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Production Cybernetization — a Basic Component of the New Higher Stage of Development of the Romanian Socialist Society

In the socio-economic development of Romania, the definition of the 1981—1990 decade as a field of science, technics, quality and efficiency includes cybernetization as a specific process of qualitative growth of the most important social activity-production.

The study is trying to define this process and characterizes its specific components: cybernetized management, the technical, material basis of cybernetization, the production of cybernetic and informatic means and techniques.

The profoundly scientific analysis made at the Party Twelveth Congress in connection with the realities of our socialist society has allowed for the formulation of high synthesis forecasts as regards the entering of the Romanian society into a new, higher stage of its development. Characteristic of this stage is... "the continuation, on a higher stage, of the implementation of the Party's Programme, the constant growth of the national economy, *the powerful affirmation of the technical and scientific revolution in all fields*, the passing to a new quality in the entire socio-economic activity".[1] (underscored by us). These characteristics are defined in the documents of the Twelfth Congress as a fundamental objective of the 1981—1985 Five-Year Plan. The definition emphasizes the essential role incumbent on the *technical-scientific revolution*, on its essential components: technics and science.The synthetic estimation

[1] Nicolae Ceaușescu — *Report at the Twelveth Congress of the Romanian Communist. Party, November 49, 1979*, Publishing House for Political Literature, Bucharest, 1979, p. 24.

of their role in the fundamental objective of the current Five-Year Plan is very clearly specified in the trends of action defined by the Party General Secretary, Nicolae Ceauşescu for the fuilfilment of this objective, in the main qualitative guide-lines as regards the general development of our society, of the economy, of its basic branches and, first and foremost, of industry.

A main trend of action is represented by "the proportional and harmonious growth of industry and agriculture, of all branches of our national economy, the establishment of an optimal equilibrium among various sectors, for meeting to an ever greater extent the requirements of the general progress of society and for constantly raising the material and spiritual welfare of our entire people".[1]. Within this framework, special attention is given to the process of re-organizing industry by developing with priority highly processing branches and to a more rapid raising of labour production through the scientific organization of production and work in all branches of activity. Both aspects are directly linked with modern science and technology, briefly with cybernetization.

The re-organization of industry is based on increasing the importance of its top branches and, in the first place, of machine building which will continue to be the industrial branch with the most dynamic growth, increasing by nearly 12% annually. This will permit to ensure the technical-material basis of production cybernetization through the contribution of modern subbranches, such as the electronic industry, the fine mechanics industry, the machine tools industry, the industry of complex technological equipment, a.s.o. By a nearly three fold increase of the production of the fine mechanics industry in the current Five-year Plan, it will practically ensure "the entire outfit of hydraulic and pneumatic equipment as well as elements for *the cybernetization of the entire production*".[2] (underscored by us).

An important role in a more rapid raising of labour productivity is incumbent on the extension of mechanization and automation. The assimilation of technical progress in production is based on *the cybernetized management of technological processes*, mainly on the capacity of Romanian science and technics of creating such self-adjustable technological equipment and mechanisms, of designing and achieving new production capacities and work places and of re-organizing and modernizing the existent ones in such a way that the worker can work more efficiently and be able to involve and master a larger number of installations and devices in the working process. The meaning given to the cybernetized management of technological processes is represented by "the generalization of work on several machines, the rational use of work time, the use of electronic technique in production programming, in calculus and record activity and, on this basis, the reduction to the strictly necessary number of red tape staff".[3]

Another main trend of action in implementing the fundamental objective of the current Five-Year Plan is represented by the development of science, the intensification of the science-production binomial inter-connection, the raising of the efficiency of the impact of science on production. The

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[1] *Ibidem*, p. 26.
[2] *Ibidem*, p. 29
[3] *Ibidem*, p. 41

basic orientation as regards science as a decisive element of social development is represented by "the affirmation of the technical scientific revolution in all fields of activity, the increasing role of science in the modernization of the national economy, of the entire social life, in the management of society, the ever closer blending of research with production, the greater contribution of Romanian scientific creation to the multilateral and dynamic progress of our country, to enriching the thesaurus of universal knowledge, so that the coming decade should really become the decade of science, technology, quality and efficiency".[1] In the context of these ample targets incumbent on science, stress is laid on cybernetization as one of the basic components of our socio-economic development materializing the effort to modernize and improve the material goods production process.

The long-range guide-lines of Romania's socio-economic development until 1990 underline the furthering of preoccupations for the powerful development of science and technology in the 1981—1990 decade, keeping pace with the general requirements of material and social progress. The general orientation in connection with the development of science is that of permanently outrunning production. A priority among the objectives of science, in this context, is that linked with the complex mechanization, automation and cybernetization of production: "Scientific research will have constantly to outrun production, aiming at increasing the national potential of material resources and their best turning to account, the ensurance of the energy basis of the economy, the working out and application of technologies of high economic efficiency, the creation and assimilation of products and materials competitive on the world market, the complex mechanization, automatization and *cybernetization of production*".[2] (underscored by us).

In the process of reorganizing industry, scientific research, the technological development and the assimilation of technical progress ensure best conditions for the unfolding of production-the widening and diversification of the basis of raw materials, the inclusion into the economic circuit of new energy resources, the creation of advanced technologies and of new products, etc. The contribution to the creation of these qualitatively higher conditions is materialized mainly in the generalization of production mechanization, automation and cybernetization. Scientific research, technological development and the assimilation of technical progress as basic elements in carrying out this process-on a wider scale of the previsions of the Party's Programme-are mainly directed towards a large-scale promotion of pluridisciplinary research generated by the systemic, cybernetic understanding of the complexity of reality, of science and technology, of the problems posed by the science-production integration and by the recognition of the deep interconnections between various fields of knowledge, of the feed-back mechanism in science and its connection with production.

The content of science-production interconnection is enriched with a new, modern component: production cybernetization. It is expressed in the

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[1] *Ibidem* p. 44

[2] *Directives of the Twelveth Congress of the Romanian Communist Party on Romania's Socio-Economic Development in the 1981—1985 Five-Year Plan and the Long-Range Guide-Lines until 1990.* Editura Politică, Bucharest, 1979, p. 60.

process of restructuring industry by turning out high performance equipment based on the gradual integration of fine mechanics, electronics and computing technique in the structure of machines. Scientific research in the fields of electronics and electrotechnics aims at achieving high performance components and products which should ensure the wide-scale promotion of complex automation and cybernetization in the entire economy, inclusively through the use of industrial robots. In the field of production proper, it means the manufacturing of special integrated circuits, of microprocessors, electronic stores, opto-electronic components, a.s.o., the production of new types of microcomputers, data gathering and input equipment, process computers, etc., the elaboration in the informatic production of basic programmes for micro and minicomputers as well as for process computers. An important component of production cybernetization is represented by the extension of automation in transports and telecommunications through the introduction of computer-aided modern control systems, the automation of railway traffic and train composition.

Thus, production cybernetization can be defined as a process of raising the technical and qualitative standard of material production based on the self-adjustment concept for an optimal development, for a modern economy of high productivity and efficiency.

Specific of this process are three basic components: the development and improvement, from the cybernetic point of view, of the technical-material basis; the cybernetization of technological processes; the promotion of cybernetic methods in the management process.

An essential problem of the near future in building the multilaterally developed socialist society in our country is the growth and modernization of productive forces and the obtaining of a new quality in all fields of activity with a view to consolidating the technical-material basis, the gains and victories obtained so far. The development level of our scientific research, the productive capacity and creativeness of our economy and, first and foremost of industry, make it possible to pass, at present, to a new quality inclusively in the field of the technical and material basis and, the sense of this quality is the very large integration in production of the values of cybernetics. The point in question, in the first place, is about the conception of a new technics materializing the concepts, laws and principles of cybernetics and secondly, about the effective turning out of machinery, aggregates and equipment bearing this sort of tehnics. At the same time, the point in question is about the application, on the fly, of adaptors to the existent technical-material basis for ensuring the (total or partial) connection to it of elements of cybernetic technique and technical means. It can be said that the *production of cybernetic means* will be consolidated in our industry.

The cybernetization of technological processes refers to the transformation of technological flows by including self-adjustment techniques and means and to the conception of new technologies based on such techniques and means. The functioning by integration of equipment, aggregates and installations in production, the extension of computing electronic technique in the unfolding and control of processes with a constant flow, in telecommunications, transportation, in service-rendering activities, the use of electronic computers in data record, storing, processing and retrieval operations are only some of

the main aspects materializing the cybernetization of the technological processes. *The utilization in production of industrial relations and of teleinformatics* represents the main trend of investigation and modern method of solving problems regarding the cybernetization of technological processes. Added to it is the *production of informatic products*, mainly, computer programmes capable of ensuring the rapid solving of mathematical models describing production technical processes, the problems of self-administration and of the economic-financial mechanism, the complex production interconnections at the level of industrial groups, enterprises and other basic units, at the level of branches and fields of activity, at a regional and even all-country level.

The promotion of the methods of cybernetics in the management process is a basic component of production cybernetization. This component has a larger content both as regards the cybernetized control of technological processes and the use of the methods of cybernetics in management. The first aspect is included as a component element into the cybernetization of technological processes. The second aspect regards the optimal organization and functioning of the unitary system of control of the socio-economic processes based on the methods of cybernetics and of the modern computation techniques. This approach, includes the systemic conception of analysis of the technical phenomena, of the economic, social and political phenomena and processes, the optimal concept in the socio-economic activity, the integration of the informatic systems in the unitary systems of management of the socio-economic processes. All this expresses the large-scale use of the modelling method as the main, specific component of the method of the cybernetics science. An essential contribution to the achivement of these aspects as regards production cybernetization is incumbent on scientific research, mathematics and informatics. Involved in the field of mathematics are the chapters and techniques having the strongest impact on modelling in various branches of science and technics:" ... the studies on the mathematical fundamentals of informatics (formal and programming languages, mathematical logic, data structures, the algorithm theory); the operational studies and mathematical theory of systems with applications in automatics and in the analysis of the social and political phenomena"[1].

Similarly, an essential contribution in the field of informatics is incumbent on the development and improvement of studies on "the informatic systems for technological processes inclusively with industrial robots as well as for the management of the activity of industrial enterprises and groups,... branch informatic systems as well as functional ones at the level of the national economy for statistics, planning, technical-material supply, the financial-banking system and other activities ... regional informatic systems"[2]. The above — mentioned document establishes as a major task of scientific research in the field of informatics the working out of optimal solutions for the creation and functioning of the all-country informatic system, of the computer and data transmission network. This will mark a profound change in the

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[1] *Guide-Programme on Scientific Research, Technological Development and Assimilation of Technical Progress in the 1981—1990 Period and the Main Guide-Lines until the Year 2000.* Editura politică, Bucharest, 1979, p. 28.

[2] *Ibidem* p. 28

management of the socio-economic life which, in fact, represents the main effect of the promotion of the cybernetics methods in the economy. In this context, one can speak about a *production of informatic systems and of mathematical models in management.* If we add to it the production of cybernetic means (cybernetic technique) and the turning out of informatic products, we can say that from the point of view of cybernetics and informatics, the science-production integration generates a new field of material production — *the production of means and techniques of cybernetics and informatics.*

Cybernetization is one of the features of the process of restructuring industry and, at the same time, one of the ways by which science will contribute to this process, a way for achieving this process. Through the reorganization of industry as a decisive branch of the development of our economy, cybernetization is to be found as an element of the new quality also in the other economic branches fields of the socio-economic activity. The process of homogenizing territorial development also includes cybernetization as an element of the new quality, of improving the regional distribution of the productive forces, of territorial systematization and modernization of the network of localities, of developing the economic potential of all counties and of the harmonious growth of production per head of the population, of implementing the multiple tasks set by the Party Twelfth Congress, of Romania's socio-economic development from a territorial point of view, in the 1981—1985 period.

Territorial cybernetization is included into the sphere of economic cybernetics, but into that of social cybernetics, too, considering that the share of the social problems within the management of regional development is tending to grow. The basic guide-lines and tasks of Romania's socio-economic development from a regional point of view, in the 1981—1985 period emphasize this tendency by including aspects as regards a more rational distribution of work places throughout the country's territory, by laying stress on the development of the smaller and handicraft industries, on the extension and diversification of services with a view to using labour and to meeting the needs of the working people of the regions, the raising of the labour employment degree, the systematization of the territory and of the rural and urban localities, the supply with goods and services in keeping with scientifically substantiated requirements, the steady continuation of house building, the development of education, culture, health protection, tourism and sports.[1]

An aspect of regional cybernetization is represented by the approach of the national economy as a regionally structured hierarchic cybernetic system in which the regional information forms one of the feedback connections characterizing the macrosystem and its components. The systemic approach in a territorial structure means to take into account the connections on a vertical and horizontal line in which the territory appears as a component part: the territory — enterprise (group) connexions, the inter and interregional connexions, the territory-branch connexions, the territory-national economy connections. In economic cybernetics there are already methods

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[1] *Guide-Programme of Romania's Socio-Economic Development from the Territorial Point of View, in the 1981—1985 Period* (Draft), Scînteia, Year XLIX, No 11543, Oct. 4, 1979, p. 1, col. 4, p. 2, col. 1—2.

of investigating these connexions, such as correlative cybernetic-economic models, multi-level management models, the concept of polarizing centre, the technique of models integrated systems, etc. The concept of polarizing centre is favourable to the enterprise-territory, group-territory, branch-territory correlative study. It represents a territorial cybernetic-economic concept the essence of which expresses the very existence or creation of units or big production units, the creation of new production structures, territorially (Fig. 1).

An important aspect of territorial cybernetization is the cybernetic-economic modelling of the territorial economic development processes. The specific character of the territorial models refers, on the one hand, to the inclusion of social problems and, on the other hand to the dual character of the structural-models approach as regards the economic internal structure of the territory and models as regards the space structure of the territory. The models belonging to the first category approach the internal regional mechanism of development, the inter-sectorial connexions at the respective territorial level; the models of the second category are generally correlative and refer to the inter and inter-regional connexions.

Another aspect of territorial cybernetization concerning the cybernetic-economic modelling of the process of homogenizing territorial development refers to the understanding of this development only within the strict framework of the national development. This means to approach territorial development as a component of the national development, not as its decentralization, but as the country's expansion in each of its regions. From the point of view of the optimal in development, it means that the trajectory of development of a territorial system (region, area, hydrographic basin, county, municipality, town and commune) can be estimated as optimal only to the extent to which it is integrated into the development trajectory of the national economy macrosystem. Reciprocally, to the effect that a development trajectory of a territorial system integrated into the trajectory of development of the national economy macrosystem is optimal. The correlation between the optimal of the system (the macrosystem) — called a global optimum and the optimum of the component subsystems (systems) — called partial optimals — is expressed by the fact that the global optimum is not equal to the sum of the partial optimals. In this context, some components may develop in conditions of suboptimal and others iconditions of superoptimal in relation to the situation in which the optimum would be established for each component taken separately. This expresses the subordination correlation existing between the general social interests and the group, local or partial interests.

Appearing in close connection with modelling is also another aspect of territorial cybernetization, namely that concerning territorial information. From this point of view, the potentialities of the territorial information system or in connection with the territory must be taken into account in the modelling process. The information about the territorial economic mechanism and structure is generally more scarce than that about the national economy as a whole (for example, there is no statistical Year-Book of the counties) and, therefore, the control, adjustment and selfadjustment parameters and coefficients must be introduced into the modelling process in strict relation with the existent information. The use of data bases and banks as a modality of storing territorial information represents an important direction

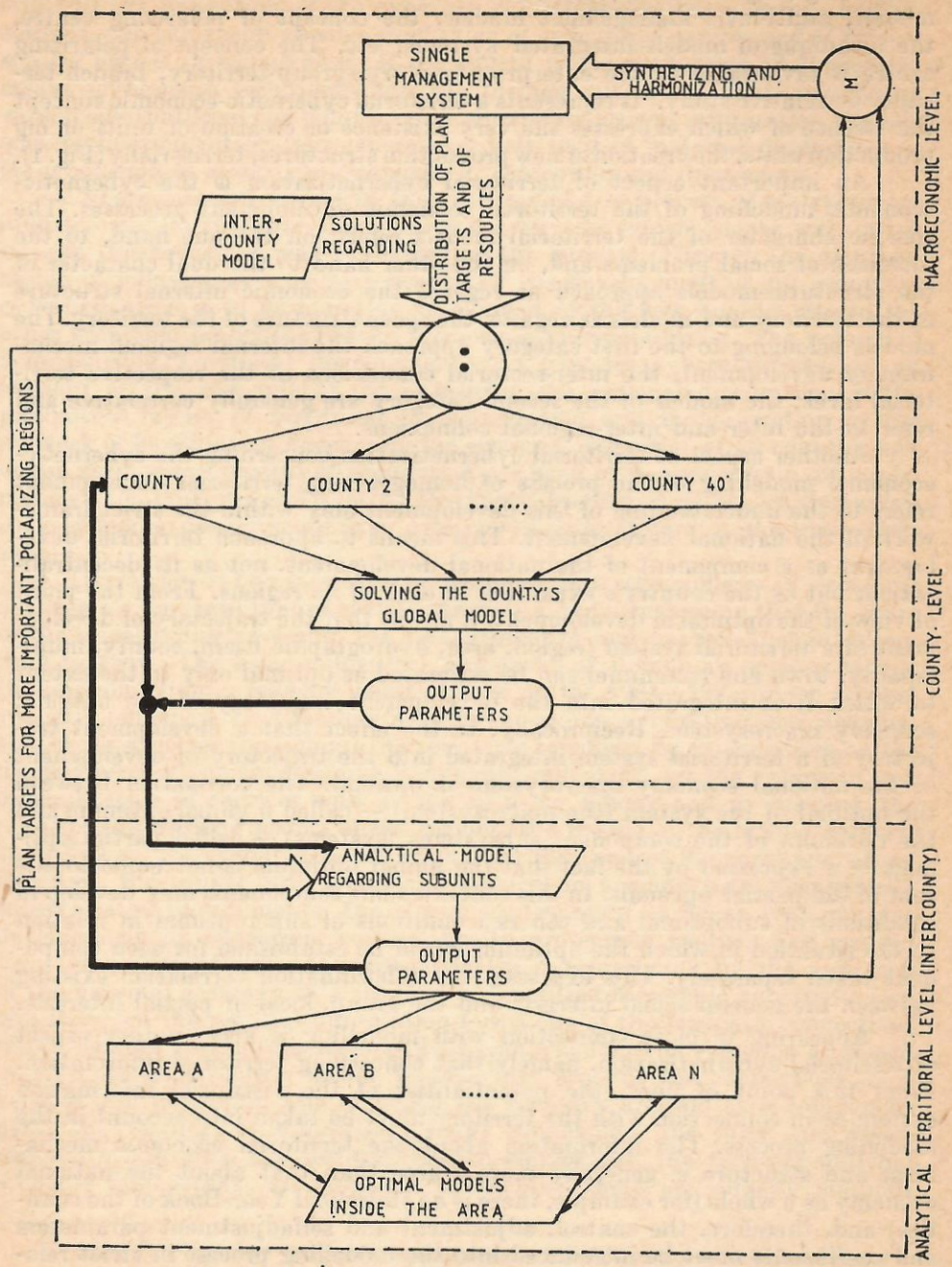

FIG. 1 MACROECONOMY-COUNTY-POLARIZING AREA CORRELATION IN A SYSTEM OF TERRITORIAL DEVELOPMENT MODELS

through which cybernetization can contribute to improving the information system and by this to increasing the efficiency of the use of cybernetic means and techniques in management, to obtaining a new quality in this field, too.

REFERENCES

1. NICOLAE CEAUȘESCU: *Raport la cel de-al XII-lea Congres al Partidului Comunist Român* ((Report at the Twelveth Congress of the Romanian Communist Party). Editura Politică, București, 1979.
2. * * * *Directivele Congresului al XII-lea al P.C.R. cu privire la dezvoltarea economico-socială a României în cincinalul 1981—1985 și orientările de perspectivă până în 1990.* (The Directives of the Twelveth Congress of the Romanian Communist Party Concerning Romania's Economic-Social Development and Forecasting Orientations up to 1990). Ed. Politică, Bucharest, 1979.
3. * * * *Programul directivă de cercetare științifică, dezvoltare tehnologică și introducerea progresului tehnic în perioada 1981—1990 și direcțiile principale până în anul 2000* (Directive-Programme of Scientific Research, Technological Development and the Introduction of Technical Progress during 1981—1990 Period and Main Trends up to 2000 Year) Ed. Politică, Bucharest, 1979.
4. * * * *Programul directivă de dezvoltare economico-socială a României în profil teritorial în perioada 1981—1985 (proiect)* (Directive-Programme of Romania's Economic-Social Development in Territorial Profile during 1981—1985 period (Project)). Scînteia, XLIX year, no. 11. 543, October 4, 1979.
5. * * * *Programul Partidului Comunist Român de făurire a societății socialiste multilateral dezvoltate și înaintare a României spre comunism* (Programme of the Romanian Communist Party of Building the Manysided Developed Socialist Society and of Romania's Advance to Communism). Ed. Politică, Bucharest, 1975.
6. ALTAR M., STROE R.: *Coordonate metodologice ale modelării dezvoltării în profil teritorial* (Methodological Coordinates for Territorial Development Modelling). Revista economică, July 27, 1979 and 31 August, 1979.
7. BIICIU C., STROE R.: *Modelarea cibernetico-economică utilizată în prognoza și planificarea macroeconomică* (Cybernetic-Economic Modelling Used in Macroeconomic, Forecast and Planning). Revista de statistică, no. 7, 1979.
8. MĂNESCU MANEA: *Cibernetica economică* (Economic Cybernetics). Ed. Academiei R.S.R., Bucharest, 1979.
9. STROE R.: *Procesul cibernetizării în profil teritorial* (The Territorial Cybernetization Process). Scientific Session "Cybernetic Modelling of Production Processes", LCCE-ASEB, ucharest, May, 1980.
10. STROE R.: *Elemente caracteristice ale procesului de cibernetizare a producției* (Characteristic Elements of Production Cybernetization). The Second Symposium of Systems Engineering and Industrial Cybernetics, I.P.B. Bucharest, December, 1980.

LA CYBERNETISATION DE LA PRODUCTION, COMPOSANTE ESSENTIELLE DE LA NOUVELLE PHASE SUPERIEURE DE DEVELOPPEMENT DE LA SOCIETE SOCIALISTE ROUMAINE

Dans le développement économique et social de la Roumanie la définition de la période 1981—1990 comme appartenant à la science, à la technique, à la qualité et à l'efficacité comprend la cybernétisation comme processus spécifique de croissance qualitative de l'activité sociale la plus importante: la production.

Les auteurs cherchent une définition de ce processus et donnent les caractéristiques des composantes spécifiques: la direction à l'aide de la cybernétique, la base technique et matérielle de la cybernétisation, la production des moyens et des techniques de la cybernétique et de l'informatique.

КИБЕРНЕТИЗАЦИЯ ПРОИЗВОДСТВА—ОСНОВНАЯ СОСТАВЛЯЮЩИЯ НОВОЙ, БОЛЕЕ ВЫСОКОЙ ФАЗЫ РАЗВИТИЯ РУМЫНСКОГО СОЦИАЛИСТИЧЕСКОГО ОБЩЕСТВА

В социально-экономическом развитии Румынии, определение десятилетия *1981—1990* как десятилетия науки, техники, качества и эффективности включает кибернетизацию как специфический процесс качественного роста главнейшей общественной деятельности — производственной деятельности.

Работа содержит попытку определения этого процесса и приводится описание его специфичных составляющих: кибернетическое управление, материально-техническая база кибернетизации, производство кибернетических и информатических средств.

10.XII.1980.