Introduction

The accelerated development of agriculture and foodstuff production requires a more exact foundation to the solution of economic problems: a better preparation of decisions and if possible a more accurate numerical study of interdependences and relations. At the present level of the productive forces of agriculture, and in the situation of concentrated 'mass production', the basis of economic decisions becomes so complicated, even in this branch of production, that it is ever more difficult to find one's way by relying traditionally only on the human mind and on simple computers attached directly to man. Up to date methods of planning and analysis, using, mathematics and computers now offer to agricultural specialist a better possibility than ever to understand and get acquainted with this complex system of relations.

One of the latest trends is represented by the use of simulation methods in the study of economic problems. The introduction of these methods is related to the advance of systems theory and to the demands for an increasingly close approximation to the real world. By approaching problems on a system basis, with greater flexibility, new perspectives are opened by simulation methods in agrarian economic research and in the search for better foundations of decision-making at different levels.

Numerous methods called simulation have been developed to study processes experienced in our environment: to plan complicated systems, and to predict the effects of different interventions. The word 'simulation' itself has various, more or less synonymous meanings. In everyday use it has a slightly different meaning from that used in a scientific context.

In science, simulation means an experiment whose aim is to effect relations more or less approaching those in the real world in order to predict the likely behaviour of the objects investigated in realistic conditions. So the essence of simulation is the reconstruction of a certain part of reality, or the model of a certain real system; and the performance of an experiment using this model, in order to understand the phenomenon more fully.

The Process of Simulation

The need to describe reality more exactly led to the development of simulation methods. It is thus no coincidence that each application of simulation is problem-oriented, and has individual characteristics. But the logic of simulation of economic systems is similar in each case. Experience suggests that the most expedient order of implementation of simulation of economic problems includes:

- formulation of the problem, and setting the objectives of the study
- studying the problem and the system
- constructing the mathematical model
- running the model in the computer
- experimenting with the model
- analyzing and appraising the results.

In describing these task - the organization of which is illustrated in figure 1 - attention will be focused on general rules and methodological principles essential to the application of simulation in agriculture. There are, of course, general principles which apply and whose application in practice reflects the concentrate problems and objectives under study. The steps of simulation do not imply a rigid demarcation of the various stages of the work; in fact execution of the different tasks can partly be interwoven.
At the stage of problem definition and system analysis the contribution of agronomists and specialists in the technical and technological aspects of agriculture is generally essential. This is demonstrated by the many cases in which a lack of appreciation or misinterpretation of the special features of agricultural production have given rise to serious mistakes in the agricultural use of mathematical methods of planning and analysis. Even a mathematical perfect model can lead to useless results if the characteristic features of the real system are not properly reflected. This danger highlights the need for careful preparation and proper study of the system to be simulated.

Our Model In most deterministic models we can simulate the entire process so that the data gained will give answers to all our questions. Our model is a static deterministic study. In this, the number of stages of the system studied is determined by the number of possible combinations of independent variables. For this reason, this is called combinatoric simulation. In a typical case we would calculate the characteristics of the system under all permissible combinations of the possible values of the variables studied.

The model is composed of levels and sub-levels. These levels and sublevels are the dominant factors of the wine production process and they differ from each other according to their characteristics of production, their aims, managements or their sectorial constructions. Each level and sub-level is composed of two or more elements. The elements of the same level have the same technical and economic function, but each element performs its function in a different fashion. In the model every element is characterized by the following parameters stored in the computer:

- Code of element
- Name of element
- Price of element or its calculated marginal price
- Production cost (direct and indirect parts).
- Share of element in the sub-level
- Connections from the previous sub-level (max 10)
  a.) code of previous element code... code.....
  b.) probability of connection probability... prob......

We can choose one element from each level and sub-level. The chosen 8 elements determine one way of production supplying the most important factors involved in the production (quality of habitat, property, grape growing technology, wine type etc.). This collection of elements is called "a way of production". The parameters of different ways of production are calculated from the parameters of their components. One of our main goals is to analyze and compare the different types of production according to the above-mentioned economic data. We are going to show the whole model of Hungary as well as the model of Tokaj the most famous vine region in Hungary.