APLICAŢII ALE CIBERNETICII ECONOMICE ÎN INDUSTRIA CHIMICĂ

*Applications of Economic Cybernetics in the Chemical Industry**

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It is a well established truth and frequently affirmed in the world today that a country's multilateral economic development is ever more conditioned by the results obtained in scientific research, by the application of methods, techniques and technologies with best results in each domain.

Our party's policy structurally based on scientific principles, setting out from this objective reality of the contemporary world and taking into account the characteristics and level attained in our country, the requirements of the long-term economic-social development gives prominence to the continuously increasing contribution of our own thinking to solving the direct production problems and to establishing an ever closer and more fruitful relation between research workers and specialists in production.

Both the concepts and basic principles and the priority domains which should be approached on economic branches and on major themes are clearly set within this policy. The best use of the raw materials of the country, especially of hydrocarbons is a priority target in the field of the chemical industry. The contribution of scientific research in this field is decisive both as regards dynamic research proper and the use of modern methods for production and investment optimization, for production management and equipment maintenance.

The complexity of the problems raised by this second trend of research, in which the economic aspects blend with the technical ones requires their approach with the means of cybernetics and informatics, of mathematical modelling and of the intensive use of electronic computers.

Naturally, in this context, the preoccupations of a group of researchers of the Economic Cybernetics Department of the Academy of Economic Studies whose scientific orientation, direct guidance and leadership are owed to the chief of the department, professor Manea Mănescu, have embraced the application of economic cybernetics in chemistry too. The work reviewed by us is an outcome of the close collaboration between this group and members of the academic staff and specialists in production. It illustrates not only the major preoccupations in this domain of the aforementioned group but also some of the results obtained up to the level of finalization and current appli-

* A study worked out by a team coordinated by V. Pescaru, Gh. Boldur, V. Ionescu and M. Altăr.

cation in a number of enterprises of the chemical industry in the country.

The book is organized on chapters which successively deal with: the optimization of the planning of investment in the chemical industry, mathematical models for the optimization of production processes in the chemical industry, efficient methods for overhauls in the chemical industry.

The first part presents a number of variants for solving the optimization of the use of investment funds for the development of the industry of chemical fertilizers in the 1971—1980 period. The results which are a meritorious start for cooperation between production and research in this field, are materialized in a system of mathematical models which allow to obtain solutions concerning:

— the quantitative forecast of the necessary chemical fertilizers for the respective period of time, considering as input parameters the pedo-climatic conditions and the structure of vegetable production and as an optimum criterium the best allocation of fertilizers for each county and the obtaining of a global optimum for the entire agriculture;

— the qualitative forecast of the production of fertilizers with a dynamic structure and optimum character, the best dimensioning of the new objectives;

— the tendency of the demand and the prices of fertilizers for export.

The results obtained and described in the work can be used as a starting point also for the optimization of investment and in other sectors of our national economy, as a calculus methodology, a structure of the mathematical models and a number of computer programmes with a high level of generality, have appeared.

The second part of the work is of an exceptional interest for the engineers of the oil installations, for specialists in automatics as well as for system analysts. This part dwells on the mathematical modelling of the oil production at the respective factory within the Ploiești Industrial Group of Refineries and Petrochemistry as well as on the mathematical modelling of the mixture of oil products. Although the results effectively solve the problems for the applications proposed, the presentation and putting of problems benefit from an increased level of generality, a fact which allows the use of the method in similar domains. Worth mentioning here is the very judicious way in which the economic, technological and mathematical aspects blend in the analysis of the production process, in the drawing up of the model and in its solution.

The authors underline the decisive role of data collection as a stage preparing the analysis of production on the basis of statistical models, the planning of data collection, their check, the construction of the model, its check and simulation and finally, the refinement or improvement of the model and its implementation. The method is mainly based on statistical data processing, linear programming and the intensive use of the electronic computer.

The authors consistently set forth the idea that the presence and proper functioning of the measurement apparatus in the installation, the correct use of the statistical methods, the OFF-LINE and ON-LINE in using the electronic computer, are necesary for the design, carrying out and implementation of such a mathematical model.

Worth mentioning in this connection is the major original contribution of the authors materialized in the detailed analysis made and in elaborating programme decks for the electronic computer.

A special chapter also presents models of the flow of raw and related materials, and semi-products in petrochemistry and the operative programming of production in the tyre industry.

The third part deals with "efficient methods for overhaulings in the chemical industry". The main point of this part is represented by an algorithm for analysing the critical path for the standardization of the use of resources. The algorithm is an original contribution of the authors and allowed the elaboration and perfecting of a valuable programme deck.

Combining an exact and properly formalized analysis of the information-decision system of overhaulings with a clear and detailed method of using PERT, the authors outlined the problems specific of the use of this exceptional management instrument in the chemical industry. Worth mentioning is also the attempt at standardization, especially as regards the technology concerning the stages preceding the implementation of the PERT method.

The book is an eloquent proof of the possibilities offered by applied research in the chemical industry, especially when it is a complex research based on the concepts and methods of economic cybernetics and which judiciously and highly competently uses techniques of great diversity, from the construction of computer programme decks to the establishment of the data collection method for the production installations, the using by stages of the information-decisional system analysis, the construction of complex mathematical models at the level of a whole industrial branch (the industry of chemical fertilizers), etc.

Some general conclusions have to be emphasized here: firstly, the objectives of such studies cannot be attained without their approach by a complex team which should include economists, mathematicians, engineers, researchers, specialists in production, a team capable of taking over all the problems of economic and technological analysis, the analysis of mathematical models, the elaboration of software and the implementation of the results obtained.

Secondly, it is clear that the means of informatics, the intensive and best use of the electronic computer provide not only the work tools for the materialization of the results of such studies but also the indispensable means for carrying out the respective studies.

Finally, as a last conclusion, as it is pointed out in the preface to the book, a preface signed by professor Manea Mănescu, it can be said that in this book, the scientific contribution is as valuable as the applied contribution and it may serve as a well established support for the subsequent development of both the applied research and of scientific research proper.

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