P. CONSTANTINESCU
L. OPRESCU
"Ştefan Gheorghiu" Academy

The Main Features of the Informatic System Design for the Territorial Level Management

1. INTRODUCTION

The system approach of the managerial activities and the process led, allowed to define the informatic system for the territorial level management as one of the two feed-back loops system class (S_2) *).

In this system were separated, on the one hand, the strategic and tactical management levels, being the block of strategic-tactical management, that is the first feed-back loop (Fig. 1) and, on the other hand, the operative management level, being the block of operative management, that is the second feed-back loop.

The delimitation reflects:

— the essential character of the management qualities on the strategic and tactical level, for settling of the goals and the trajectory in which the leaded system goes to states space from the initial state to the final one (Fig. 2).

— the content of the management qualities, on the operative level, by watching the planned trajectory at the upper hierarchical level (Fig. 3).

The operative level (loop II) of the territorial level informatic system means the strategic-tactical level of the organizations (sectors) of the territory.

Thinking the territory as a system, and the component branches as subsystems, the management of these corresponds to the strategic and, respectively, tactical level; and the organizations (sectors), as subsystems of the component branches subsystems, correspond to operative management level of the territorial system, respectively to the strategic-tactical level of the informatic systems for organizations (sectors) management.

*) See [6,8]

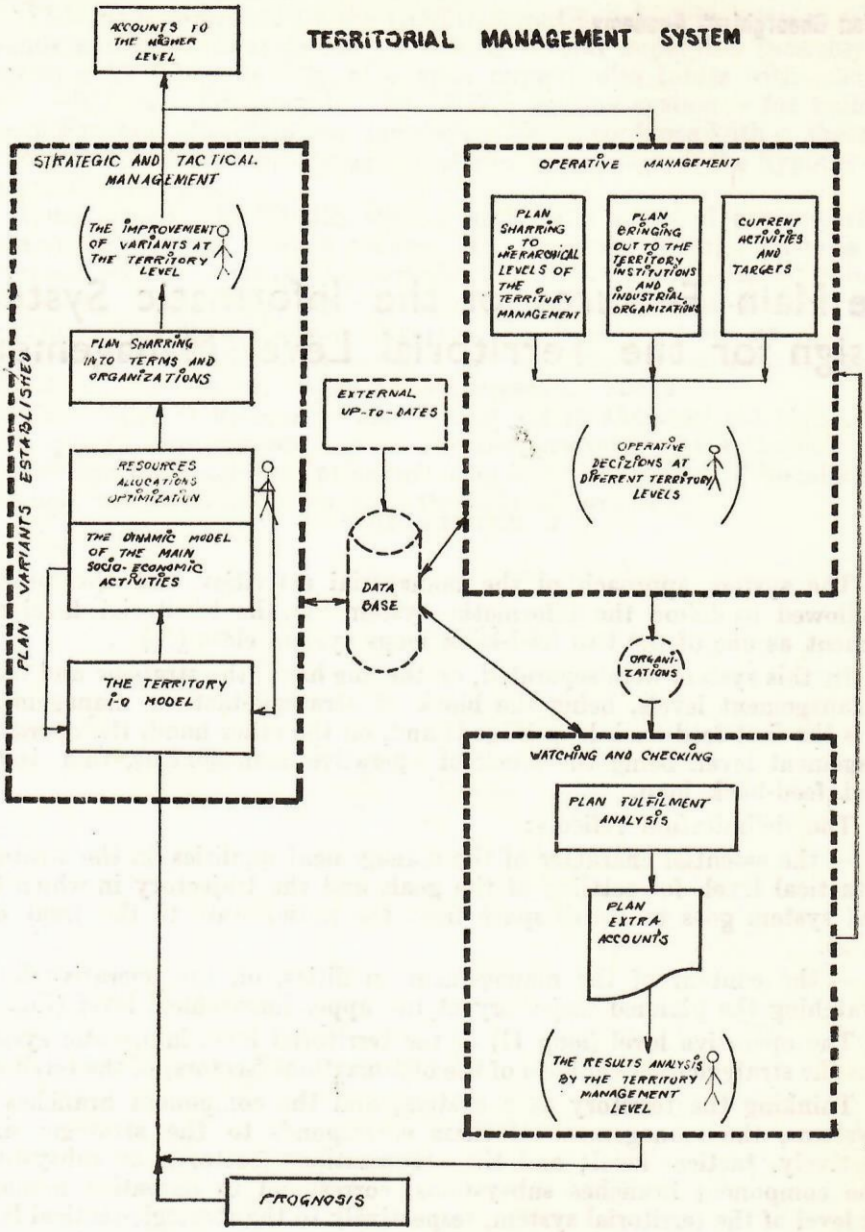
TERRITORIAL MANAGEMENT SYSTEM
ACCOUNTS TO THE HIGHER LEVEL
STRATEGIC AND TACTICAL MANAGEMENT
THE IMPROVEMENT OF VARIANTS AT THE TERRITORY LEVEL
PLAN SHARRING INTO TERMS AND ORGANIZATIONS
RESOURCES ALLOCATIONS OPTIMIZATION
THE DINAMIC MODEL OF THE MAIN SOCIO-ECONOMIC ACTIVITIES
THE TERRITORY I-O MODEL
PLAN VARIANTS ESTABLISHED
EXTERNAL UP-TO-DATES
DATA BASE
OPERATIVE MANAGEMENT
PLAN SHARRING TO HIERARCHICAL LEVELS OF THE TERRITORY MANAGEMENT
PLAN BRINGING OUT TO THE TERRITORY INSTITUTIONS AND INDUSTRIAL ORGANIZATIONS
CURRENT ACTIVITIES AND TARGETS
OPERATIVE DECIZIONS AT DIFFERENT TERRITORY LEVELS
ORGANIZATIONS
WATCHING AND CHECKING
PLAN FULFILMENT ANALYSIS
PLAN EXTRA-ACCOUNTS
THE RESULTS ANALYSIS BY THE TERRITORY MANAGEMENT LEVEL
PROGNOSIS

Fig. 1

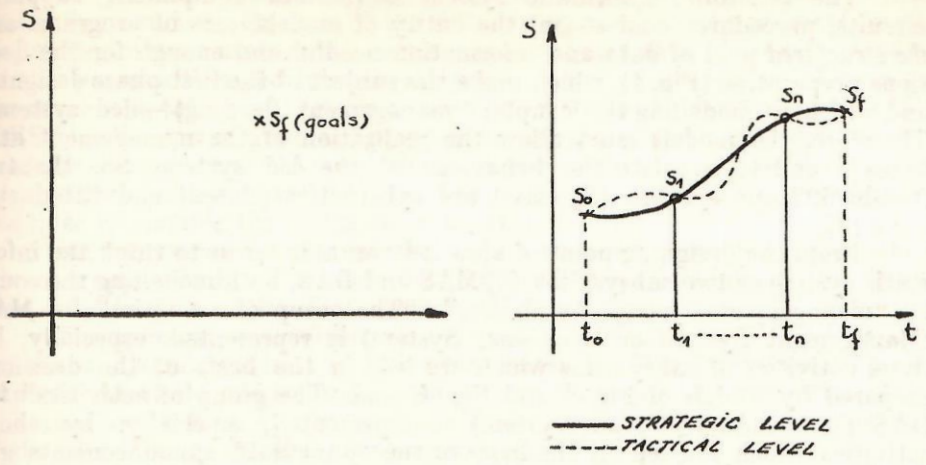
S
×Sf (goals)
S
Sn
Sf
S1
So
to
t1
tn
tf
t
STRATEGIC LEVEL
TACTICAL LEVEL

Fig. 2

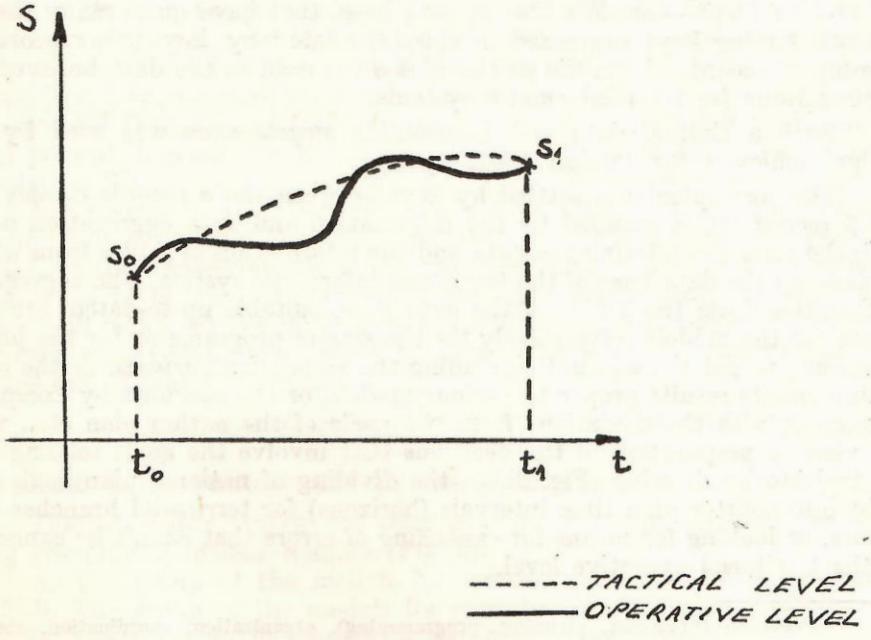
S
S1
So
to
t1
t
TACTICAL LEVEL
OPERATIVE LEVEL

Fig. 3

The territorial informatic system is (besides equipment, supports, circuits, procedures, and so on) the entity of models, sets of programs and *the structured* pool of data and information needful and enough for the decisions preparation (Fig. 1), which make the subject of the first phase designing and which is modelling the couple: "management (leading) — led system". Therefore, the models must allow the realization of the management atributes *) and to simulate the behaviour of the led system. So, the two feed-back loops systems (S_2 class) are cybernetics (closed) and fitted systems [8].

From the designing point of view it is suitable for us to think the informatic system as two subsystems, [6] MAS and DAS, both modelling the couple: "management — group of activities": "The group of activities" for MAS (Management System or Decisional System) is represented, especially, by those activities of subsystems which are led on the basis of the decisions prepared by models of Fig. 1 and Fig. 4, and "The group of activities" for DAS (Data administration system) is represented, especially, by those activities which are led on the basis of the "punctual" announcements got by data base inquiry (the interrogation together with creation, updating and maintenance of data base are the DAS functions) [2].

The two subsystems contribute to decisions preparation and are *conditioning* the data base structure. Due to equipment constraints (limits) a realistic *structuration* is given by considering two categories of files for the territorial informatic system and, generally, for the macro-economic informatic systems:

— "β files" — that have quite few but relatively long records, used in the informatic system *data base* for territory management.

— "τ files" — *satellite* files of data base, that have quite many shorter records, having keys organized in classes, related by key to a record or a group of records of the file β; the files σ are used in the data bases of the organizations (sectors) informatic systems.

Such a skill of data and information *structuration* was used by the design achieved for foreign trade system.

The correspondence settled by keys between the σ records classes and the β record (s), is entailed by the information and data aggregation needs with the view to updating the data and the information of β files from which is made up the data base of the territorial informatic system. The aggregated information from the β files of the data base, suitable up-to-dated, are pertinent for the models (respectively for the sets of programs or for the joined programs) to get the accounts including the *simulation variants*, or the optimizing counts results proper to various models, or the accounts by exception concerning vith the deviations from the goals of the nation plan etc., with the view to preparation of the decisions that involve the goals settling and the trajectories drawing (Fig. 2), or the dividing of national plan goals and tasks into shorter plan time intervals (horizons) for territorial branches and sectors, or looking for means for cancelling of errors that cann't be cancelled on the territorial operative level.

*) Prevision (prognosis, planning, programming), organization, coordination, control (follow-up).

The models shown in [7], have, as variable quantities, especially, economic index numbers. Because of the difficult approach of the political, social, population index numbers, we consider that the structure of models proposed in this paper within the informatic system design of the territorial management, i.e. the taking of these last index numbers in the dynamic model MODEST, will allow a gradual approach of them and the enrichment of this *modular* component of MAS models, while the experimentation and validation of new index numbers will *lead* the territorial management strategic level to consider reasonable the inclusion of them.

So, we propose as the first set of socio-economic index numbers those given in appendix 1, where the index "life quality" and its joined index family was considered for the first time by Miron Constantinescu [1], [4], [5].

The aggregation level we can use within MODEST by $\beta - \sigma$ files skill, makes no special problems of writing of information and data needed on the suports, this skill could be used for the present configurations and, particularly, the data and information storage could be done on the magnetic tapes and disks of relatively small existing capacities.

The proposed modularity ensure, also as we still saw, the possibilities of the informatic system development, in the way of including of new political, social, economic, etc., index numbers, without the appearance of quite difficult problems of redesigning.

Taking account of the methodological basis of designing and of implementation of the informatic systems [3], that proposes the approach of implementation from the strategic level to operative one and, likewise, the territorial system particularity for which the operative level is represented mainly by the strategic and tactical management of sectors (organizations), the jointness between the two loops of the informatic system (Fig. 1) beeing made by *out-spacing* models, from the first loop to the second one and aggregation models, based on $\beta - \sigma$ skill presented before, from the second loop to the first loop, we shall show below the block of the strategic and tactical management (Fig. 1), and from among the models the block is consisted, we shall present detailed the MODEST; the description of the others is made detailed in [7].

The presentation of the model MODEST jointed among the models of the block of strategic and tactical management, as it is shown in Fig. 4, is related to the socio-economic index numbers from Appendix 1, that makes up a set of index numbers for which the organization problems of data by $\beta - \sigma$ skill make not special particular problems. The inclusion of new index numbers within this model must be done after a careful analysis of data needed and of β and σ files sizes.

2. MODELS OF THE INFORMATIC SYSTEM FOR TERRITORIAL LEVEL MANAGEMENT

The Block of the Strategic and Tactical Management

The informatic system for territorial management contains the following grouping of models families (Fig. 4):

A. The group of the models for strategic and tactical management;
B. The group of the models for operative management;
C. The group of the models for watching, control check.

THE SCHEME OF THE MAIN MODELS OF THE TERRITORIAL MAS

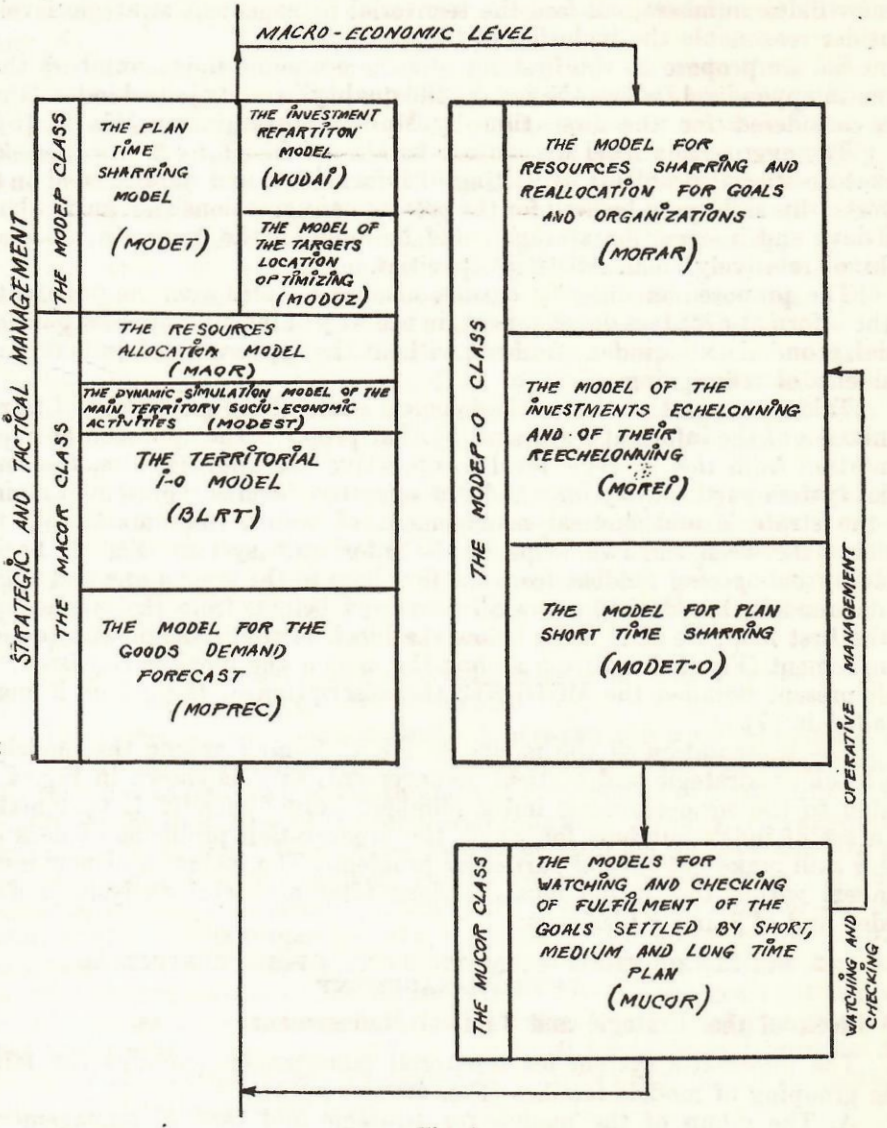

Fig. 4

The structure of the group of models from the block of the strategic and tactical management, is the following:

A_1 The family of models for plan establishing (MACOR) consists in:

- A_{11} the model for final demand forecast (MOPREC)
- A_{12} the territorial input-output model (BLRT)
- A_{13} the dynamic model of the main territorial socio-economic activities (MODEST) *
- A_{14} the resources optimal allocation model (MAOR)

A_2 The family of models for the plan division (space-out) into goals and terms (MODEP)

- A_{21} the plan time sharing (division) models (MODET)
- A_{22} the model for optimal distribution of territorial investments (zone) MODAI
- A_{23} the model for optimization of territorial targets (objectives) lay-out (MODOZ)

Another models for plan goals division upon different organizations (sectors, units).

Keeping on doing, we present the synthetic models of the plan establishment models family, whose INPUTS/OUTPUTS scheme is given in Fig. 5. Seeing that A_{11}, A_{12} and A_{14} have been presented in [6, 7], we shall describe in detail the model MODEST (13) which allows to consider a political, social, demographic index numbers system versus the economic index numbers with which the three models showed in [6, 7] mainly work.

The MOPREC model — consists of:

a) the trend counting determination using the least-squares method (LISSAGE method)

b) short-term forecasting methods (BROWN method)

c) the estimation of the demand development for long-time employment goods, by means of the logistic function (FLOG method)

d) the consumption functions determination

e) other methods.

This model helps the modelling for the final demand forecast, particularly for goods demand within the territorial domestic trade activities. It provides input information concerning with the final consumption, for BLRT model, for determination of the production level and structure.

The BLRT model is an extension of the national input-output model whose fitting was made starting from the territorial system particularity. So, from the inter-branches flows reflection (pondering) way point of view, they are evidenced in this model by four categories, i.e.:

- — full flows (territory + country + import);
- — flows from territory;
- — flows from country;
- — flows from import.

---

*) MODEST is an adjusted form of the models from 12, 13. There is a variant of the model being already in the computer test and experiment phase.

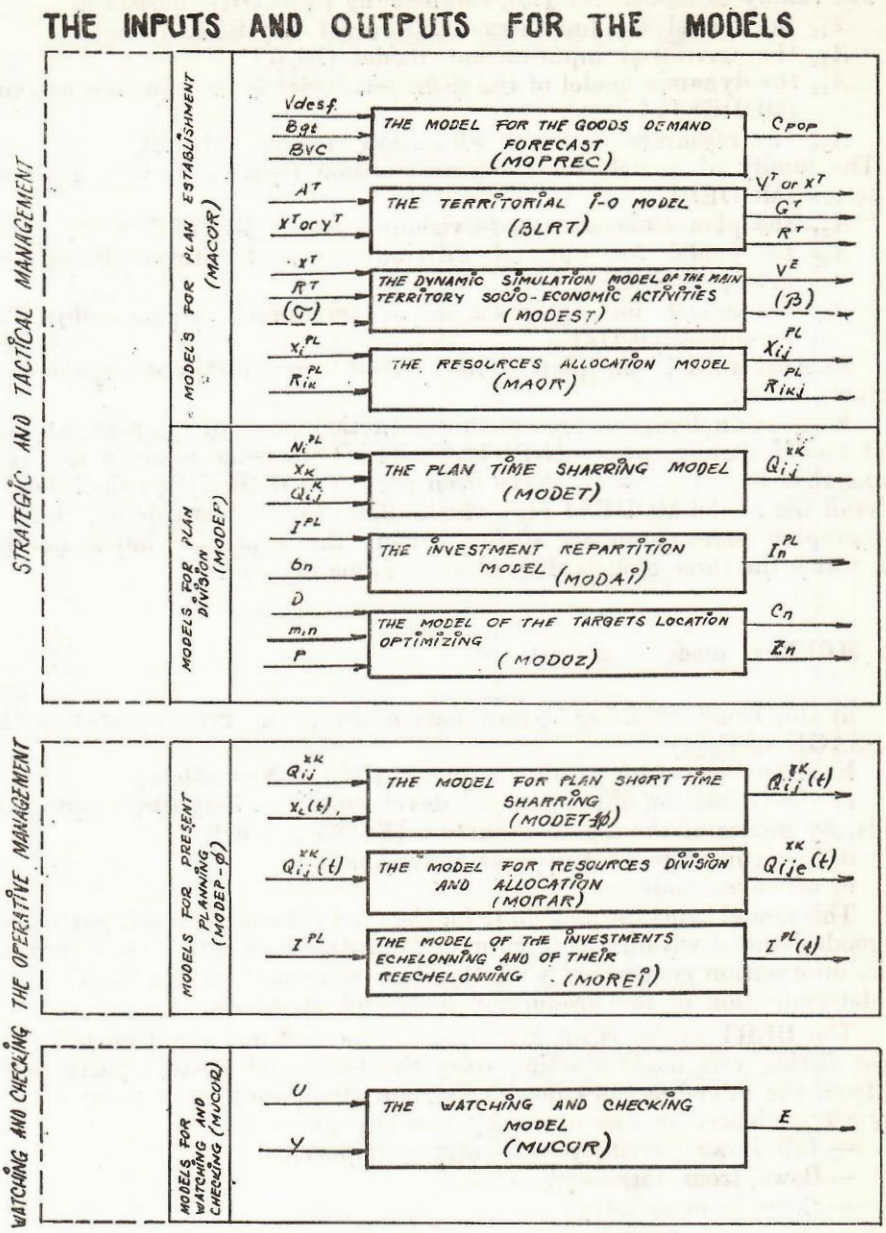
THE INPUTS AND OUTPUTS FOR THE MODELS
STRATEGIC AND TACTICAL MANAGEMENT
MODELS FOR PLAN ESTABLISHMENT (MACOR)
Vdesf
Bgt
BVC
THE MODEL FOR THE GOODS DEMAND FORECAST (MOPREC)
Cpop
A^T
X^T or Y^T
THE TERRITORIAL I-O MODEL (BLRT)
V^T or X^T
G^T
R^T
X^T
R^T
(G^T)
THE DYNAMIC SIMULATION MODEL OF THE MAIN TERRITORY SOCIO-ECONOMIC ACTIVITIES (MODEST)
V^E
(β)
X_i^PL
R_ik^PL
THE RESOURCES ALLOCATION MODEL (MAOR)
X_ij^PL
R_ikj^PL
MODELS FOR PLAN DIVISION (MODEP)
N_i^PL
X_K
Q_ij^K
THE PLAN TIME SHARRING MODEL (MODET)
Q_ij^xK
I^PL
δn
THE INVESTMENT REPARTITION MODEL (MODAI)
I_n^PL
D
m,n
P
THE MODEL OF THE TARGETS LOCATION OPTIMIZING (MODOZ)
Cn
Zn
THE OPERATIVE MANAGEMENT
MODELS FOR PRESENT PLANNING (MODEP-φ)
Q_ij^xK
x_c(t)
THE MODEL FOR PLAN SHORT TIME SHARRING (MODETφ)
Q_ij^xK(t)
Q_ij^xK(t)
THE MODEL FOR RESOURCES DIVISION AND ALLOCATION (MORAR)
Q_ije^xK(t)
I^PL
THE MODEL OF THE INVESTMENTS ECHELONNING AND OF THEIR REECHELONNING (MOREI)
I^PL(t)
WATCHING AND CHECKING
MODELS FOR WATCHING AND CHECKING (MUCOR)
U
Y
THE WATCHING AND CHECKING MODEL (MUCOR)
E

Fig. 5

As a consequence, such a balance contains four kinds of direct expenditure coefficients:

— the full expenditure coefficient;
— the coefficient of expenditures from the own production;
— the coefficient of expenditures from the country production;
— the import expenditures coefficient.

Similarly are evidenced the other BLR model elements, the aim of this fitting beeing required by the territorial analysis needs. This model is used to solve the following categories of problems:

a) the plan variants simulation (plan proposals establishment)
b) analysis and diagnosis
c) the resources needs counting (fixed assets, moving funds and investments).

Using also the models proper to the three categories of problems [7], we can settle by simulation different plan variants, being directly useful to the planning activity with an important social labour saving and with a higher efficiency.

The information provided by these models together with the other categories of information (demographic, social, political etc.) become inputs of the dynamic model of the main territorial socio-economic activities (MODEST). Because versus the liniar and procedural models shown in [7] this dynamic model has some particularities, we shall insist much more on its description (fig. 13); its variables are shown in Appendix 1.

The MODEST model tries to supply the shortcoming of the previous models from the social, demographic, political *) information point of view, and is as a shutting for the territorial input-output model (BLRT) in the same sense in which the "shadow prices" method [7], [11] allows the realization of a pertinent feed-back for decision making within the frame of BLRT model.

So, being a general and simplified representation of the real system, including an important number of qualitative information as socio-economic demographic and political index numbers in a closed connection **), this model is useful to a validation of the plan decisions taken by means of the territorial I — O model (BLRT).

We consider that this solution of designing is, for the present stage, a satisfactory approximation if we notice that the territorial system belongs to the complex system class, with, sometimes, no intuitive and long time behaviours.

From the models family for the plan establishment, we described in [7], we shall still present, for an illustration of the connection between the models variables and the socio-economic index numbers, the model MAOR (resources optimal allocation model).

The model variables correspond to each representative or conventional product and to the weight of that in the foreign trade and they could be generally represented by the following standard variables: the last year production plan realised by means of the fixed funds existing at the beginning of

---

*) Such index numbers are: population an milien and large age groups, life puality, life expectation, production per capita, crawd, industrial urban land area per capjta.

**) See Appendix 1.

the plan time interval, without technological changes; the last year production plan realised by means of the existing fixed fund sat the beginning of the plan time interval, with technological changes; the last year production plan realized by means of new fixed funds, invested during the plan year (period); the product import from the foreign market (socialist and/or capitalist market) the product export to the foreign market (socialist and/or capitalist market).

The constraints system is made up of a number of limitative conditions that can be grouped from their economic content point of view, into the following general categories: the internal production products balance; the foreign trade products balances, the salary fund limits; the production capacities limits; the special technological amounts, the investments resources limits; the import and export limits; the foreign currency balances.

The goal functions.

For the model simulation it can be used alternatively much more goal functions, e.g.: the total profit maximizing, the price minimizing, the total production maximizing, the labor force expenses minimizing, etc.

In some variants, these goal functions can be combined. The models system of the optimization program for the resources optimal allocation is made up of three important types (sorts) of models.

I. The sector models that programmes the activities of a sector from the main branch. The inclusion of the sector model into the models system is exclusively achieved by the determination of the limits corresponding to the constraints of the main branches to which this model belongs.

II. The main branch models gathers the all main branch activities. The including of this model into the models system is exclusively achieved by the determination of the limits corresponding to the constraints for the higher (central) level.

III. The territory economy model rallies both the sector models and the main branch models.

This by levels system building is implied, as we have seen, by the fact the territory economy can be considered as a system, its component branches as subsystems of it, and the sectors or the entreprises as subsystems of the branch system, or subsystems of the territorial economy systems, which has as a main feature the fact that it is at unitary plan led system; between its subsystems is settled a various scale of particular relationships i.e.: supply relationships, cooperation relationships, technical cooperation relationships, etc.

We shall not insist upon the models from the goals and terms plan sharing methods family, which are presented in [6].

3. THE DYNAMIC MODELLING OF THE MACRO-ECONOMIC SYSTEMS

For understanding the Fig. 13 representation of the dynamic model MODEST whose variables are shown in Appendix 1, we shall present in this paragraph the main component parts of the representation skill [10].

The dynamic models (helpful for watching of the time evolution of the studied system) have at the basis the *level* (qualitative accumulation) and *rate* (variation speed, flow speed) *concepts.*

Besides the equations joined to these concepts there are introduced the auxiliary equations which represent system information processings. For the graphical representation of the model, there are used sketches of the following form:

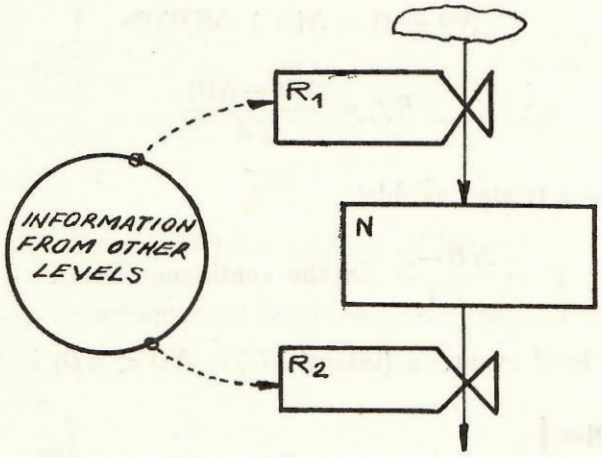

Fig. 6

where N means a level, R_1 and R_2 means rates (determinated by other levels, or even by N). The time evolution equation of the N level is:

$$N(t+1) = N(t) + \Delta t[R_1(t) - R_2(t)]$$

$$R_1(t) = f(N_1(t), ..., N_k(t))$$

$$R_2(t) = g(N'_1(t), ..., N'_k(t).$$

We shall further present some macro-economic models particularities.

A typical feed-back loop that occurs in these models is the Ist order loop, which contains one level, one rate, the level desired value and an adjustement time (for the error perceiving delay).

Graphically, the Ist order loop can be represented as:

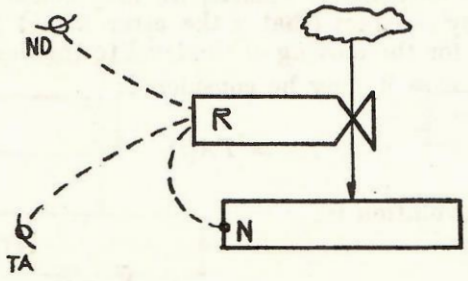

Fig. 7

N = the level
R = the rate
ND = the desired level
TA = the adjustment time

The I[st] order system equation is

$$N(t+1) = N(t) + \Delta t[R(t)]$$

$$R(t) = \frac{ND - N(t)}{TA}$$

or, naming $N = x$ (state variable):

$$x' = \frac{ND - x}{TA} \text{ (in the continuous form).}$$

The time level evolution (taking $N(o) = NO < ND$) is the following:

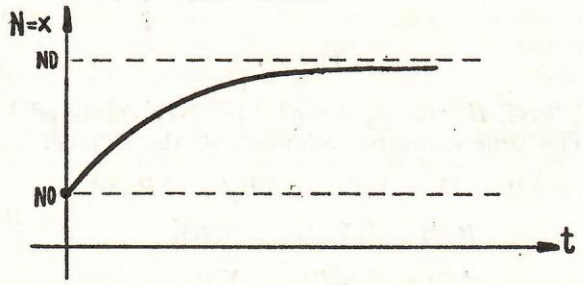

Fig. 8

$$N(t) = ND - (ND - NO)^{-\frac{t}{TA}}$$

Within the macro-economic models, we may consider the adjustment time TA not generally constant (that is the error is not perceived with the same constant delay for the moving of the level to the desired level).

In the general case it may be considered:

$$TA = TA(t),$$

and then, the level evolution is:

$$N(t) = (ND - NO)e^{-\int_0^t \frac{d\tau}{TA(\tau)}}$$

For instance, we may suppose $TA(t)$ going from an initial TAO value to the desired time adjustment value, TAD, the asimptotical exponential evolution being:

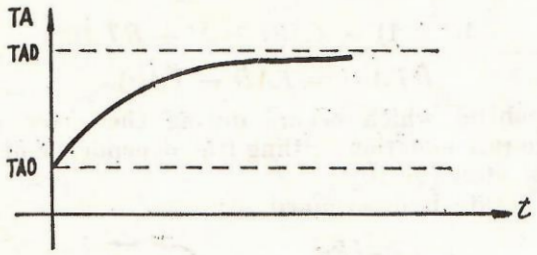

Fig. 9

$$TA(t) = TAD - (TAD - TAO)\, e^{-t}$$

It gets then an asimptotical level evolution too, but fitting another curve:

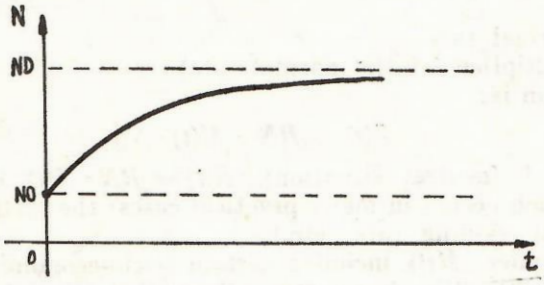

Fig. 10

The situation described above has a simple interpretation within the graphic model: it is conceived a "time level" TA, having a Ist order route evolution (a rate, a desired value):

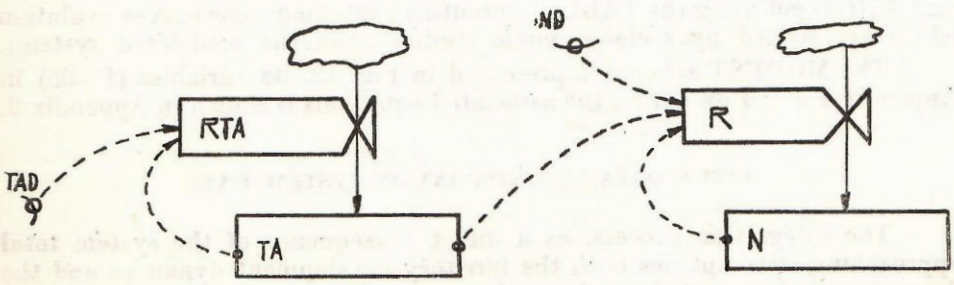

Fig. 11

$$N(t+1) = N(t) + \Delta t + R(t)$$

$$R(t) = \frac{ND - N(t)}{TA(t)}$$

$$TA(t+1) = TA(t) + \Delta t + RTA(t)$$

$$RTA(t) = TAD - TA(t).$$

Another problem which occurs during the macro-economic models elaboration, is the rate equation settling (the dependence of the others levels, of the constants, etc.) [9, 10].

Generally, a rate is determined so:

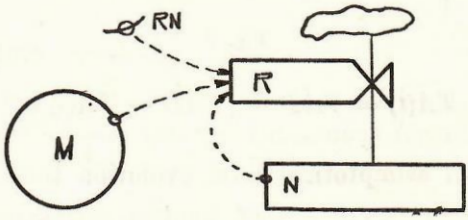

Fig. 12

RN = normal rate
M = multiplier (of the normal rate)
The rate equation is:

$$R(t) = RN \cdot M(t) \cdot N(t)$$

If $M(t) = 1$ (neutral situation), $R(t) = RN \cdot N(t)$ hence a normal growth rate (which occurs in many practical cases: the birth rate, the death rate, the worker skilling rate, etc.).

The multiplier $M(t)$ includes certain socio-economic factors, which determine the $R(t)$ rate (e.g.: the influence of the inhabitants number increasing, public expenditure, job number increasing, etc.).

If $M(t) < 1$, then $R(t) < RN \cdot N(t)$, and if $M(t) > 1$ results $R(t) > RN \cdot N(t)$. It is obvious, in practice, that $M(t)$ is limited: $a \leqslant M(t) \leqslant b$

The $M(t)$ multiplier has the form:

$$M(t) = M_1(t) \cdot M_2(t) \ldots M_k(t)$$

and $M_k(t)$ is got using the TABLE subroutine (watching some curves evolution which are settled by socio-economic studies upon the modelated system).

The MODEST scheme is presented in Fig. 13, its variables (1—95) in Appendix 1 and a part from the associated equations is shown in Appendix 2.

4. THE DATA ADMINISTRATION SYSTEM (DAS)

The integration process, as a direct consequence of the system total approaching, accompanies both the territory development dynamics and the dynamics of the respective informatic system development. The subsystems

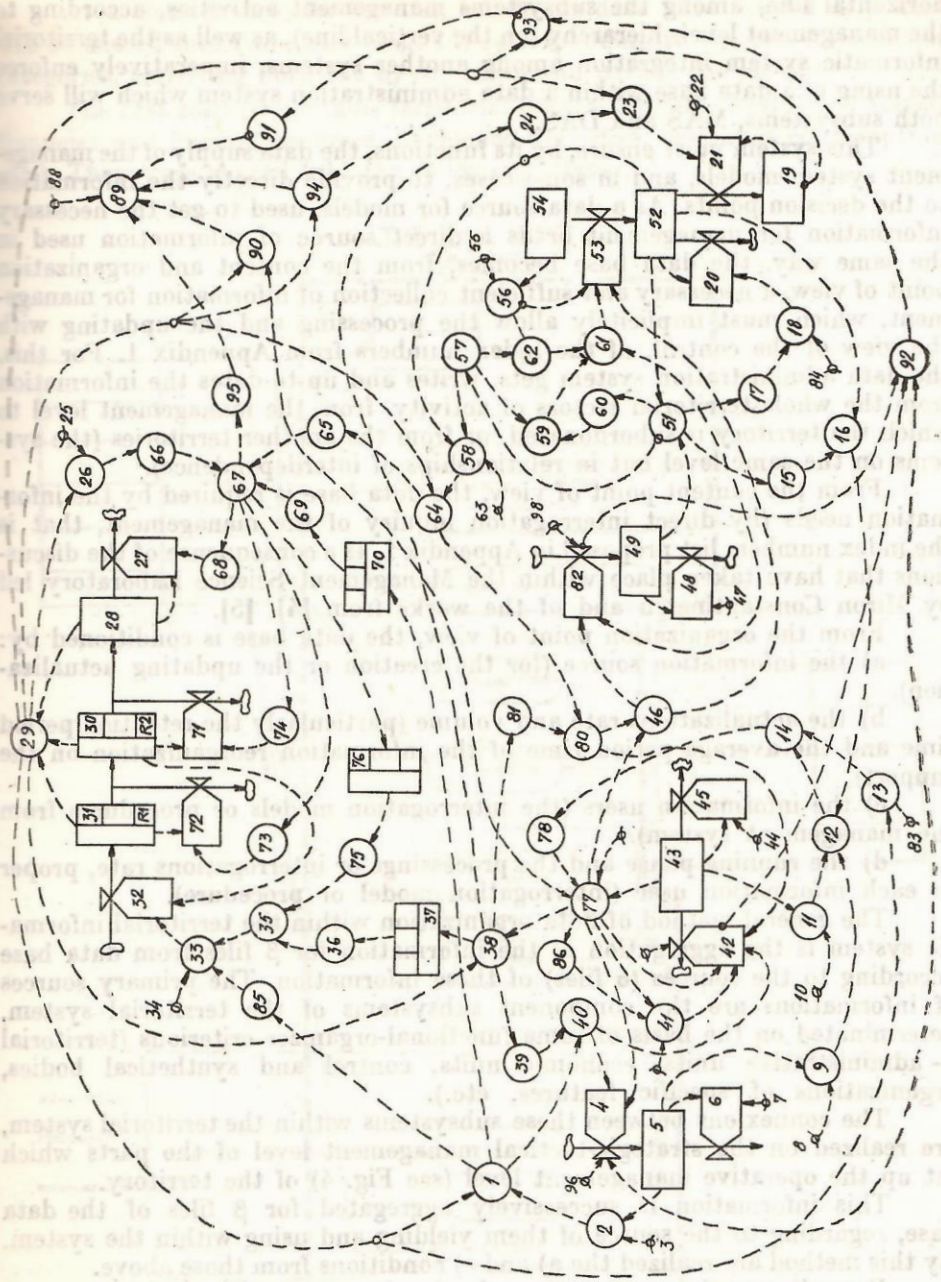

Fig. 13

integration in the way of the realization of the dynamic *connexions* (on the horizontal line) among the subsystems management activities, according to the management levels hierarchy (on the vertical line), as well as the territorial informatic system integration among another systems, imperatively enforce the using of a data base within a data administration system which will serve both subsystems, MAS and DAS.

This system must ensure, by its functions, the data supply of the management system models, and in some cases, to provide directly the information to the decision points. As a data source for models, used to get the necessary information for management or as a direct source of information used in the same way, the data base becomes, from the content and organization point of view, a necessary and sufficient collection of information for management, which must implicitely allow the processing and the updating with the view of the control, of the index numbers from Appendix 1. For this, the data administration system gets, writes and up-to-dates the information from the whole territorial sectors of activity, from the management level to which the territory is subordonated, or from the another territories (the systems on the same level but in relationships of interdependence).

From the content point of view, the data base is required by the information needs (by direct interrogation inquiry of the management, that is the index numbers list proposed in Appendix 1, as a consequence of the discussions that have taken place within the Management Science Laboratory led by Miron Constantinescu and of the works from [4], [5].

From the organization point of view, the data base is conditioned by:

a) the information source (for the creation or the updating actualization).

b) the actualizations rate and volume (particularly the retention period time and the average period time of the information reorganization on the support).

c) the information users (the interrogation models or procedures from the management system)

d) the running phase and the processings or interrogations rate, proper to each information user (interrogation model or procedure).

The general method of data organization within the territorial informatic system is the aggregation of the information for β files from data base according to the sources (σ files) of these information. The primary sources of informations are the component subsystems of the territorial system, determinated on the basis of some functional-organizer criterious (territorial — administrative units, economic units, control and synthetical bodies, *organizations of specific features, etc.).*

The connexions between these subsystems within the territorial system, are realized on the strategic-tactical management level of the parts which set up the operative management level (see Fig. 4) of the territory.

This information is successively aggregated for β files of the data base, regarding to the source of them yielding and using within the system. By this method are realized the a) and c) conditions from those above.

Regarding to the appearance and using frequency, the information from the data base are grouped in two categories:

— information of small appearance and/or using frequency;

— information of great appearance and/or using frequency.

As a consequence, for running relief, the data base shaped of β files, will be shared into two zones (Fig. 14) corresponding to the two information categories, satisfying both the b) condition and partial the d) one.

The first zone (I) contains territorial data, relatively constant (material, financiar and human resources, developed activities, resources consumption, etc.). They were shared into the following classes:

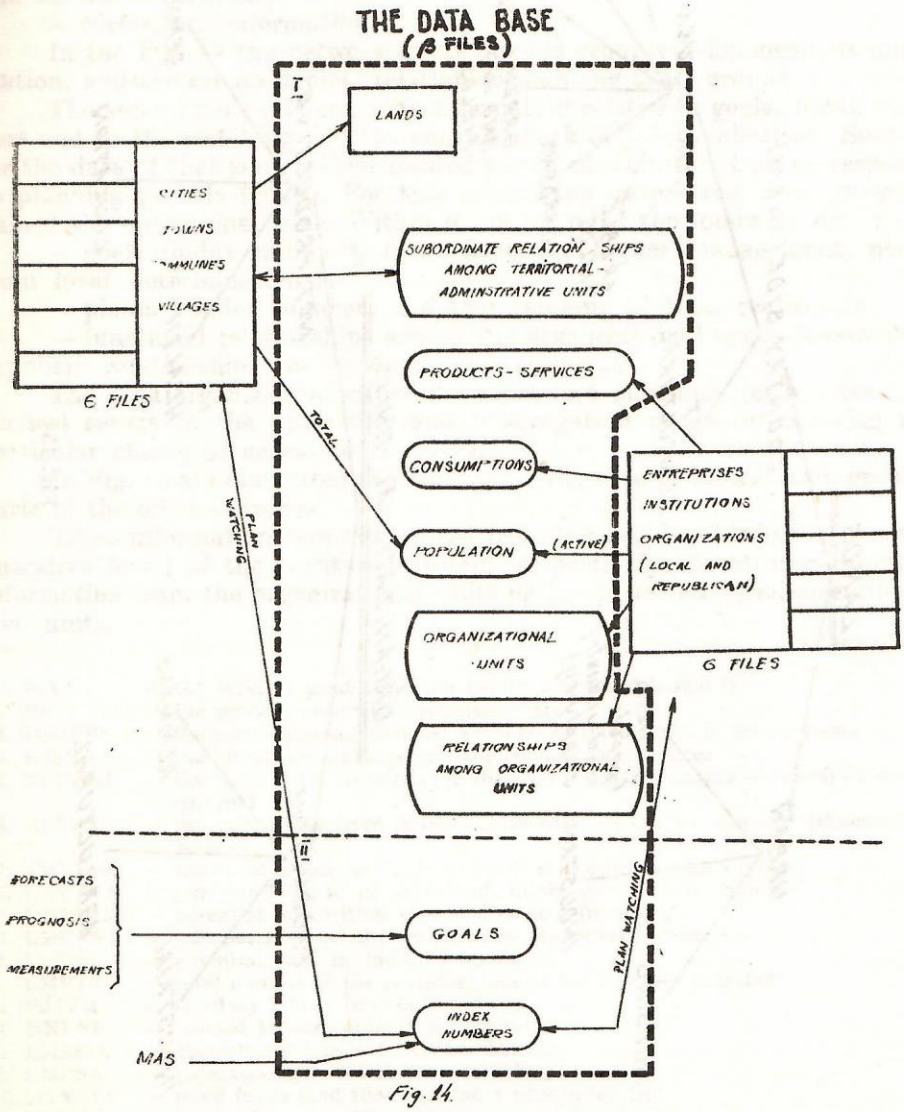

Fig. 14

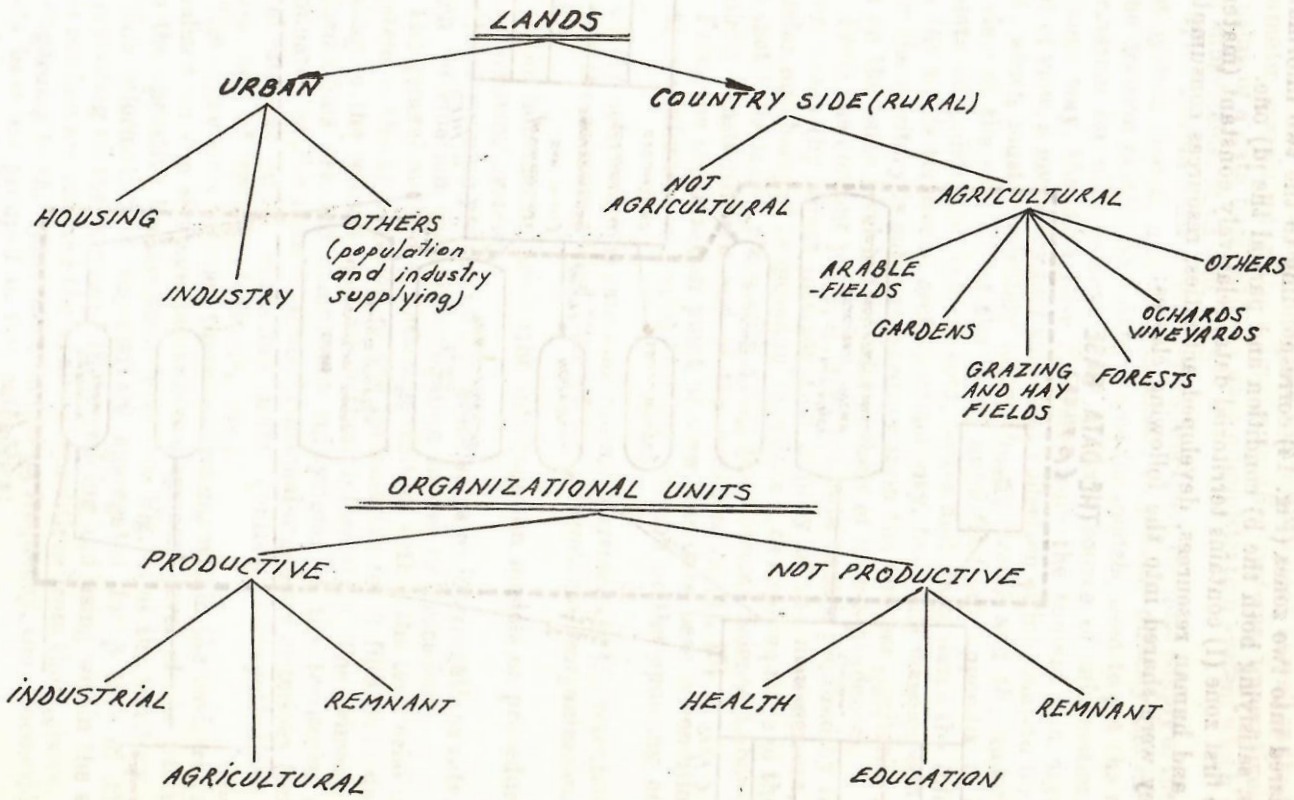
LANDS
URBAN
COUNTRY SIDE (RURAL)
HOUSING
INDUSTRY
OTHERS (population and industry supplying)
NOT AGRICULTURAL
AGRICULTURAL
ARABLE -FIELDS
GARDENS
GRAZING AND HAY FIELDS
FORESTS
OCHARDS VINEYARDS
OTHERS
ORGANIZATIONAL UNITS
PRODUCTIVE
NOT PRODUCTIVE
INDUSTRIAL
AGRICULTURAL
REMNANT
HEALTH
EDUCATION
REMNANT

Fig. 15

— lands;

— territorial-administrative units and the relationships among them (subordination);

— organizational units (economic units, institutions, organizations) and the relationships among them (subordination);

— products and services executed within the territory;

— population;

— consumptions (fixed funds, raw materials, fuels, labour) in products and services execution;

— historical. information.

In the Fig. 14 the network knots depicts groups of homogenous information, and the arches depicts relationships among these groups.

The second zone (II) contains information related to goals, index numbers and to the watching and the control check of their realisation. Specific for the data of that zone is their limited period of retention, that corresponds to planning periods (goals). For this reason the respective zone may be named the operational zone. Within it are included the following data:

— goals (index numbers, tasks from the higher management, needs from local determinations);

— planned index numbers and the watching of their realization;

— functional relationships among the organizational needs (customers-suppliers relationships for products and services).

The data organization within the zones and subzones (categories and classes) serves to the processing and interrogation needs by ensuring the particular chains of access to the data.

In Fig. 15 are illustrated the relations between some information groups, parts of the cited subzones.

These informations are aggregated from the last level information (the operative level) of the territorial system, respectively the strategic-tactical information from the organizational units or from the territorial-administrative units.

APPENDIX 1

1. PSCL — the services production per capita (thousand lei/head)
2. PS — the services production (thousand lei)
3. PSUFFS — the services production per 1 000 lei of fixed funds in services area
4. RISS — the investments rate within the services (sector) area
5. VFFRNP — the value of the fixed fund in the unproductive branches (services) (thousand lei/year)
6. RCFFS — the rate of the fixed funds consumption in the services area (thousand lei /year)
7. TMVFFS — the average time of the fixed funds in the services area (years)
8. LMUFFS — jobs per 1 000 lei of fixed funds in the services area (number)
9. LIMPOSS — potential jobs within the services area (number)
10. LMUFFI — jobs per 1 000 lei of fixed funds in the industry (number)
11. LMPSI — potential jobs in industry (number)
12. LMPTJ — total number of the potential jobs of the territory (number)
13. PJIVM — territory labour (number)
14. RNFFE — needed labour / present labour ratio
15. LMAHA — agricultural jobs per ha. (number/ha)
16. LMPSA — potential agricultural jobs (number)
17. MTVTFF — fixed funds land time multiplier (dimension-less)
18. TMVAT — the land average time (years)
19. TUI — industrial urban land area (ha)

20. RDEPT — the land decay rate (ha/year)
21. RTTUI — land to urban industrial land rate (ha/year)
22. TOCTER — land occupation period (years)
23. NTUI — industrial urban land needs indicated (ha)
24. TUICL — industrial urban land per capita (ha/inhabit.)
25. SUPTJ — total land area of the territory (ha)
26. AGLJ — crowd
27. RD3 — death rate of the population older than 62 years
28. PΦPJ3 — the territory population older than 62 years (no)
29. PΦPTJ — the territory total population
30. PΦPJ2 — the territory population of age between 16 and 62 years (no.)
31. PΦPJ1 — the territory population of age between 1—15 years (no.)
32. RN — year birth rate
33. FERT — fertility
34. RNMB — the biological maximal birth rate
35. RDN — the desired birth rate
36. MNDPI — the births desired multiplier in the industrial production
37. IEPN — the delay of the production effect upon the births
38. PICL — industrial production per capita
39. PSDCL — services desired production per capita
40. PPIS — the part alloted to services area from the industrial production
41. MISSPI — the multiplier of the investments in services area from the industrial production
42. RIFFI — the industry fixed funds investments rate
43. VFFR — the industry fixed funds value
44. TMVFFI — the average time of the industrial fixed funds
45. RCFFI — the industry fixed funds consumption rate
46. INVFAG — total investment in agriculture
47. TVMFFA — the agricultural fixed funds average time
48. RCFFA — the agricultural fixed funds consumption rate
49. VFFRAG — the agricultural fixed funds value
50. MPAFF — the multiplier of the agricultural production from fixed funds
51. RFAFF — arable land / fixed funds ratio
52. STERA — the arable land area (ha)
53. RDEZT — the agricultural lands development rate
54. TERPA — the agricultural potential land areas (ha)
55. TERPAI — the initial agricultural potential land areas
56. CDEZTH — the land development cost per ha
57. PRΦDA — the agricultural productivity
58. VALALI — territory food production
59. PMFFA — marginal productivity of the agricultural fixed funds
60. PMTFF — the marginal productivity of the lands from the fixed funds
61. PITADT — the agricultural total investment part alloted to the land development
62. PMDEZT — the marginal productivity of the land development
63. PTACC — the part of the land occupied by corn (ha)
64. ALCLOC — foods per capita
65. MTVALI — life time multiplier from feeding
66. MTVAGL — life time multiplier from crowd
67. ASTVI — life expectation
68. MΦRT3 — deaths rate of the population older than 62 years
69. MTVSS — life time multiplier from the health services
70. INTGS — delay within the health services
71. RD2 — death rate of the population of age between 16 and 62 years
72. RD1 — death rate of the population of age between 0 and 15 years
73. MΦRT2 — deaths rate at age of 16—62 years
74. MΦRT1 — deaths rate at age of 0—15 years
75. RDNTV — the desired births rate from the life time
76. INTPTV — life time perception delay
77. VPRΦDI — the industrial production value
78. PUFFI — the industrial fixed funds usage ratio
79. RUFF — production/ind. fixed funds value ratio

80. PPIALA — fraction from the industrial production alloted to the agriculture
81. ALDPCL — desired foods per capita
82. RIFFA — the rate of the fixed funds investments in agriculture
83. FRFM — potential labour fraction
84. TIVT — initial life time of the land
85. ECN — birth check efficiency
86. CVPRΦDI — industrial production growth
87. VPRΦDII — initial industrial production
88. SCV — territory life quality size
89. CVJ — territory life quality
90. CVPIJ — life quality from the territory industrial production
91. CVITJ — life quality from the total investments within the territory
92. TOTIVJ — total investments within the territory
93. INVCLJ — territory investments per capita
94. CVDTUI — urban area life quality per capita
95. CVAVJ — life quality from the life expectation per capita
96. MISSPN — the multiplier of the services area investments from the national plan (simulation factor)
97. MISIPN — the multiplier of the industry investments from the national plan (simulation factor)
98. MISAPN — the multiplier of the agriculture investments from the national plan (simulation factor).

APPENDIX 2

MODEST—equations

1. PSCL = PS/POPTJ
2. PS = VEERNP * PSUFFS
3. RISS = VPRODAI * PPIS + VFFRNP * MISSPN
4. VFFRNP = VFFRNP + DT * (RISS − RCFFS)
5. RCFFS = VFFRNP/TMVFFS
6. LMPOSS = VFFRNP * LMUFFS
7. LMPSI = VFFR/ND * LMUFFI
8. LMPTJ = LMPOSS + LMPSI + LMPSA
9. PJIVM = POPTJ * FPFM
10. RNFFE = LMPTJ/PJIVM
11. LMAHA = TABLE (LMAHAT, RTAFF) [1]
12. LMPSA = LMAHA * STERA
13. MTVTFF = TABLE (MTVTFFT, RTAFF)
14. TMVAT = TIVT * MTVTFF
15. TUI = TUI + DT * RTTIUI
16. RDEPT = STERA/TMVAT
17. RTTUI = (NTUI − TUI)/TOCTER
18. NTUI = POPTJ * TUICL
19. TUICL = TABLE (TUICLT, PICL)
20. AGLJ = POPTJ/SUPTJ
21. RD_3 = $POPJ_3$ * MORT3
22. POPJ3 = POPJ3 + DT * (R2 − RD2 − RD3)
23. POPTJ = POPJ1 + POPJ2 + POPJ3)
24. $POPJ_2$ = $POPJ_2$ + DT ** (R_1 − RD_1 − RD_2)
25. $POPJ_1$ = $POPJ_1$ + DT * (RN − RD_1)
26. RN = $POPJ_2$ * FERT
27. FERT = RNMB * ECN * RDN
28. RDN = RDNTV * MNDPI
29. MNDPI = TABLE (MNDPIT, IEPN)

---

[1] LMAHAT = is the name of the multiplier table function and it will not appear in the index numbers list.

30. IEPN = IEPN + DT * (IEPN − PICL)/TPPC
31. PICL = VPRODI/POPTJ
32. PSDCL = TABLE (PSDCLT, PICL)
33. PPIS = PSCL * PSDCL
34. MISSPI = TABLE (PPICT, CVPRODI)
35. CVJ = CVPIJ * CVITJ * CVDTUI * CVAVJ
36. RFAFF = STERA/VFFRAG
37. STERA = STERA + DT * (RDEZT − RDEPT − RTTIUI)
38. R_1 = DELAY (RN, $POPJ_1$) [2]
39. R_2 = DELAY (R_1 − RD_1, $POPJ_2$)

The authors are in great drept to the Dolj territory mamagement and specialist and want to express their gratitude for helpful sugestions to the members of the Management Laboratory of the "Ştefan Gheorghiu" Academy and to their colleques from the Central Institute of Management.

REFERENCES

1. APOSTOL P.: *The Social Prognosis Today; Possibilities and Limits.* Prognosis, no. 1, 1964, CIDSP.
2. ANTONESCU C., CONSTANTINESCU P.: *Features of the Data Base of an Economic Unit Informatic System.* Management-Decision, No. 8, CIDSP.
3. BEIU I., CONSTANTINESCU P.: *The Methodological Basis of the Informatic Systems Designing within the Economic Units.* Management-Decision, No. 1, 1974, CIDSP.
4. CONSTANTINESCU M.: *The Present Subject Items of the Sociology in S.R. of Romania.* The Sociologic Thinking in Romania.
5. CONSTANTINESCU M.: *The Sociologic and Politologic Test Upon the Dolj Territory.* Study copy books, reports and disscusions, Sociologic Laboratory, No. 12, October, 1973.
6. CONSTANTINESCU P.: *Informatics.* The Methodological Basis of the Informatic Systems Designing. Stefan Gheorghiu Academy, 1974.
7. CONSTANTINESCU P., OPRESCU P.: *Skills and Models Used in the Dolj Test.* The Social Future, No. 4, 1973.
8. CONSTANTINESCU P., RĂDĂCEANU E.: *The Characterization of the Informatic System of S_2 Class.* Annals of the Stefan Gheorghiu Academy, no. 2, 1974.
9. NEGOIŢĂ, C. V.: *The Automate Adaptation Theory.* Lecture, Academy of Economic Studies, 1973.
10. NEGOIŢĂ C. V., STAN E.: *Thoughts upon a Territorial Model.* Management-Decision, no. 7, 1974, CIDSP.
11. TÖVISSI L., TIGĂNESCU E.: *I-O Balance*; Scientific Editure, Bucharest, 1961.
12. FORRESTER J. W.: *Principles of Systems.* Wright-Allen Press, Cambridge, Massachusetts 02142, 1968.
13. FORRESTER J. W.: *Industrial Dynamics — A Response to Ansoff and Slevin.* Management Science, tom. XIV, no. 9, May, 1968.

[2] R_1, R_2 = are birth rate delays and they reflect the pass of the population from and to the age categories. Also, it does not appear in the index numbers list.