Prof. dr. M. BULGARU
Department of Economic Cybernetics,
The Academy of Economic Studies

The Socio-Economic Information System and the Management of the National Economy

Starting from the targets of the cybernetics management of the national economy, the article examines problems of the information and informatic systems, presents a global scheme of the system of socio-economic indices which should be at the basis of a complex multilateral analysis of the socio-economic phenomena and processes.

1. GENERAL CONSIDERATIONS

The organization and development of the socio-economic life take place under the impulse of a whole number of technical-economic, socio-political and natural factors within an extremely complex economic mechanism with multiple relations and connections.

Both the social and natural systems have the capacity of constantly changing their condition, of passing from a state to another within dynamic and complex processes. Under these circumstances, the economic mechanism as a cybernetic system must be led and guided, its command, control and adjustment be ensured through fundamental decisions, by ensuring their efficiency in the normal and balanced functioning of the entire economic body.

The state of the complex and dynamic cybernetic systems such as the national economy can be known and characterized with the aid of a set of parameters, quantitatively and qualitatively expressing their component elements their structure and dynamics. Only by knowing them a certain action on these parameters can be exerted with the aid of the control-adjustment systems for a control over the conduct of the economic system, of the factors acting on it, for maintaining its state of equilibrium under certain circumstances. These complex connections can be identified and formulated with the aid of economic-mathematical models which from the theoretical

point of view describe the functioning and relations within the economic systems as a whole, on branches, sectors, activities, a.s.o. and, practically they can be quantitatively and qualitatively reflected in data and indices through the economic information system. Hence the particular importance and role played by the designing, organization and use of the information system as a component of the science of socio-economic management and of the management of complex cybernetic systems. In our country, in the conditions of the improvement of the entire socio-economic activity as a result of the deep and rapid transformations in the Romanian society, at present, the information system is witnessing sensible changes, as regards adaptation and improvement of the content, the organization of data collection, the increasing quality and efficiency, automatic processing, a more rational organization of data in various stages of the hierarchy of decision-making factors.

After the Ninth Congress and the National Conference of the Party of 1967, with the measures for improving production organization and planning and the entire social life, under the growing impulse of the need for knowledge, there has been a considerable interest in ensuring some adequate information. The more rational placing of decisions on organizational structures, the distribution of prerogatives in keeping with our principles of management, the passing to territorial planning by incorporating the entire socio-economic life of the counties, municipalities, towns and villages raise new problems before the economic information system, as regards its conception in a systemic outlook, the modernization and improvement of data processing means and techniques.

2. THE SPHERE OF THE ECONOMIC INFORMATION SYSTEM

Economic information in general can be obtained as part of an information system based on an increased share of electronic data processing. By an economic information system we mean a set organized and integrated into a unitary whole for data collection, transmission, processing, scheduling, classification, storing and use, for a multilateral knowing of the socio-economic processes and phenomena and for decision-making. In this case the economic information system would comprise : a) data organization and collection, b) system of indices, c) classification of products and activities, d) methodology of index computing, e) information carriers, f) the means and network of data transmission, g) data processing means, h) storing means and methods (data banks), i) the ways of using data.

The processing informatic system appears as a component of the information system, extremely important, representing the methods of computer-aided data transmission, processing and storing, namely automatic data processing. Schematically, a linear information and informatic system could be presented as in figure 1.

Naturally, the introduction of modern automatic data processing means with the aid of the electronic computer reorganizes the whole information system beginning with the stage of collection and ending with that of use, but without replacing the information system, being in fact its subsystem.

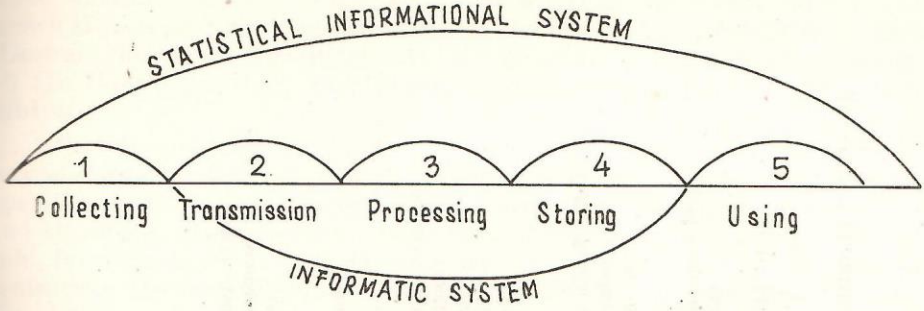

Fig. 1

3. THE FUNCTION OF THE INFORMATION SYSTEM

The main function of the information system is given by the real reflection of the content of the economic processes in time, space and then, on branches and fields of activity. Therefore, from the point of view of the objective function of knowledge, the economic information system, the economic information respectively would be divided into three subsystems (Fig. 2).

1. The statistic (retrospective) information subsystem which characterized a period of time ended and which characterizes the economy as a whole, branches, sectors, territorial-level, enterprises regardless of the source of formation of date;

2. The decisional information subsystem which characterize a time period and is expressed by yearly and five-year plan indices and by measures for the control and adjustment of the socio-economic models of development of the national economy;

3. The perspective information subsystem which characterizes a future but remote time period; the indices characteristic for this period have a statistical character by computing methods and techniques, but they have an orientative, probabilistic value from the point of view of their evolution and exactitude.

From the point of view of the sphere of inclusion, the economic information system may be organized on branches of the economy—industry, agriculture, transports, trade, education, health—or on organizational structures (enterprise, central, ministries) and level—such as microeconomic, territorial and macroeconomic. All these subsystems may also contain the statistic (retrospective), decisional and prospective subsystems.

Therefore the content of data reflecting real economic and social processes should not be confused with the existing organizational system in which the date are formed and processed. It is due to this fact that, in my opinion, appearing in the economic literature, as subsystems of the national system of informatics are beside economic planning also the statistical-bookkeeping subsystem and the financial-banking subsystem, the subsystem of technical-material supply, the foreign trade subsystem. Could this mean that, for example, the statistical information system does not includes financial-banking statistics, the statistics of technical-material supply or the foreign

ECONOMIC INFORMATION SYSTEM ON SUBSYSTEMS (according to the temporal criterion)

- 1. *Statistic bookkeeping subsystem* (retrospective)
  - 1.1. Primary data
    - 1.1.1. primary record
    - 1.1.2. bookkeeping record
    - 1.1.3. statistic surveys
    - 1.1.4 demoscopic (opinion) polls
    - 1.1.5. censuses
  - 1.2. Secondary data
    - 1.2.1. statistical reports
    - 1.2.2. bookkeeping reports
    - 1.2.3. statistic-bookkeeping reports
  - 1.3. Derivate data
    - 1.3.1. derivate indices
    - 1.3.2. statistic groups
    - 1.3.3. statistic tables
  - 1.4. Synthetic data
    - 1.4.1. synthetic indices
    - 1.4.2. synthetic balancesheets
- 2. *Decisional subsystem* (of plan)
  - 2.1. Economic models
    - 2.1.1. operating plans
    - 2.1.2. annual plans
    - 2.1.3. five-year plans
  - 2.2. Adjustment and control data
    - 2.2.1. normative decisions
    - 2.2.2. regulations, instructions
- 3. *Prospective subsystem*
  - 3.1. Long-range economic models
  - 3.2. Sc narioes
  - 3.3. Forecasts

Fig. 2

trade statistics? Of course not, even if it would be supposed that the above shown statistical data do not circulate on the line of the state statistical bodies (Central Board of Statistics). At the same time, the date on planning in all the three subsystems, mentioned above, should be part of the planning subsystem.

Certain considerations could be taken into debate also as regards the way of data classification used at present as a primary bookkeping, technical-operative and statistical record. This classification appears outmoded to me and therefore, in my opinion, regardless of the form in which the record is held, from the point of view of formation, of the way of aggregation and concentration, the data might be classified as follows: a) *primary data*, that is the data appearing with the socio-economic phenomenon represented by them and regardless of the form of the data carrier or the way in which they are expressed (in natural or money units); *secondary data* which are formed on the basis of the primary information; c) *derivate data* which result from the processing of primary or secondary data and d) *synthetic data* which have a very high degree of aggregation and concentration and are usually reflected in the system of balance-sheets of the national economy.

4. GENERAL FUNCTIONS OF THE INFORMATION SYSTEM

The designing of the index system which by diversity, content and way of presentation is meant to ensure a multilateral knowledge, especially on the basis of the statistical methods, of the socio-economic phenomena and processes, of the level of their structure and tendency plays an extremely important part in the economic information system. For this purpose, the information system may have the following more important functions (Fig. 3).

1) The control on the basis of quantitative and qualitative methods of *the fulfilment* of the single national plan of development as a whole, on branches, sectors, on territorial level, etc.;

2) *The general progress of economic development*, the development rates in general and on economic branches, the quantitative and qualitative transformations taking place in a) the economic structure; b) the socio-professional structure; c) the territorial structure; d) the structure on social life environment (urban-rural); e) the quality of life and the material and spiritual living standards; f) ecological environment, etc.

3) *The outlining of the entropic phenomena* in the economy and of the natural, techno-economic factors which have determined and influence, the dynamic equilibrium of the national economy for the discovery of the unused reserves in the economy and for their rational exploitation.

4) A special problem is represented by the *utilization of* natural, mineral and fuel resources, of production capacities, of labour, labour productivity and general economic efficiency in close connection with social efficiency.

5) The information system must answer the complex needs of *characterizing our country's economic relations* with other countries, of the efficiency of the relations of co-operation within exchange world economy.

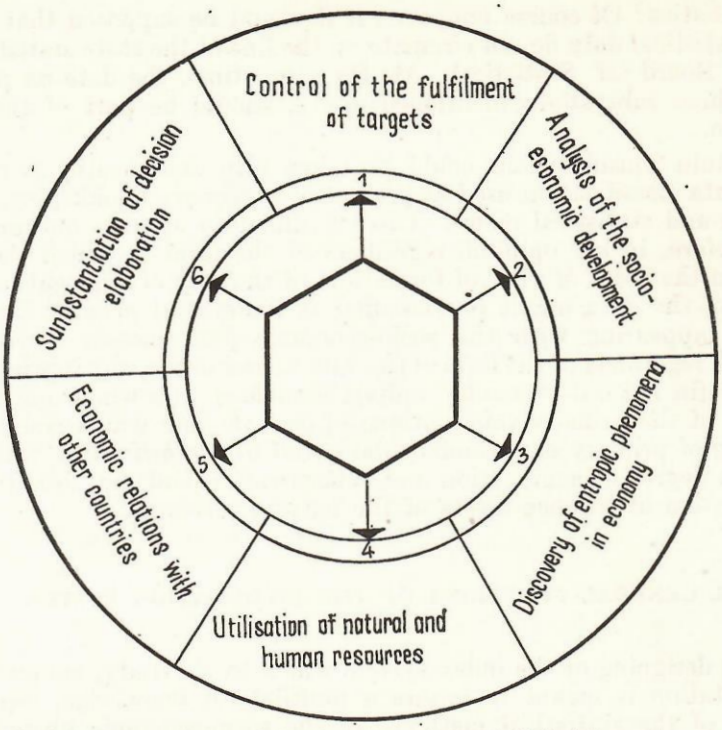

Fig. 3. Orientative scheme of the functions of the statistic information system

6) The information system must *provide data for the further substantiation of our short-medium-and-long-term development programmes*, for the elaboration of new models of socio-economic development. An important part in the carrying out of these functions is played by the improvement of the index system of the national economy as a whole, on branches, territorial level, on organization structures, groups and enterprises which should meet with these complex and multiple needs of knowledge.

5. THE INDEX SYSTEM OF THE NATIONAL ECONOMY

The index system must characterize the national economy as regards level, structure, dimensions, dynamics, in a unitary systemic outlook with multiple flows and connections, on branches, on stages of the reproduction process, on organizational structures (enterprise, central, ministry). This very fact should be taken into consideration, namely the blending of the index system with the cybernetic character of the economy, which means to impose a systemic approach to the set of statistical, decisional and perspective indices, to establish the interrelations and interconnections. With the introduction and extension of the electronic computing means in the economy and their utilization in the process of data collection, transmission and

processing and with the gradual setting up of data banks, they also consider necessary the rigorous classification of indices and the improvement of their computing methodology, the assimilation of a system of unitary codes, diversified in groups and subgroups which should facilitate the rapid modernization of the entire economic information system (Fig. 4).

(ORIENTATIVE) FRAME-CHART OF THE INDEX SYSTEM OF THE NATIONAL ECONOMY

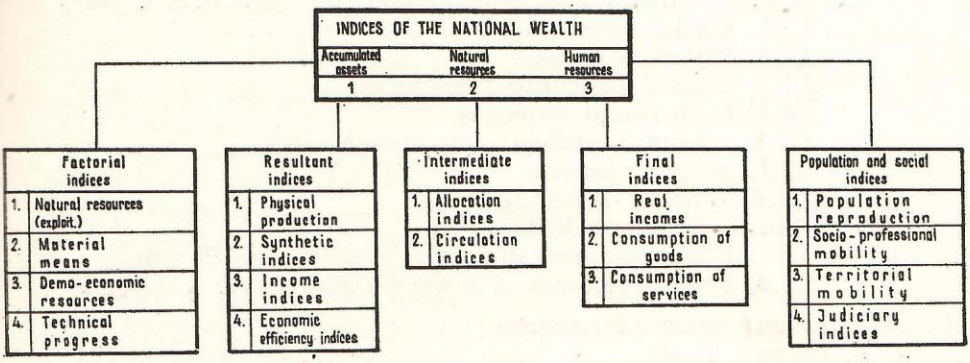

Fig. 4

General Scheme of the Index System

The index system would represent a setting in order of the economic indices on groups and classes in a close relation of interdependence for reflecting both quantitatively and qualitatively, under multiple sides and connections the reproduction process and the casual relation of the economic phenomena and processes.

The index system can be made up of several subsystems, namely: a) the characterization of certain aspects of the process according to their role in the production and reproduction process (natural, labour resources, etc), b) the characterization of some branches (industry, agriculture, etc.), c) territorial level, d) organizational structure (ministry, central, enterprise). The index system may comprise indices in a physical (natural) expression, in a naturally conventional expression and in a value (money) expression. They can also be expressed in a number of several sorts of absolute and relative dimensions and derivate measures with numberless possibilities of combinations which leads to a great diversity and complication of the system. It should be based on a unitary conception as regards: a) the index name, b) the sphere of inclusion, c) the economic content, d) the computing methodology, e) the method of money valuation for ensuring conditions of comparisons, correlations in the multilateral economic analysis.

A first criterion of classification would be that according to the criteria of reproduction combined with that of the production factors, namely of the factorial relation.

A. Factorial Indices

A_1. *Natural resources* (area, weight, volume, etc.)

1. *Natural resources which do not reproduce*
   - 1.1. Mineral resources
   - 1.2. Raw material resources
   - 1.3. Resources of natural fuel (oil, coal, natural gas, etc.)
2. Natural resources *which reproduce* after each production cycle
   - 2.1. With a *relatively short* reproduction *cycle* (less than a year)
     - 2.1.1. Eolian resources
     - 2.1.2. Water resources
     - 2.1.3. Natural agricultural resources
     - 2.1.4. Piscicultural resources
   - 2.2. With a *relative medium* reproduction *cycle*
     - 2.2.1. Animal resources
     - 2.2.2. Hunting resources
   - 2.3. With *a long* reproduction *cycle*
     - 2.3.1. Forest resources in a grove system (over 20 years)
     - 2.3.2. Forest resources in a wood system (over 100 years)

A_2. *Material and financial resources*

1. Investment funds
2. Fixed assets and other means of labour
3. Circulating means (raw materials)
4. Financial means (currency)

A_3 *Demo-economic resources*

1. School-aged population
2. Resources able to work
3. Active population
4. Population employed
5. Specialized staff
6. Education stock

A_4 *Scientific research and technological innovation*

1. Indices of technical and technological progress
2. Population employed in research
3. Stock of science

B. Production resulting indices

1. Production indices in physical units
2. Synthetic indices of production in a financial expression
3. Total social product
   - 2.2. Global product
   - 2.3. Gross output
   - 2.4. Final production
   - 2.5. Material expenses
   - 2.6. National income
   - 2.7. Net product
   - 2.8. Net production
   - 2.9. Added value

3. *Income Indices*
   3.1. *Primary income indices*
      3.1.1. State primary incomes
      3.1.2. Primary incomes of the cooperative system
      3.1.3. Primary incomes of the population
   3.2. *Indices of incomes from redistribution*
   3.3. *Indices of final incomes*
      3.3.1. Incomes from redistribution of the state
      3.3.2. Incomes from redistribution of the cooperative system
      3.3.3. Incomes from redistribution of the population

C. *Indices of general economic efficiency*
1. Production expenses
   1.1. Material expenses
   1.2. Labour expenses
2. Production costs per unit of product
3. Material specific consumptions
4. Labour specific consumptions
5. Labour productivity indices
6. Indices of the utilization of investments and of fixed assets
7. Production quality indices
8. Profitability indices

D. *Indices of production allocation*
1. *The national fund of socio-economic development*
   1.1. Development fund
   1.2. Payoff fund
2. *Investment funds*
3. *Material stocks*
4. *Currency stocks*
5. *Consumption total fund*
   5.1. Individual consumption
   5.2. Social consumption

E. *Indices of production circulation*
1. Indices of technical-material supply
2. Indices of commodity production
3. Indices of goods sales
4. Indices of goods import and export
5. Price indices
6. Transportation indices

F. *Indices of consumption and services*
1. Indices of average income
2. Indices of the cost of living
3. Indices of real incomes
4. Indices of food consumption
5. Indices of non-food consumption
6. Indices of housing conditions
7. Indices of tourism, leisure, sport
8. Indices of services

G. Population and social indices
1. *Indices of population reproduction*
   1.1. Fertility indices
   1.2. Birth-rate indices
   1.3. Nutptiallity indices
   1.4. Divorce indices
   1.5. Death-rate indices
   1.6. Indices of the average span of life
2. *Indices of social movability*
   2.1. Industrial population
   2.2. Agricultural population
3. *Indices of social life environment*
   3.1. Urban population
   3.2. Rural population
4. *Indices of territorial movability*
5. *Indices of judiciary statistics*

H. Indices of the national income
1. *Accumulated assets*
   1.1. Material assets
   1.2. Spiritual assets
2. *Natural resources*
   2.1. Soil resources
   2.2. Subsoil resources
3. *Human resources*
   3.1. Population — economic resources
   3.2. Education stock

Naturally, the index system by which the progress of the national economy is measured must keep pace with the present and future requirements of the national economy, with the exigency of the qualitative and quantitative improvement of the entire socio-economic activity. It must reflect the real dimension of the economic phenomena, the effort of the economic units, the effective results and the efficiency of economic activity. That is why the overall production index calcullated after the enterprise method was replaced by a new index—the net production —which is more receptive to the effort of the enterprise. Within the new economic mechanism, the net production index reflects the entire economy of human and materialized work, the real effort of the enterprise enabling it actually to work out its production plan, the plan of incomes and expenses, thus consolidating the principle of selffinancing and selfadministration. For this, the net production index has a number of most important functions, namely: a) it establishes the real place of the branch and enterprise in the formation of the national income, excluding any waste of human and materialized labour; b) it ensures the real measuring of the economic growth at a macroeconomic, territorial and microeconomic level; c) the distribution of the net production in accumulation, consumption and the establishment in this way of the contribution of each branch and unit to the reproduction process; d) it reflects in a real way social labour productivity, both of human and materialized labour; e) it ensures most really general economic efficiency in correlation with the investments and fixed assets-through the marginal coefficient of invest-

ments, etc.; f) it contributes to stimulating salary in keeping with the real effort of the workers and of the enterprises.

In the light of the targets set through the Party documents, specialists of the central synthesis bodies (Central Board of Statistics, State Planning Committee, Ministry of Finance, etc.) are constantly concerned with the improvement of the designing, elaboration and perfection of the informational system and of the index system and with the estimation of the multiple implications generated by it. This naturally requires other very important activities linked with: a) the improvement of the classification of the branches of the national economy on structure, types of activities, subbranches, b) the classification of the fixed assets on groups and subsystems up to the level of the types of machines and installations, c) the list of socio-economic units which are information carriers and their coding; d) the list of professions, activities and occupations; e) the single and general list of products and services for the entire economy, on branches and subbranches, etc.

In this way, the economic informational system containing a united index system worked out in a clear and unitary conception, coded, can give a more complete and efficient answer to the multiple targets of knowledge deriving from the complex, dynamic development of our national economy.

LE SYSTEME INFORMATIONNEL SOCIO-ECONOMIQUE ET LA DIRECTION DE L'ECONOMIE NATIONALE

Prenant comme point de départ les tâches de la direction cybernétique de l'économie nationale, l'auteur examine les problèmes des systèmes informationnel et informatique, élabore un schéma globale d'indicateurs socio-économiques qui puissent constituer la base de l'analyse complexe multilatérale des phénomènes et des processus socio-économiques.

СОЦИАЛЬНО-ЭКОНОМИЧЕСКАЯ ИНФОРМАЦИОННАЯ СИСТЕМА И УПРАВЛЕНИЕ НАРОДНЫМ ХОЗЯЙСТВОМ

Исходя из задач кибернетического управления народным хозяйсвом, в статье рассматриваются вопросы информационных систем и АСУ, разработывается общая схема социально-экономических показателец, которая дольжна находиться на основе комплексного многостороннего анализа социально-экономических явлении и процессов.