L'ARC ET LA CORDE. UN MODELE D'ANTAGONISMES DIALECTIQUES EN BIOLOGIE ET SCIENCES HUMAINES

(The Bow and String. A model of Dialectical Antagonisms in Biology and Human Sciences)

Ed. Maloine. Paris, 1975

Lately, the interest of scientists the economic phenomena has been continuously growing. While the past centuries were marked by the flourishing of natural sciences, a marked development of social sciences among which economy is holding a privileged part has been noticced of late.

The situation is fully explainable. The natural sciences make interfere factors which can be easier identified and the relationships between these factors are also relatively simple. On the contrary, the social phenomena are much more complex and the intervention of human conscience lends a particular character to this kind of preoccupations. We should also and to this the different experimental method. In natural sciences, the experiment is rather easy to make. In the sciences of life, the experiment is more difficult. The difficulty is growig to some extent when referring to the economic field.

The model we refer to has been worked out by F. Bernard-Weil, assistant physician of the Paris hospitals, the work being entitled: "The Bow and the String". The volume was published in the series "Interdisciplinary Studies" under the care of Pierre Delattre.

It must be noted from the very beginning that the interdisciplinary studies appear today as one of the most promising ways for the development of science. We recall that the economist J. Tinbergen started by studying mathematical physics, afterwards approaching economic problems. It is the very grafting of methods worked out in a field of economy that has led to those important results which have been awarded a Nobel prize.

In our epoch, specialization has so much increased that practically, it is necessary to recourse to interdisciplinary and pluridisciplinary studies.

The model we refer to has been elaborated on a nereoe-ndocrine foundation but the field of application is still larger.

In essence, two factors with an opposed action are interfering in this model, u being the resultant of the action of these factors. We can cosnider that $u = x - y$, if we attribute to the factors positive values or, on the contrary $u = x + y$, if a factor is positive and the other negative. Two other exogeneous factors, S and E are associated with these two variables, x and y, considered as endogeneous factors.

The mathematical model in the first approximation is described in the first approximation by the following equations: $x = mu$ and $y = nu$.

In the second approximation, we can write

$$x = (m + pu)\, u \qquad y = (n + qu)\, u$$

If condition (state) $u = x - y$, is introduced, a system of equations is found allowing the determination of u as the time function.

The previous system may be corrected, replacing in the last preceding equations u by $u' + r$, where r is a time function.

After the values given to the coefficients, the adjustment system will have different behaviours.

The author also proposes a more complex model in which he first replaces u by $x - y$, after which, to both equations, he also adds a term of the form $(a + bw)w$, where $w = x + y - m$.

Coefficients a and b have different values in the two equations.

This system of nonlinear differential equations may be treated by digit computation techniques. The author draws attention to the oscillatory behaviour of the solutions of the model as well as to the important problem of parameter identification.

We shall not dwell on the biological applications which go beyond our goal. The author considers that the model can be linked with the prospect of an evolutionist dialectics comprising, among other things, the analyses deriving from Marx's work. That is why, the subtitle of the work is "A model of dialectical antagonisms in biology and human sciences".

It should be pointed out in essence that the authors consider the model on two antagonistic factors which, for example, can be the capitalists and the proletarians.

It is interesting to note that the Romanian scientist, A. Frenkian, a well known humanist is also mentioned in this work. The author also considers that adjustment is made by two adjustment systems, a thesis which as is known is maintained by Paul Constantinescu.

Of course, the work having been elaborated by a biologist is not perfect from the macro-economic point of view. The theme under discussion is, however, extremely interesting and it is worth studying. The model linking the two antagonistic factos may have many practical applications.

The author considers that its formalism allows the explanation of several equilibrium models of macroeconomic growth.

As is only natural, the work refers to the binary dialectical thinking which is followed from Anaximander to Hegel, but, at the same time, it also resorts to modern concepts on the systems theory.

The reading of this model is stimulating and, in any case, it can form the object of studies which should validate or invalidate these research works.

In any case, the idea of modelling the mutual action of some antagonistic factors is not new. The action of such factors was studied especially in biocybernetics (Rashewsky, Nicolau and Bălăceanu).

The mathematical mode proposed by the author is however different, so that it must be known by all those concerned with cybernetics, mathematics and technics.

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