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EFFICIENCY STRATEGIES IN THE CONTEXT OF THE E.U. INTEGRATION OF ROMANIAN INDUSTRY

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Abstract: *The main objective of the Romanian industrial policy, as stated in governmental documents, refers to the strengthening of industry competition through the development of a reliable and open business environment, based on a legal stable and coherent frame, on the acceleration of structural adjustments, the promotion of intangible investments (investment in the human capital, research and innovation, quality, standardization etc.) and support the development of industrial and SME's cooperation. The most often used economic indicators as optimizing criterion are investment and benefit are presented in the present paper.*

Key words: *economic efficiency, investment, benefit, optimization.*

1. OBJECTIVES SET FOR THE INCREASE OF INDUSTRY COMPETITION

The industrial politics of Romania applies, through it's precautions, the developmental durable concept. This is achieved, on one side, through the use in the developmental industrial process of the paths through which the economic activities can protect the environment on a long term, and through the rational utilization of natural resources, especially the ones with economic value and limited potential in time.

The main instruments used for the increase of industrial competition are:

- The development of an open and viable business environment through the consolidation of a simple, transparent and coherent stable legislative system, supported by a proper institutional environment, both compatible with the ones from the EU.
- Speeding up reorganization of the enterprises on the principle of economic capitalization, including shutting off unreliable capacities of production. The economic and financial viability is the main target which aims at the improvement of enterprise competition.
- The stimulation of the buy-out process, through the diversification of the buy-out methods which allows the acceleration of the process, the realization of a efficient buy-out and the insurance of proper transparency, in accordance to the international practices.
- The development of informational technologies in the industrial sectors through the appliance of a developmental strategy in the area of information and communication technology.
- The promotion of direct investments through the development and the perfecting of the legislative and institutional environment, in order to insure the transfer of technology, the improvement of managerial performances and competition and the access of Romanian products on the international markets.
- The promotion of intangible investments in the area of human funds, research and innovation (regarding the insurance of quality and the evaluation of product compatibility) as well as in the standardization area. It needs: investment in the human capital and improvements in professional training and reconversion; The enforcement of the connection between industry and the system of science and technology, the orientation of investigatory activities towards the needs of the social-economic environment, the promotion of active quality politics (quality management / ISO 9000), as well as the standard harmonization between Romanian and EU standards.
- The development of industrial cooperation, through identification and application of specific support measures for the industrial initiatives, leading to the insurance of greater economic relationship stability.
- The support for development of small and medium enterprises through easing-up access to sources of finance and assistance, consultancy, and information. A concept and a legal coherent frame have been developed for that purpose, in accordance to international practices, in order to support the activity of small and medium enterprises.
- The development of a functional national market of industrial products by encouraging it in being competitive and the increase of demands for industrial products. This shall facilitate scale economies, offering opportunities for the emergence of new producers, thus maintaining the competitive character of the market.
- Insuring the compatibility between technologies and industrial products with the environmental protection standards. The environmental system of management will soon be implemented (ISO 14000).
- The promotion of social cohesion by establishing the procedures of consultation with all the participants in the industrial area, for the extension of large participation in taking major decisions and through obtaining the support of social partners in the realization of structural adjustments. Major priorities on a short-term are: speeding-up structural adjustments (reorganization and buy-out) in order to insure economic viability, elimination of bureaucratic barriers in the process of

improving the business environment and attracting foreign direct investments.

2. STRATEGIES USED FOR INCREASING ECONOMIC EFFICIENCY

Increasing the investments in RD needs a proper environment; it needs access to quality human funds and a solid database of public research. Also, there are other criteria to be fulfilled: the contractor spirit, a proper intellectual property regime, a competition environment with regulations and rules proper for research and innovation, financial support markets, a favorable fiscal environment and macroeconomic stability. For the enterprises inside the EU Research Center (SEC), this means a coherent mobilization of a large array of politics in order to strengthen the circle of real possibilities in which investments enhanced in knowledge and technology are transformed into new products and jobs and lead to the improvement of competition, development and workforce occupation. Technological development (RD) is the main manpower consumer and available data show that the lack of human resources represents an important obstacle for the capacity of EU countries to attract research workers and engineers which own a proper qualification in order to reach almost 3% of Gross National Product.

Objectives needed to be looked-after which require an intensification of efforts or supplementary initiatives are:

- stronger encouragement of women to embrace a scientific and technical career;
- stronger encouragement of development, pole visibility and excellence networks for a higher education and a competitive RD with the non-European branches;
- encouragement of development and scientific / technical careers visibility in Europe, in enterprises and in the public sector, watching financial conditions, the evolution of careers of young scientists, the research equipments and the availability of research funds;
- improving access to continuous formation (over the entire lifespan) of the knowledge transfer and the evolution of careers on expense of the mobility researches from Europe and the reception of research workers from other countries, stopping national obstacles and delivering information and proper help on all levels.

Intellectual property ownerships especially patents, copyrights, manufacturing secrets, and models protection are an important factor in defining collaboration rules for research and technological transfer between enterprises and between them and the public research institutions.

They are also essential in science and technical cooperation agrees and in commercial international ones.

Objectives to be followed that need intensifying of efforts or supplemental initiatives are:

- improvement of the juridical environment, in order to respond the evolution of technologies and the world process of harmonization, having as an evaluation base the effects of the current legislation, resulted from the technological progress;
- active surveillance of the harmonization and regime appliance progress of the DPI on a international level and helping poor/emerging countries to acquire self-capacity and through promoting reciprocal advantageous collaborations in the RD area in parties of common interests.

Establishing rules for product and job markets should lean towards helping the competition and the development of enterprises, insuring a superior protective level for both consumers and environment, as well as rules equitable for these enterprises. These objectives can be convergent and even reciprocal advantageous. The existence of formal standardization politics and the adoption of standards in a timely manner play a critical role in selling new technologies, taking mobile telephony for example. Due to these politics, enterprises can establish their own technical solutions for standardization, which may be frequently used to support the legislation on a European level. Objectives that must be followed which require an intensification of efforts or supplementary initiatives are:

- Exploring possibilities offered by European and national regulations concerning product and job markets for the promotion of RD and innovation and the monitoring of effects exercised by the RD and innovation both directly and through the capacity to sell new products and services. Probably it would be righteous to review regulations.
- If needed, and in tight collaboration with the industrial sector, a stronger encouragement is needed in order to systematically elaborate and utilize European standards. This help could be offered as part of the creation of technological platforms which reunite different parties interested in development, testing and use of new technologies.
- Intercessions in public market's rules and practices, making them more favorable for innovation, improving chances of participation offered to small and medium enterprises, especially by adopting and applying legislative proposals concerning the modernization of EU rights in the area of public markets. European enterprises could support such a vast group of users for their cutting-edge technologies and they could achieve a quick entrance on the market in order to obtain commercial success on a worldwide level.
- Cooperation between enterprises in the RD domain is more and more necessary in order to make scale economies profitable.

As part of the decisions concerning competition, market dynamics and competition conditions will be taken into account in order to evaluate innovation and RD activity.

Numerous companies must accede on financial share or credit markets in order to invest in RD and innovation activities. Enterprises with high rapid development technologies depend in a crucial manner on the access to participation funding in different stages of their development: the market of capital investments in an early stage (initiation and starting) and in the development and secondary markets phase in order to finance the first

public registration offers and the later expanding stages. The objectives that must be followed which need an intensification of efforts or supplementary initiatives are:

- Encouragement for financing by the participations and credits market of the RD and, in different stages of development.
- As part of the monitoring initiative of BEI, establishing financial instruments best suited to this objective.

Public healthy finances are profitable for RD investments for many reasons. Lower real interest rates reduce the cost of investments over a long period of time, including for the RD. The stability of prices leads to the incertitude investors have regarding the profit rate. This situation is especially useful for the RD, where amortizations are many times materialized on a medium or long term.

3. RD AND INNOVATION IN ENTERPRISE STRATEGY AND MANAGEMENT

The decision to invest in RD taken by an enterprise is not influenced only by the general situation but by the according of public subventions too. More examples demonstrate the fact that enterprises that adopt RD and innovation in their own commercial strategy have a greater success and invest more in this domain. Many enterprises did not resort though to this method and do not fully take advantage of RD's methods and management instruments which increase productivity. This refers not only to the high-tech sectors, but also to the medium and low-tech ones in which knowledge consumption is increasing, this being the reason why local enterprises should develop their own capacity in buying and integrating new technologies.

Another aspect is the admittance of the importance of expanding intellectual capital as the key asset of enterprises. In annual reports, many enterprises refer to their RD activity as a simple small note, reducing attention from potential investors.

Objectives that must be followed which need a intensification of efforts or supplementary initiatives are:

- exploring the role which national and European industrial associations have in promoting self-awareness and use of good managerial practices in the RD;
- encouraging analysis and a more visible declaration of RD and intellectual property assets in order to help enterprise managers and the investor's community to better evaluate opportunities and risks.

4. MARKERS AND EVALUATION CRITERIA FOR PROJECT EFFICIENCY

In social practice, financial management, taking decisions, including investment decisions, are based on two fundamental principles:

- Obtaining greater results, advantages, useful effects using financial and time resources allocated for project completion = *the principle of maximizing anticipated results volume*.
- Realizing the desired effect, the desired volume, preset by advantages, useful effects and low costs – *the principle of minimizing costs in order to obtain the desired result*.

In concordance with these two principles we distinguish 5 indicator and evaluation criteria concept models for project efficiency.

1st model – also called the *relative advantage* model, it's a simple mathematic calculation in which advantages or annual revenues are being compared with the total costs of the project.

$$e = \frac{\overline{P}}{I_t}. \tag{1}$$

where $\overline{P}$ = medium anual profit and e = eficiency coeficient.

2nd model – it expresses *specific costs per unit* of advantage/benefit; $s_i = \frac{I_t}{q_h}$ = (total volume of investments / annual physical production capacity), represents the specific investment.

3rd model – it's the *net advantage* model generated by the investment project; it is obtained by differencing the real value of revenues with the total value of costs needed for the project, investments and exploitation.

$$VNAT = AN = \sum_{h=0}^{N} VA(V_h) - \sum_{h=0}^{N} K_h (1+a)^{-h}. \tag{2}$$

where AN = net advantage (difference indicator).

4th model – the model of *total costs* per project in order to obtain a pre-established volume of advantages. It is composed of total and exploitation costs.

5th model – total *integral advantages* for a given volume of costs.

Corresponding criteria and indicators for the M1, M3 and M5 models respond to the maximizing principle and, as values rise on a project/variant, it is considered to be more efficient for investors. Models M2 and M4 correspond to the principle of resource economy, and, thus, for smaller values, we will consider those variants as being more efficient.

Usually, criteria and indicators are reunited in a system which insures the characterization of essential elements, which are basic characteristics of efficiency. Practically, the number of useful criteria and indicators used for efficiency evaluation is 7 ± 2. The optimizing criteria for investment decisions represent those fundamental conditions, the base on which choices are being separated and options are being stated. They are chosen from complex efficiency indicators, afterwards being used on the corresponding investment domain. So, in the private sector of investment we will have a maximum of $VNAT = 9$ (net advantage), a maximum of the internal rate of profitability (RIR) and a maximum of the profitability index. In the public sector, choosing project criteria are defined like this: minimum CTA (total actual costs), or $VA(K_t)$, min CUA (unitary actual costs – on power plants), min CG (global cost – in order to choose types of buildings, building materials, plumbing systems).

5. OPTIMIZING THE TECHNOLOGICAL PROCESSES

Optimization has an important role in modern technology because it fundaments decisions in the main stages of new technology conception like: feasibility analysis, lab research, pilot research, design and monitoring/testing functioning products. The majority of functioning modern processes are characterized by:

- high speed development;
- large number of phases;
- high pressures and temperatures;
- non-ideal behavior;
- great number of constituents for machined material flows;
- high complexity due to the large number of parameters on which the process depends and the non-linear dependency between them.

Solving an optimization problem is done by following these steps:

a) developing the mathematical model for the process;
b) developing the objective function;
c) searching for the optimum.

a) Developing the mathematical model for the process. The mathematical model of the process represents a system of relations which express the interdependency between the n, x_i variables of the process. Interdependencies are being expressed through a system of equations / in-equations, analytical relations, tables, diagrams, calculation sub-routines etc.:

$$h_j (x_1, x_2, \ldots, x_i, \ldots, x_n) = 0, \text{ where } j = 1, 2, ..., n$$

$$g_j (x_1, x_2, \ldots, x_i, \ldots, x_n) = 0, \text{ where } g = p + 1, p + 2, ..., n.$$

Models can be logical, mathematical and procedural. Modeling methods are the realization procedures of a system placed under a degree of similitude with the modeled process, on which operations are being executed, thus resulting in new information regarding the process. Current modeling methods are:

- mathematical methods, which use analytical, statistical, mathematically logic procedures, in order to find out equations which describe the behavior of the system when variables or parameters change;
- cybernetic methods which create behavioral and functional patterns of the system, starting from constitutive elements and connections on which functioning is based on. They allow choosing the causes of connection, the laws which control production systems and the processes that take place inside them, based on the flow of information which travels inside the system.

Algebraic and arithmetic systems which form the mathematical model of a technological process represent relations between:

- performance dependent variables of the process (X_{ep});
- non-commendable independent variables (X_p);
- commendable independent variables (X_i);
- intermediary independent variables (X_{ei}).

For the design activity of technological processes, analytical models are a must. Physical dimensions, process unit configuration, construction materials become variables, and the composition and quantity of raw materials and products are the stabile parameters. Models allow the study of technological processes to be done using computers, which give out information regarding the response of the system once its parameters are being modified in numerous ways. The use of computers has made possible the evolution from the lab stage directly to the industrial phase, eliminating intermediary phases. During the design phase, the use of computers has decreased the designing period, enhanced precision, established optimal solutions, designed complex processes (aeronautics, space technology).

b) Developing the objective function. Developing the objective function means the installment of an optimization criterion under an analytical form, implicit or explicit from the X_i variables of the process:

$$f = f(x_1, x_2 \ldots, x_i, \ldots, x_n), \quad (3)$$

where f is an economic function and must reflect correctly and completely the economic efficiency of the process development. The efficiency of the process is expressed, many times, through a system of indicators. In this case, the most complete indicator is being chosen, the optimal solution is being established and then it's verified whether this solution satisfies the rest of the indicators. The most often used economic indicators as optimizing criterion are investment and benefit. They add up to the technical criteria.

c) Searching for the optimum. Finding out a set of X_0 values is the problem 1, X_0; 2, …, X_0; i, …, X_0 n of the Xi variables, which lead to the best $f0$ value for the objective function f which satisfies the restriction system given by $h_j = 0$ and $g_j = 0$. Different methods are being used, based on process complexity. We can use classic analytical methods, direct methods and canonic form based methods (linear, square, geometric, dynamic programming).

6. CONCLUSIONS

Based on traditional appreciation criteria of project investment efficiency, this project will be approved for financing because it generates an important profitability rate, and the initial investment is recuperated in a short time.

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