

CONFERENCE REPORT

Trends in mathematical modelling

San Carlos de Bariloche, Argentina, 1-4 December 1976

Increased attention to the global nature of environmental and economic problems was in part responsible for the developments in mathematical modelling of large socio-economic systems of the last ten years. These modelling efforts were handicapped at the beginning in several aspects: the lack of an academic or intellectual tradition in the area, for instance, of interdisciplinary work within social and exact sciences, and an excess of public interest for immediate (and flamboyant) results or predictions. Indeed, some of these handicaps proved to be blessings; the demand for these intellectual 'goods', not dependent on peer approval or tradition brought about original output of a type that was previously considered neither possible nor reliable in academic circles. Now, quite established in terms of intellectual existence, these models are starting, in turn, to demand mathematical modelling and computing techniques, as well as socio-economic theory and data analysis, of a high level of sophistication from the more traditional areas. In addition, these new trends in modelling demand mathematical techniques that have yet to be developed. From the point of view of the applications, global models are increasingly being used as tools for the understanding of present and other possible realities, of alternative strategies, and their costs. However, from both the theoretical and the empirical sides, global models exhibit serious weaknesses that can be exasperating. At present, nevertheless, these inadequacies are perceived more as an indication of the need for further work, than as an indication of the impossibility of their tasks or goals.

Last December, an interdisciplinary group of about 30 policy-oriented scientists from Africa, Europe, Latin

America and the United States met in San Carlos de Bariloche, Argentina, at a conference sponsored by UNESCO and Fundación Bariloche,—the third international symposium on Trends in mathematical modelling. The focus was on global modelling, its formalization and reliability. The applications were to problems of population growth, the environment, energy, and alternative economic development strategies. Broadly speaking, such models provide an organized frame of reference and tool of analysis, useful for a dialogue between policy scientists and decision makers. In this case, because of the public interest in global problems, a third actor of the dialogue is the public. In addition to the above, in the context of a world divided for some purposes into North and South, developed and underdeveloped areas, global models become a tool for dialogue on the question of, or the demand for, possible new international economic orders.

As the source of the Bariloche model, which brought into focus the study of alternative development paths for the satisfaction of basic needs with the corresponding implications for international relations, Fundación Bariloche was a natural host for this meeting. Despite the trying national political circumstances in Argentina, the conference carried on quite successfully. Both theoretical and empirical aspects of models were actively discussed. By and large, the main objectives of such encounters (transmission of information, dialogue, and seed for further work), were met. But, more interestingly, there was an unusual mix of hard nosed know-how with a concern for problems being faced by underdeveloped regions of a type usually not considered formalizable in a rigorous fashion, or admitting of mathematization. This

combination already occurred in the Bariloche model, and I find it intriguing and fertile. In addition, since international organizations are related to policy making, there was an underlying feeling that the topics discussed fitted somehow with reality; this, I think, is a productive feeling for a scientist.

The papers presented covered a wide range of subjects and approaches: theoretical problems on structural stability of systems, formalization of systems with imperfect information, economic-demographic models for the study of population growth, alternative development strategies for the satisfaction of basic needs in less developed regions. The theoretical problems were challenging and the solutions proposed did not even meet them half way. The formalization of the models and their adequacy and reliability were most difficult and important points which were only brushed over, and over which there was wide disagreement. One had the feeling that large portions of available mathematical and socio-economic knowledge were missing there, and required to be put into use immediately. However, more sophisticated technical requirements were denounced as emphasizing scientific quality, as traditionally defined, over the essence of the problems, while the more simple, immediate (at least at first glance) approaches were, in turn, accused of providing misleading answers. In a balanced view, these two approaches should naturally be expected to clash with each other during the production of applied science and the process of intellectual reality coming into existence. At any rate, some of these modelling efforts help to establish that certain things can be observed and thought about with scientific tools. The underdeveloped world might well be in the process of shaping intellectual as well as historical reality; it is to be expected that further and improved work be forthcoming.

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