NEW FUNDAMENTAL AREA OF GENERAL THEORY OF SYSTEMS: NEW THEORY OF THE ECONOMIC SYSTEMS*

The following exposition should not be regarded as a typical introduction of a scientific publication. The reason for this is that my knowledge of the General theory of systems, my advanced doctoral knowledge of social management and engineering knowledge of technical cybernetics accumulated over more than 25 years of research in system analysis, general theory of systems and in the development and application of the approach "Artificial intelligence for identification and visualization of regulatory mechanisms in society" (the institutional framework, including legal and economic mechanisms identified as the genome of the organization of society) would not allow me the indecency to claim that a fundamental work of 2261 pages such as the two volumes of "The economic system" could be introduced in a comprehensive manner by me or any other scientist working in the area of the Theory of systems, both in Bulgaria and across the world.

In this exposition I offer an overview of some of the significant contributions that this work makes to the General theory of systems, Theory of the economic systems, Social science, which also broaden significantly the possibilities for accurate modeling of economic systems in social practice.

The work consists of eight sections, arranged following the logic of implementation of any structure created by man (and engineering by nature): mathematical description and identification of the process realised by the object; classification of mathematical description of the object using a set of classification criteria; description of the characteristics of the process realised by the object; description of the characteristics of the object carrying out the process; selection and definition of descriptive mathematical methodology employed in the identification of the process, object and characteristics; identification of the structures implementing the process, described by mathematical expressions, eg. characteristic equations; defined ambient space ; analysis of sustainability of the system; test for system optimality according to defined criterion or criteria (under multifactorial optimization); as well as analysis of the transitional processes to determine "the cost of the *transitions" and optimization of the cost* of the transition processes as follows:

Section one: *Introduction to Economic systems* includes: economic system; economic set; economic space and abstract economic system; economic quantity, economic function, economic field, economic process; economic system modeling; cybernetic economic system; volume of 373 pages.

* *Mirkovich, Kamen.* Economic system, publishing company, Sofia: "Trakia-M", (item 1, 2008, p. 1115, item 2, 2009, p. 1146.

Section two: *Stochastic economic system* contains: economic probability and random economic quantity; numeric characteristic of the random economic quantity; volume of 100 pages.

Section three: *Dynamic Economic system* includes: general aspects of the dynamic economic system; oscillating economic system; non-linear dynamic economic system; random economic process; spectral analysis of the economic cycle; economic forecasting; economic control devises, volume of 363 pages.

Section four: *Regulatory economic system* contains: economic system regulation; economic system metaregulation; economic system sustainability; economic system dynamic sustainability; economic system self-organization; volume of 274 pages.

Section five: *Optimal economic system* involves: general aspects of the optimal economic system; strategic economic optimization, non-linear and linear programming; static economic optimization, specific cases of mathematical programming; introduction into dynamic economic optimization; non-classic calculus of variations in the dynamic economic optimization; economic games, within the volume of 280 pages.

Section six: *Economic management system* includes: introduction to the economic management system; types of economic management systems; systems for optimal economic management; tasks of the optimal economic management; hierarchy systems of economic management; volume of 368 pages.

Section seven: *Ingredient economic system* includes: general aspects of the ingredient economic system, types of resource – substantial economic system; types of substantially stratified economic system; substantially stratified resource – substantial economic system; factor conditionality of value and utility; production functions; volume of 352 pages.

Section eight: *Equilibrium economic system* includes: introduction to the economic equilibrium, macroeconomic market equilibrium, Karl Marx's and Vasily Leontiev's theory of the economic equilibrium; volume of 121 pages.

The work, offered to the reader, is not only interpretation of the economics' object as it is defined by the Quality Assurance Agency – Great Britain, and determined by the scope of its subject according to the two main criteria: "Studying the factors that influence income, wealth and prosperity" and the purpose: "Analysis and study of the distribution and application of the limited resources". The work focuses not only on the economy as a science which studies the economic processes including analysis of production, distribution, trade and consumption of goods and services but also their interpretation as regulatory mechanisms in a system context, as mathematical descriptions of regulatory mechanisms, and the related cyber characteristics.

In the articles, arranged as in an encyclopedic dictionary, a successful attempt has been made all viewpoints to be discussed, influenced by various

ideological doctrines including the traditional for the economic science interpretation of economic processes as taking place in market environment; as well as of alternative viewpoints.

As a result - all viewpoints are reviewed in detail in the context of the General theory of systems using the apparatus of the theoretical multiple approach as well as integro-differential equations, the operator algebra, etc. This method has led to a fundamental addition to the general theory of systems in the part about economic system, especially on the level and within the logic of the best developed part of the General theory of systems – the technical cybernetics.

This addition to the General theory of systems is extremely important and useful - both for the development of the economic science itself and of economy and mathematical economic modeling experts, and for opening possibilities for interdisciplinary research in the field of regulatory mechanisms and economic system management.

Systems' classification – according to the type of mathematical equations of the systems, unifies the logic and creates conditions for using mathematics as a universal language among experts in different fields of knowledge. It also identifies opportunities for establishing strong interdisciplinary research teams and for creating hybrid by nature models of the systems.

The new definitions of the concepts of economic and mathematical category apparatus and their adaptation and their integration around the fundamental for the General theory of system concept – system, leads to reconsidering of the methodological points in the social sciences, not only in economic aspect.

Together with the identification of economic objects in a system context described by mathematical and economic models using mathematical descriptions it is emphasized also on the regulatory mechanisms of economic systems. Mathematical descriptions of the regulatory structures in economic systems as a quantitative interpretation of regulatory processes, generated by structures described with differential equations of the processes and as models of mathematical logic, interpreting logical relations, similar to those in the theory of automatic regulation (in technical cybernetics) and computer science, provide excellent opportunity for using ideas and structures from the technical cybernetics to adapt them to the economic systems. Examples of this extreme opportunity are shown all over the book with a new look towards the economy in a system context.

The introduction of a mathematical apparatus adapted to the specifics of economic systems, similar to that of technical cybernetics, has allowed the author to make a crucial step towards justification of methodological approach to the new economic systems - to define characteristic equations and phase space for economic objects. This enables us to extend the cognitive and structural models and to enlarge the tools to define basic concepts for the

systems such as sustainability and criteria for its achievement, optimization and criteria; transition processes and requirements for them. The result of this extension of the toolbox is the ability to properly define the objectives of every economic and social system - optimal and socially efficient functioning as well as optimal and socially efficient outcomes, assessed by integrating the partial assessments of individuals in a global aspect and realization of the social system as a system with “tracking regulation” (Kalman filter, in terms of technical cybernetics).

Interpretations of the above mentioned system characteristics in their economic aspect, when applied to a particular economic object described in system context, allow to develop a well-considered management strategy in accordance with the objective realities.

Introduction of the regulation as part of meta-system level allows to implement qualitatively new approaches: from the approach defining absolutes which belongs to the classical theory of organization (with its limits), shown by Kenneth Erou; towards the approach which decentralizes the regulatory processes in terms of solid coordination of: generating the information from partial perception components, partial solutions and partial effects. The holistic concept for the system traces a relativistic approach from the stage of identifying the public structure in its economic interpretation up to the stage of reengineering with optimal and socially efficient functioning and optimal and socially efficient results*.

This is the base of the economic system, allowing further development within an institutional framework with built-in mechanism for implementing the overall human values and ensuring respect for human rights and man’s irreversible right to choose.

In essence, the author creates a springboard to extend and redefine basic principles of the economic theory in the context of the science for systems.

Another, not less important feature of the book, is the new meaning given to the economic system management approaches. Along with the management thesis, very properly and precisely formulated by the author, which are very different from the traditional ideas on this subject, and according to my opinion, to the same extent more constructive, they also reveal possibility for management on meta-level - regulation, which is an important prerequisite for realization of hybrid simulation models for forecasting of results generated from: strategies for the transition of the system from one state to another; analytical forecasts ‘cost-results’; and forecasts, assessing the risk accompanying the transition processes.

Quantitative descriptions of the regulatory mechanisms of the economic system on meta-system level are an important prerequisite for establishing different structures of options of institutional framework and of corresponding approaches, implementing the tracking systems logic. In order the logic of the hybrid models containing institutional framework to be embedded in the social

practice there should be compliance between the logic of the characteristic equation corresponding to the construction of the system implementing the processes described in the mathematic – economic model and the logic embedded into the institutional framework. All systematic parameters determining sustainability, transition process character, optimum of the system structure and 'the transition price' as well as the forecast range of the quantitative values of the probable risk, should obligatory be computed on meta-system level and be embedded as parameters of the institutional framework structure, which regulates the social and economic interests of the economic system's active component – the man. Subject's attitude under regulation from a specific institutional framework (legally regulated economic mechanism) can be forecasted by created specifically for this purpose simulation models.

Further development of the institutional framework, established by using instruments such as isomorphic and recursive multilevel model allows implementing in practice regulation of interests in compliance with the universal values, stated in the Convention on Human Rights, and the main freedoms, accepted from the civilized human society as the basis of the social contract.

Implementation of the system tools and particularly of the characteristic equations and phase space gives new meaning and in practical aspect optimises the economic development. It also requires new meaning to be given of the 'sustainable development' not only as forecast-plan but also as development and connection of Condratiev's long waves on macro level and Forester's industrial dynamics on micro level with a possible configuration taking into account the realities and the created historical relation in values, which allows assessment of the parameters of the necessary structural and infrastructural elements for implementation of a specific social and economic strategy.

The need for implementation of the system instruments determines the establishment of elements' classifier. Different configuration options of elements and relations – structure options can realize a certain function. The choice permits also optimisation of the economic system by selection of elements corresponding in price, function and maintenance and operation costs.

Successful and very edifying is the author's method – to make a comparison between the thesis of the economic cybernetics described in the presented work and statements of leading politicians presenting the problems solved by the economic cybernetics as a social need. Their solution in the scientific field of the economic cybernetics unfortunately does not lead to changes in the social practice especially due to lack of political decisions for such change corresponding to the scientific decisions. Thus the author introduces the eternal philosophic question valid for each society – why the determined by the politicians social need placed in front of the science, when

being solved and embedded in the scientific theory, is not incorporated in the social technology. The reader is left the choice how to get near the answer of this question.

Very precisely the author shows relations and differences between the thesis presented in this work and existing different viewpoints both in scientific and political aspect. Together with the contemporary terminology and logical structures, used in the English speaking scientific community he also offers alternative terms and structures, applied by generations of economists in Bulgaria. In this way the work is understandable for people with different ideological, political and economic background and also presents, as fact sequence, the structures and functions of the economic systems in their specifically scientific aspect.

This enormous work by volume, by logical construction and by scope presents, together with each thesis, both scientific and political viewpoints and the reason for the confrontation between them – giving advantage in the scientific theory to alternative approaches, leading to implementation of different social practices for maintaining the homeostatic equilibrium in the economy and society, which in their nature are multicultural and multi-related systems for which defining of whatever priority beginning, from the viewpoint of the scientific field of the economic cybernetics, would be irrelevant.

Thus the author demonstrates the scientific field of the economic systems as a sphere beyond economic, political and ideological situation – as a scientific field, which cannot be influenced by the marginal conditions of the social development.

By admitting the reader's right to choose, the author has properly presented the facts and the logic of the scientific viewpoint and has left the comments and the choice of a point of view to the reader himself. The articles, which present interesting scientific concepts of profound researchers of the social and economic processes who interpret some of the knowledge spheres in system contexts and their biographies, are very interesting and causing some deeper thoughts, even provoke some not very comforting conclusions.

The importance and acknowledgement, which this work deserves, should cause gratitude among the scientific society.

Gratitude should be expressed for the courage to start such tremendous research work on establishing a classification system for the models identifying the economic systems and the embedded in them regulatory mechanisms applying a logic that follows the technical cybernetics logic – the best developed so far section of the theory of systems.

Gratitude should also be expressed for the precise research and the proper description from mathematical viewpoint of new and adapted concepts in the fields of economy and economic system management. These are several thousands terms which could be accepted as a category apparatus of economic cybernetics and which doubtlessly are both fundamental sphere – new part of

the General theory of systems – for the economic cybernetics, and a stable base for new studies and reconsideration of the existing theories in the context of new possibilities for application in compliance with the existing realities.

Gratitude should be expressed for the didactic professionalism used for creating this work and for the incorporated author's good will towards those who will take on the difficult professional path in the field of identification and mathematic description of economic subjects using mathematic – economic models, regulatory mechanisms and economic system management.

I hope the readers who will accept the challenge to extend their knowledge in the filed of General theory of systems, especially in its part about the economic systems, will estimate the merits of this work and will use it very carefully, as every other precise and powerful instrument should be used, for improvement of their cognitive models in this sphere as well as for implementation in the social practice. Nevertheless, the responsibility for the specific mathematical description of a particular economic subject and the regulatory mechanisms is left to the competent researcher. When specific mathematical and economic models describing a particular object should be applied in the practice, the responsibility for the selected model, which is relevant to the real subject and process in it, is left to the competent subject.

The encyclopedic features of the book by no means diminish the requirement for professional competence of the expert who will use this information for practical application and achieving practical goals.

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