be interested in buying of by-products or wastes of production formed at the particular plant. To save the transport costs, the search for possible partners should be started from the regional level (Fig. 1). In process of expansion of radius of search of partners, the probability of solving technical and economic task increases.
For the successful implementation of this model, a data bank for enterprises is to be created. A tentative list of baseline information contributing the creation a data bank is shown in table 3.

Table 3. The baseline information to create a data bank.

| Name of the company | Location of the company | Nomenclature and range of products | Formulation of technical-economic task | Technical parameters of the products underlying the technical-economic task |
|---------------------|-------------------------|------------------------------------|----------------------------------------|-------------------------------------------------|

If in the result of analyzing the data bank it is not possible to obtain the desired solution of the problem in the plant, then it is necessary to proceed to the second stage – preventive approach in solving technical and economic problems of the plant.

The preventive approach consists in point wise application of the most modern high-tech technologies to solve specific problems of industrial enterprise. For example, the teachers of Sterlitamak branch of Ufa State Petroleum Technological University develop the technical solutions for the use of alternative methods of influence on the technological environment (microwave radiation) in the production of isoprene rubber at processing of oil sludge [3–5].

The above calculation of integral indicators of effectiveness of these design solutions is justified by their economic feasibility. The success will consist in applying the most effective energy-saving technologies, focusing on solving specific technical problems. For successful implementation of preventive approach it is important to understand: the more specific the problem will be put (i.e. the technical task is to be narrowed to the maximum possible level), the less is the cost.

The optimal solution of technical and economic tasks can consist solely in the unification of existing methods with the economic evaluation of the cost of level and preventive approaches. For economic evaluation of the solutions considered, the known method of economic evaluation of efficiency of investment projects can be used. In the presence of both level and preventive solutions of technical and economic tasks, as the best one will be considered the project, which will have the highest value of net discounted income and profitability index with sufficient underlying strength.

3. Conclusion
Thus, the use of level/preventive approach in solving the technical and economic problems will contribute to working out the strategy of enterprise development, whose successful implementation will allow the optimal use of the limited financial resources of the company. By doing so, the macro – and microeconomic interests will be favorably combined.

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