DIAGNOSIS OF TECHNOLOGICAL ENDOWMENT OF THE TECHNICAL AND ECONOMICAL SYSTEMS - OVERVIEW

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ABSTRACT: The paper deals with the principles of diagnostics of technical-economical systems, applied for the coal mining restructuring process. The main steps of the asset diagnosis process and the assessment of the modernization effects of a complex industrial system are presented. The methodology treated can be used in improving the results of the coal mining industry.

ДИАГНОСТИКА НА ТЕХНОЛОГИЧНИТЕ ВЪЗМОЖНОСТИ НА ТЕХНИКО-ИКОНОМИЧЕСКИТЕ СИСТЕМИ – ПРЕГЛЕД

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РЕЗЮМЕ: Докладът се занимава с принципите на диагностика на технико-икономическите системи, прилагани при преструктурирането на въглищните мини. Представени са основните стъпки в процеса на определяне на активите и е направена оценка на резултатите от модернизирането на комплексна индустриална система. Разработената методология може да бъде използвана и за намаляване на последиците от въглищната минно-добивна дейност.

1. General considerations

Diagnosis of technological endowment for technical-economical systems, presume a detailed analysis of production technical and technological factors, of fabrication technology, of management ways and of production

The diagnoses of technological endowment have to give some answers to problems referring to:

- functioning status of fixed assets reflected by the wear degree, depending upon the functioning duration and the acquisition period;

- the equipment performances depending upon the existing situation on international markets;

- necessity and the possibilities of replacing the equipment and the technologies used;

- fixed assets that are not functioning and that are in preservation status or are no longer used;

- modernization perspectives and the refurbishment of equipments, for the re-introduction them in productive circuit;

- assessment of investments that are in the development stage, their execution stage in comparison with previous estimations, finishing possibilities, influence of these objectives over the productive potential of enterprise;

- situation of utilities ensuring for the developed processes, possibilities for reducing the consumption, dependence degree towards these utilities.

Care and maintenance activity have to be evidenced and justified by the existence of some programs for care, by some graphs for periodical revisions, by the number of repairing made in a certain time period etc.

A global characterization of technical and productive potential of an enterprise that can be made using some specific indicators, from which the most important are: degree of using the production capacity, weight of equipments in the total fixed assets and their wear degree, indicators that can be determined with relations (1):

$$G_{CP} = \frac{Q_h}{C_P};\ P_u = \frac{N_u}{A_F};\ G_U = \frac{A_C}{V_I} \cdot 100, \qquad (1)$$

where G_{CP} is the degree of using the production capacity;

Q_h – achieved annual production;

C_P – annual production capacity;

P_U – weight of equipments in total fixed assets;

N_U – number of equipments;

A_F – total fixed assets;

G_U – wear degree of fixed assets;

A_C – summarized amortization;

V_I – equipments inventory value.

The use of indicators is necessary due to the complexity and for the purpose of assessment process. The weak points, possible to be identified on this stage, can refer to the weak situation of equipments and technologies in use, to the lack of some care and maintenance and repairing programs, to the activity inefficiency.

The strong points can reveal the modernizing or refurbishment processes, the increasing of products quality and as consequence of the, the apparition of new products & services resulted from the research activity etc.

Special importance efficiency for the modernizing of technical and economical systems is underlined also by the fact the inside each stage, no matter who is making it (internal or external personnel), this is registering permanently consumption, and the results can be observed only in the final stag of the project.

The efficiency analyses have to be made by taking into consideration the resources consumption, because in the modernization programs, the distribution have to be very attentive founded, any deviation can reduce the effects in global result and in general situation of technical and economical system.

2. Assessment of modernization effect

In the total of effects generated by the modernization project have to be included also the *residual value*, respective the benefit that can be obtained by taking off from functioning the equipments and by selling them as re-usable materials, or to be used in other conditions by other companies.

The last alternative can occur only in the situation of modernization that are presuming the complete replacement of an equipment (or technological chain) and which, after some repairing will be able to function in the future.

If the modernizing project is coming to solve a certain problem or deficiency (no matter its nature), the obtained effects have to be quantified and transformed in effects of economical nature, for the assessment of its economical efficiency.

In particular, the obtained effects by these projects are not able to cover all the necessary efforts, case when have to be identified also other criterions for their founding, different the one for efficiency. These are depending upon the shareholders or interest, the financial conditions or the perspectives on long or average term.

3. Identification of efforts associated to modernization project

The efforts associated to modernization project, no matter the application field, are diverse from financial costs for direct acquisitions (land, buildings, equipments) or raw materials, materials going to personnel reducing, re-dimensioning of other activities for certain periods of time, changing of processes or technological solutions, relocations for production or services.

Identification of efforts presumes the knowing precisely their main characteristics:

- there are two categories: *efforts for investments*, specific for the execution or implementing stage and *efforts for exploitation* that are intervening during the exploitation period.

- no matter of their nature, these have a *safety and stability character* bigger then the one of effects;

- the efforts associated to projects are usually quantified by *notion of cost,* associated or generated by the implementing or execution of project;

- if the *efforts for investments* are determined in unit form, starting from a *necessary, in correlation with the projects objectives and then are scheduled during the execution duration*, depending the specific conditions (technical, economical), *the efforts for exploitation* can be determined *at the level of the first time period* (day, week, month, trimester, semester), of functioning, in the given conditions and then *will be estimated for the established duration for analyze;*

- *exploitation costs* are identified on the basis of *real conditions and of activity necessary proposed to be achieved;* the quantification can be made at the level of each category, identified on the basis of *documentations* (technological cards, production plans etc.), *of specific consumption and prices (prices lists)* from internal or external market, depending upon the used type of analyses.

As regarding the exploitation costs, these can be identified by a systemic approach that allows the identification of all categories of entrances inside the project (raw materials, material, human resources, utilities, fuel, diverse services etc.), no matter of their direct on indirect contribution to the developed activity.

Their estimation during the analyzed period of the project is made depending upon the evolution of some indicators, as follows|: inflation rate, average rate of interests at the credits, price evolution index, evolution of tax and fees associated to activity, risk rate of the field, others.

Together with the *main costs* (raw materials, material, human resources, utilities, fuel, diverse services etc.) in the modernization projects can occur other costs *(diverse costs)* generated by the reorientation or reorganizing of activity; the costs for the definitive closure of a non-profitable section (care, closure), costs for the temporary stopping of activity for making the modernizing works, costs for the employees training.

All these have to be found in the efforts structure associated to modernization project.

The costs categories previously presented a part of general costs. It is obvious the fact that, depending the type of the project, the respective structure is completed by the specific elements as: expenses with the specialization of human resources during the exploitation period, expenses with environmental protection or work safety of the employees etc.

No matter of their nature, all the costs associated to the project have as starting point the prices or tariffs existing on the market, at the project drawing up. Certain categories can be assimilated by comparison with historical values from inside the technical and economical system, collected at a close date to the one of making the projects calculations, for the elimination of eventual differences and error sources. If this hasn't got all the respective data, the assimilation can be made with values coming from other similar systems, but will e applied corrections, depending upon the similarities and differences between them.

If for some categories of expenses, the market prices cannot cover with precision and credibility or in the case when some of the prices are not directly observable, will be used some transfers of information fro other fields that have common elements with the analyzed one.

In the analyses of the projects efficiency, for efforts but also for effects, usually are used constant prices, meaning that the prices fro the market are adjusted with inflation ratio and are fixed on annually basis. The market prices are, some times, more adequate to be analyzed because are nominal prices, registered in specified periods of time (usually annual) and in modernization case, some quantifiable prices are not always very big and the duration of analyze is relatively small (3-5 years), the inflation, respective the general increasing of prices can affect the project efficiency.

Conclusions

In the effort to find analytical instruments, for the treating at a general level, the problem of equipments management in the conditions of decreasing the mining activity fro inside SNLO, I have searched to synthesize in this work some theoretical and conceptual instruments regarding the modernizing of technical and economical systems.

The treating of recovery and reutilization problematic for the corporeal assets of the closed mines (ort that are going to be closed) I focused on the problems of reengineering the production systems, which has as particular case the modernization as the only way of solving the economical dilemma of producing more with limited resources.

In this context, I approached the main elements of modernization, in a systemic conception, I have presented the main criterions for the selection of indicators of modernization efficiency assessment, considering the fact that the reason of making a modernization is the obtaining better results post factum, that have to be anticipated and assess on the basis of a set of criterions very carefully chosen.

These have to start from the Diagnosis of technological endowment for technical-economical systems in order to obtain a correct delimitation of the corrective intervention points. Finally, the assessment of modernization effects is representing the way of motivating the opportunity of achieved action, with the purpose of comparing it with other alternative solutions.

References

Dumitrescu, D., Dragota, V., – Evaluarea întreprinderilor. Metode, Tehnici, Incertitudine,Valoare. Ed. Economica, Bucharest, 2000.

Dobrea, R., C., - Modernizarea si retehnologizarea sistemelor tehnico -economice, posibile solutii pentru eficientizarea activitatii economice, Simpozionul de Stiinte Economice: *SIMPEC 2002, Universitity Transilvania Brasov, April 2002.*

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