A SEMINAR ON ECONOMIC SYSTEMS DYNAMICS

At the end of August 1975, Romania was playing host to the Proceedings of the Third International Congress of Cybernetics and Systems, an impressive manifestation rallying a big number of scientific personalities, specialists, academic staff, researchers from more than 30 countries. Romanians attach an undoubted importance to cybernetics and systems in the development of the economy. In an important message addressed by the President of Romania, he refered to the significance of Cybernetics as follows:

> *In our days, cybernetics is playing an ever more important part in the scientific management of production processes, of economic life, in facilitating human labour and in increasing its social productivity, in the general progress of human society.*

In his paper on Economic Cybernetics, prof. M. Mănescu, the Prime Minister of Romania showed a keen vision of the great influence of cybernetics on the thinking of economic policy-making:

> *The gnoseological functions of cybernetics, the investigation possibilities created by it obviously and decisively intensify and complete the scientific stock of the contemporary researcher. In the field of economic research, they become a real instrument in organizing management and in coordinating economic processes.*

The intensive discussions of Economic Dynamics at this Congress made it evident that there is a widespread and expanding interest in Dynamic Systems Theory and that a special seminar on the subject, extending the ideas presented at the concurrent seven sections, as the initial building blocks, would be of value to many students as well as professionals of economics.

For reasons such as this, the Seminar on Economic Systems Dynamics came into being in the Spring of 1976, sponsored by the Institute of Management and Informatics. Based on the activity in the Dept. of Modelling the Seminar aimed at covering several key areas: Dynamic Models, Control Theory in Economics, Optimization in Fuzzy Environment, Forecasting. In an aim, though to enlarge the framework, subjects on theoretical

topics with potential application in these areas were encouraged. Many of latter discussions dealt with either fuzzy sets theory and catastrophes theory problems, or the development of algorithms for solving various control problems.

The discussions were intentionally provocative, the subjects of the discussion being:

1. That wheather one likes it or not, the world of planner is a fuzzy environment.

2. That the domain of actual implementation of control theory applications to management problems is virtually untouched.

3. That many of the models explored in the literature so far do not provide useful approaches in practice because the theories depends critically on oversimplified assumptions or on the existende of data that are never actually available.

The principal purpose of the seminar was to capture the unifying flavour of Dynamic Systems Theory at a level of detail and concentration adequate for the understanding-in reasonably confident manner — of the variety of topics underlying many of the problems found in planning and forecasting. To accomplish this task we choosed to begin with the forest: the clarification of a formal statement entitled the principle of incompability (as the complexity of a system increases, our ability to make precise and yet significant statements about its dynamics diminishes), which was aimed at providing a framework within which one may achieve a certain measure of overall composure during the often unconfortable phases of a search activity which must inevitably be conducted among the trees. The central theme was that there are new directions that we can and must pursue. As one might expect the discussions were entertaining rather than conclusive, but this was consistent with the aim of the seminar.

Among the technical highlights of the seminar we notice:

— A challenging opportunity for planners is to devise models that better reflect the truly pivotal factors in the environment. The design of such models should recognize the behavioral characteristics of executives. Using tolerances instead of numbers the assessment of the parameters in any optimization model can be organized to bring out the merits of experience, judgements, and beliefs in the minds of the assessors in a quantitative manner.

— Linear programming with fuzzy constraints applied to economic development planning illustrates the fact that the lack of precision is a reality which sometimes far from being an uncontrolable enemy, can be used towards coping with complexity.

— There are very few economic phenomena which allow a precise mathematical description. Instead of trying to get explicit solutions, the global picture of the evolution could be the effective tool for evaluation. Qualitative assumptions seems to offer far reaching possibilities to attack the problem of the long-run planning and forecasting. For this reason it is useful to look for bifurcations of behaviour when a slight change in initial conditions leads to large differences in long-term behaviour. Uncontrolled economic development may pose a greater threat to our future well- being that any other single factor. The increasing complexity of modern economies is making the need for planning and control more acute.

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