ON THE STATUS AND PROSPECTS OF SYSTEMS ANALYSIS METHODS IN UKRAINE

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The paper deals with the role and place of systems analysis methods in the solution of complex problems in various spheres of human activity in Ukraine. The social and socio-economic prerequisites for development of theory and applied methods are being considered. The main characteristics of the problems to which these methods are applied are formulated. The hierarchy of problems and methods used for solution of complex problems based on systems analysis methods is presented, and the main spheres of their application in Ukraine are presented.

Keywords: systems analysis methods, quantitative analysis, decision-making, data bases, knowledge bases.

SOCIAL AND SOCIO-ECONOMIC PREREQUISITES FOR DEVELOPMENT OF SYSTEMS ANALYSIS METHODS IN UKRAINE

Development of systems analysis as methods of solution of interrelated interdisciplinary problems has a relatively short but interesting and rich history. The problems of creation, analysis, and optimization of complex social, economic, environmental, technical, and other systems, which were developed as a result of the rapid scientific and technical progress and social and economic development of the world civilization in the 20th century, called for consolidation of efforts of specialists working in different spheres, unification of approaches peculiar to different scientific directions, and, as a rule, for the search for a compromise between different contradictory objectives.

It is precisely the solution of these problems that scientists and politicians of different countries aimed at when they created over a quarter of century ago, under conditions of hard ideological opposition, the International Institute of Applied Systems Analysis (IIASA), a scientific center intended for international and interdisciplinary studies of the global problems of mankind. Creation of the IIASA gave an impetus for development of systems analysis all over the world including Ukraine. In the seventies and eighties, a prominent school of systems analysis was created by Academicians Victor Mikhailovich Glushkov and Vladimir Sergeevich Mikhalevich at the Institute of Cybernetics of the Academy of Sciences of Ukraine. Active studies were also conducted at the Taras Shevchenko Kiev University and at the Kiev Polytechnical Institute.

The most substantial advances have been made at that period in the development of mathematical methods of cybernetics as the science of control, in particular, of automatic control theory, the theory of identification of complex systems, optimization methods, stochastic programming, pattern recognition, and artificial intelligence. Scientific achievements of these divisions have been successfully used in the economy, in the social sphere, in industry, in particular, in power engineering, metallurgy, aviation, control of production systems, and in many other fields. Unfortunately, development of studies on systems analysis of social, political, and economic processes, which under conditions of the present Ukraine direction is of the highest priority, was hampered in the Soviet Union over many years in view of ideological reasons.

Contemporary social process in the country can be characterized as a threefold transition: from part of a union to an independent state, from a totalitarian society to democracy, and from a planned-administrative to a market economy.
Once independence was achieved in 1991, Ukraine created in a short space of time the main attributes of the State system. In 1994, presidential elections were conducted with the result that power was passed from one democratically elected president to another. The Constitution of Ukraine was approved, which according to appraisals of international experts corresponds to all the democratic and legal rules accepted in the world. Much was done also in the democratization of society: freedom of speech and formation of political and public unions was assured. At the same time, political culture and political structuring of society are still insufficient, political parties still play an inadequate role in social processes, and democratic instruments of government are not finally formed. This necessitates continuing and making more active the process of political reform. But the severe socio-economic relations of the present day are a factor that has the most negative effect on the development of the state. A substantial decline in production in the national economy (54.3% in 1997 as compared with 1990), hyperinflation (from 280% to 10260% a year in 1991–95), and an underground economy (which was in the range from 40 to 60%) have caused a substantial decrease in the living standard of the majority of the population.

To overcome this difficult situation, the process of economic reforms in the country should be made more active and should comprise, in particular, the following measures:

— implementation of tax reform to substantially decrease the total level of taxation and extend its basis;
— speeding up the process of privatization of large and medium enterprises;
— creation of conditions for rapid development of small business, removal of legal and administrative obstacles in its way;
— continuation of the course to national currency stabilization;
— implementation of pension reform based on complementing pension system with elements of individual insurance.

THE MAIN CHARACTERISTICS OF THE PROBLEMS TO WHICH SYSTEMS ANALYSIS METHODS ARE APPLIED

Implementation of the above-mentioned reforms requires scientifically grounded decision-making in the sphere of control of complex systems, in particular, in the sphere of government. At the same time, a number of problems arise in making such decisions related to the nature of complex systems involving the human factor, namely:

— real managerial processes proceed under the conditions of lack of coordination of objectives and interests of its participants, and because of this a major portion of the decisions is aimed at settling and resolving intrasystem conflicts;
— the overwhelming majority of managerial decisions are of multiple-stage nature and serves mainly the interest of a division, organization, coalition, or a political party rather than for accomplishment of national systems objectives;
— the processes that proceed in interrelated systems of different nature are characterized by the presence of a large number of random events and risks with a relatively low level of explicit causal relationships, which makes their prediction a complicated task;
— expert knowledge that is used in the process of estimation of the state of the system being studied and of the success of a specific action have a subjective nature: points of view of different experts depend upon their professional and other interests that leads to objective discrepancy of expert knowledge;
— the volume of initial data and information sources is extremely large, and these data can have an unreliable, uncertain, and fuzzy character, which makes their processing more complicated.

To solve these problems, investigations based on the systems approach are necessary. They will allow interrelated processes of a different nature (social, economic, political, technological, etc.) to be analyzed, modelled, and predicted.

VITAL SPHERES OF APPLICATION OF SYSTEMS ANALYSIS METHODS IN UKRAINE

Let us consider the most vital spheres of systems analysis application in Ukraine.

Social Protection Systems. They perform two main functions: redistribution (direct transfer of funds from the active to the inactive part of the population) and accumulation (creation of possibilities for working people to save money for maintaining inactive periods of their life). During the transition period, these functions contradict each other. Support of the redistribution function at a period of economic crisis requires very high taxes to form social protection funds, which hampers economic growth and is one of the main reasons why the economy goes underground, and this, in its turn, reduces the tax basis. At the same time, creation of a stable economic system requires allocation of funds for adaptation of the social protection system to a new socio-economic context. Introduction of individual insurance principles into this system can