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Approaching Home Trade as a Cybernetic System

After stressing the place and role of trade in the general cybernetic system of the national economy, the study presents it in brief, also as a cybernetic system. Then, its subsystems and the relations of interdependence between them are identified, stress being laid on the possibilities of their mathematical finalization.

The present stage covered by our country takes place under the sign of an intensive concern for a new quality to be achieved in all fields of activity.

In our opinion, the passing to a new quality in the field of home trade would be considerably facilitated and the efforts made for a constant improvement would be more efficient if the corresponding measures would conceive the home trade branch as a system.

To endorse this opinion, we shall present a few concepts necessary to understand the systemic approach in general and the economic-cybernetic systems in particular.

→ By *system* we mean a set of elements with inter-relations (endogenous) but also related with environment (exogenous), namely a set of elements structured with the aid of relations; the elements of the system are in interdependence and dependence on environment: both the elements and the endogenous or exogenous relations have a dynamic character and the existence and functioning of the system are subordinated to a goal.

Thus, a system is characterized by: set of elements; relations between elements (endogenous-endogenous); relations with the environment- inputs-outputs (exogenous); the variable character in time (in process) of elements and relations; the aim, finality of the system.

● **The state of the system** consists of a number of variables, a vector whose components allow for the identification of the system at any moment.

● **The cybernetic system** is a system which has at least a feed-back by which a signal is emitted from the output of the system to its input.

● **The economic-cybernetic system** is a complex cybernetic system which unlike other cybernetic systems contains as an essential element the direct and conscious presence of man in the management function, having a profoundly dynamic and constantly improvable character.

→ Any economic-cybernetic system is made up of several subsystems. In its turn, each of these subsystems can be considered as a system in comparison with the subsystems which are subordinated to it.

Within the national economy system, goods circulation- as an economic-cybernetic system — is considered as part of the class of effectual systems, more precisely, part of the material production system whose output is represented by the social product, the national revenue. Considering "*the functionality specific of the goods circulation subsystem within the economic mechanism, it can be divided into the following components: technical-material supply; purchasing and contracting activities*; *the commercial activity concerning population supply*". [1] In fact this last component of the goods circulation subsystem is identified with home trade.

Considering the place, role and importance of home trade in the process of enlarged socialist production, on the one hand, and on the other hand, the fact that its activity implies a direct contact with the broad mass of consumers unequally spread over the country's territory, with extremely diverse preferences and consumption habits and with constantly changing demands, it stands to reason that the carrying out of an efficient commercial activity, adequate from all points of view, is conceivable only in the conditions in which the scientific maganement of this activity is being ensured.

To have a clear, general and most faithful image of home trade it is necessary to approach and treat it in the light of the theory of economic cybernetics, that is, as it was said, it should be considered as an economic-cybernetic system.

From the point of view of the approach of home trade as an economic-cybernetic system, trade is developing in the sphere of the national economy, in the context of a set of direct and feedback connections achieved together with the other economic-cybernetic systems of the general cybernetic system of the national economy.

At a certain level we can consider a cybernetic system as a set of subsystems, as a sum of parts making up the whole, as an ensemble of elements which "work in common or in cooperation". This "work in common or in cooperation" originating from Greek means synergy. Nevertheless, according to Buckminster Fuller's conception "synergy represents the behaviour of a system taken as a whole which is not provided with the knowing of the component parts or of their subset" [2] Or, as Mircea Malița pointed out "synergy is the property by which the whole, when assembled, is offering surprises bringing additional elements in relation with its components" [3]. These additional, supplementary elements are, in fact, what is called "the synergetic effect". It might be defined as an effect of complementarity of the parts making up a whole. [4] Did not this synergetic effect exist, the value of the whole would always be equivalent with the sum of the parts making it up. But, due to the synergetic effect, the sum of the sides is not always equivalent

to the whole, but, bigger or smaller. In the first case, we can say that the synergetic effect is positive and in the second case, negative.

The main reason for which the economic systems or subsystems require the application of the cybernetic principles is to find those organizational forms and interdependence relations which should ensure a positive synergetic effect to the "movements of the whole- the system" [4].

The application of the principles of cybernetics in home trade- as a subsystem of the national economy general system -may lead to the raising of the entire commercial activity to a higher stage, so that it should attain its objectives in the best conditions.

As the overwhelming majority of the population's material needs are satisfied through the home trade, it can be said that this activity has as a strategic objective an efficient contribution to raising the population's living standards, thus being organically linked with the supreme goal of the policy of the Romanian Communist Party.

Before underlining the character of home trade as an economic-cybernetic system, it is necessary clearly to define the main subsystems making it up and which, in their turn, are also cybernetic systems.

The unfolding of a commercial activity implies:

1. The existence of goods, of an offer;

2. The existence of requests, thus the existence of a demand;

3. The existence of people to ensure the contact between demand and supply, namely the existence of manpower to ensure the continuity of the production process up to the stage of goods production;

4. The existence of a technical-material basis to provide the necessary framework for the carrying out of the sales-purchasing processes (shops, workshops, stores, measurement instruments, canning installations, etc.).

Naturally, besides these subsystems, the structure of the home trade cybernetic system also includes other subsystems (the labour productivity subsystem, the efficiency and profitableness subsystem, the informational subsystem, etc.). In the following, we propose to make only an analysis of the subsystems: the technical-material basis, manpower, goods stock and population with its attribute of goods demand, because they are ultimately the effectual subsystems of trade.

The level and structure of these cybernetic subsystems of the home trade system are reflected in what is called the state of the system in the form of a state vector. The modification of the level and structure in time of these subsystems is a result of the complex interaction between them. The state of the system also bears and reflects changes due to the action of external factors, of environment.

Obviously, in case that one of these subsystems making up the home trade economic-cybernetic system is tackled as a system, there is an adequate vector of its state reflecting the level and structure of the subsystems which are subordinated to it.

The inputs into the home trade economic-cybernetic system imply:

— inputs on the technical-material basis, the development of the commercial network as a whole (the building of new shops, stores, workshops,

etc.) and their equipment with the necessary installations and units, etc.) and accordingly inputs into the fixed and circulating assets in general:

— inputs of manpower in the form of employing working people as workers in home trade from the home trade schooling system by drawing more workers from other branches of the national economy and from the unoccupied population:

— inputs of products representing the goods stock to be turned to account by trade through the sales-buying process;

— inputs of goods demand as an attribute of customers;

— other inputs mainly those resulting from the connection with the single management system (management, control, adjustment) and the connection with the other economic-cybernetic and social systems in the national economic sphere.

Corresponding to each of the pairs of input-state vectors is a vector on the output from the home trade cybernetic system.

As regards the technical-material basis subsystem it will generate outputs in the form of vectors due to physical, moral wear, etc.

The manpower subsystem has as outputs a vector whose components are determined by the natural movement of manpower (pensioning off, death, disease, etc.) migratory movement (outputs to other branches of the national economy) and by other reasons (for instance, the case of law trespassing).

The goods stock generates as outputs a vector representing the goods sold.

The goods demand subsystem, as an attribute of buyers generates on the output from the system a vector with two big components: the satisfied demand and the unsatisfied demand.

Besides these categories of outputs, the system generates also in the form of the parameters of some vectors information on the state of the system, to the effect of the representation of its modification as a result of the outputs from the system. Thus, on the output from the system, one can speak of two big classes of information:

a) information reflecting the nature and dimension of physical outputs from the system:

b) information reflecting the state of the system after the adequate outputs have taken place.

Analysing on a vertical line the structure of the relations of the home trade management system, the image of a pyramid is obtained. It has at its base the set of management systems of the retail commercial units (shop, restaurants, etc.) and on top the management system of the Ministry for Home Trade. Other intermediate levels are situated between these two management levels. Thus, for instance studying the whole management system of home trade from the territorial point of view, the following management levels and systems are distinguished: the management of the Ministry of Home Trade, the management of the County Trade Department, the management of the Local Trade Enterprise, the management of shops. Considering two successive levels it can be noticed that going from top to bottom the pyramid, one or several leading systems are situated on the first row and several managed systems, on the second row.

Preserving the adequate proportions -as regards time period, nature, set and dimension of the problems to be solved — in a two - level succession, the upper level management system ensures the strategic-tactical management and that of the subordinate level ensures the tactical-operative management. For instance, the management system of the Home Trade Ministry ensures the strategy and tactics of development of home trade all over the country and in each county. The County Trade Department must ensure the fulfilment of the tactical and operative targets incumbent on it. But, from the point of view of the Local Trade Enterprise, these tactical-operative objectives can be considered as strategic-tactical objectives, a.s.o.

Returning to the information on the output from the system it is noticed that the two categories of information become, through feed-back, inputs into the tactical-operative management system of the home trade cybernetic system.

Following the processing and analysis of the information, the tactical-operative management system notes to what extent the system as a whole has attained the proposed objectives. In the conditions in which the objectives were entirely attained and the system, its state continues to present the capacity to carry out the future objectives, on the input into the system we shall have only inputs of new orders and of new demands. In this case, the orders cause the system to function as it did in the previous period with a view to satisfying the new demand.

But, if the tactical-operative management system establishes that the system with the remaining state no longer can attain the proposed objectives which corresponds to most of the concrete cases, it will take decisions which should partly or entirely modify the input vectors.

In case that the prerogatives of the tactical-operative management system are surpassed by the nature and importance of the trespassing-having no possibility to influence correspondingly the level, structure and rhythm of the components of the input vector — through the connections characteristic of the single management system (command, control and adjustment), it informs the strategic-tactical management system. The latter, making use of other categories of quantitative and qualitative information obtained from the single management system (command, control, adjustment), from the population and from the other tactical-operative management systems-for instance from the other County Trade Departments — it proceeds to taking the necessary measures for eliminating the violations, that have been reported.

The home trade cybernetic system is presented in figure 1, outlining the system of direct and feedback connections existent between its elements, as well as the connections of this system with its management system and with the single management system of the national economy.

The fact is also noted that part of the outputs from the space of the system's states is also directed towards the process of formation of the population demand. Naturally, both the satisfied and the unsatisfied demand along with other factors represent component elements of the process of formation of the population demand. For instance, a satisfied demand may have as a reaction the repetition of the purchasing act and, at the same time, it may represent a stimulus over other potential buyers.

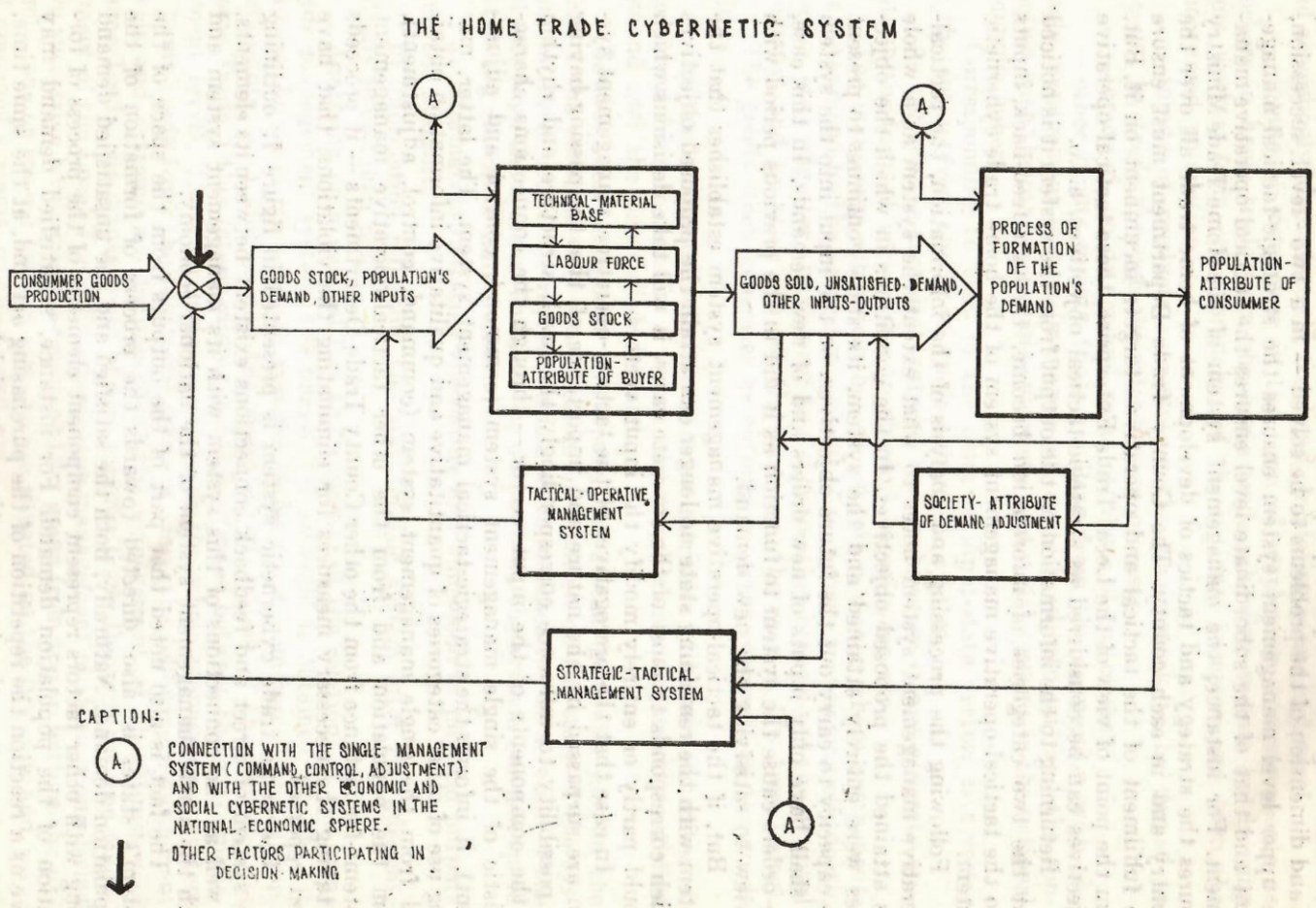

THE HOME TRADE CYBERNETIC SYSTEM
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CONSUMMER GOODS PRODUCTION
GOODS STOCK, POPULATION'S DEMAND, OTHER INPUTS
TECHNICAL-MATERIAL BASE
LABOUR FORCE
GOODS STOCK
POPULATION-ATTRIBUTE OF BUYER
GOODS SOLD, UNSATISFIED DEMAND, OTHER INPUTS-OUTPUTS
PROCESS OF FORMATION OF THE POPULATION'S DEMAND
POPULATION-ATTRIBUTE OF CONSUMMER
TACTICAL-OPERATIVE MANAGEMENT SYSTEM
SOCIETY-ATTRIBUTE OF DEMAND ADJUSTMENT
STRATEGIC-TACTICAL MANAGEMENT SYSTEM
CAPTION:
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CONNECTION WITH THE SINGLE MANAGEMENT SYSTEM (COMMAND, CONTROL, ADJUSTMENT) AND WITH THE OTHER ECONOMIC AND SOCIAL CYBERNETIC SYSTEMS IN THE NATIONAL ECONOMIC SPHERE.
OTHER FACTORS PARTICIPATING IN DECISION-MAKING

Figure 1

The outputs of the process of formation of the population demand are first perceived by society which through its attributs of adjusting the population demand influenced by the means at its disposal the very process of formation of the demand. Thus, for instance, if on the output of the process of formation of the demand a growing demand for a product noxious and detrimental to man's health is resulting, the society has the obligation to intervene in the process of formation of the demand for this product, so that a signal should appear on the output meaning the lowering of the intensity of the demand for the respective product.

For a mathematical modelling of the trade economic-cybernetic system in order to make it operational, some symbols may be assigned to the variables of the state, input and output vectors and to the external and constant ones.

By knowing the objectives to be attained by trade at the moment $t+1$ and by taking into account the level and structure of the state variables at moment t, the level, structure and intensity of the input variables necessary at moment $t + 1$ can be determined, which should lead to changes in the state vector at moment $t + 1$, so that it should be able to attain the proposed objectives.

With the aid of the symbols attached to the variables taken into account, a system of equations [5] can be written whose solution should lead to the valuation and/or simulation of the level and structure of the state variables.

Naturally, to approach and solve such a problem, the minimum condition should be created beforehand, necessary for the Collection of data and the making of investigations indispensible to the process of kowing the real situation, so that on their basis, one should further proceed to their transfer into the economic-mathematical model to allow the leadership of the Home Trade Ministry to take decisions.

At present, the home trade information system can provide most of the information. Unfortunately, it is not yet complete. We should refer, for instance, to the population demand. To know the values of the input vector variables in the system means to possess an extremely large number of primary and aggregated data and information about each product taken separately. We can easily realize the multitude of methods and technics implied by this knowledge, quantitatively and qualitatively.

This remark is directly leading us also to the general problem of the informational system, of the use of modern computing technics in studying the population's goods demand as a distinct field of sustained and continuous scientific research activities.

Hence the necessity of a further approach to each of the cybernetic subsystems of the home trade system so that in the end, the image of a united system should be gradually obtained.

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L'APPROCHE DU COMMERCE INTÉRIEUR EN TANT QUE SYSTEME CYBERNETIQUE

Après avoir montrer la place et le rôle du commerce à l'intérieur du système cybernétique général de l'économie nationale, on fait une concise présentation du commerce intérieur, comme étant à son tour un système cybernétique. Ensuite, on procède à l'identification de ses sous-systèmes et de leurs interdépendances, mettant en évidence, dans le même temps, les possibilités de leur finalisation mathématique.

ПОДХОД К ВНУТРЕННЕЙ ТОРГОВЛЕ КАК КИБЕРНЕТИЧЕСКОЙ СИСТЕМЕ

После указания на место и роль торговли в общей кибернетической системе народного хозяйства, даётся краткое её описание как кибернетической системы, в свою очередь. Затем авторы приступают к идентификации её подсистем и их взаимоотношений, одновременно выявляя возможности их математической формализации.

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