

07/2006

A Biophysical approach to the economic development



Economic development is related to the evolution of human systems as well as to interaction with the environment. Therefore, we need a biophysical analytical approach to complement the economic approach, to better understand its impact on the environment. This thesis presents a methodology to view the energetic metabolism of developing societies.

The thesis focuses on an analysis of the flows of energy consumption that are associated with phenomena of economic development. It attempts to contribute to the debate on a "biophysical reading" of economic process. Especially, it analyses the importance of energy flows in explaining the evolution of economies over time, from being less to more organized, and less to more complex.

The thesis is divided into a theoretical part, and a second applied part. The first part consists of 5 chapters. This part deals with the relationship between economic theory, the theory of complex systems and thermodynamics. Some of the topics dealt with are: i) the relationship between complexity, energy and economics; ii) the analysis of energy from the approach of the different schools of economic thought. One chapter places particular emphasis on the importance of the Second Law of Thermodynamics and its most important result, the irreversibility of processes, which shows the importance of History; iii) complexity and self-organization; iv) the evolution of economic systems both from a traditional economic perspective and from an evolutionary point of view, in which "History counts".

The second part of the thesis consists of 5 articles published in international magazines. The articles / chapters are a mixture of theory and empirical analysis, applying MSIASM methodology (Multi-Scale Integrated Analysis of Societal Metabolism) to the economies of Spain, Ecuador, Vietnam, and China, in order to analyse, historically, their processes of development, as well as to discuss future perspectives.

The conclusions are of a diverse nature. From a methodological point of view, it is evident that there is a need to complement economic information on processes of development, with information of a biophysical type, such as energy consumption or use of time, which can help us to better understand the impact of these processes on the environment, besides highlighting, from an applied point of view, possible "bottle necks" in the model of development adopted in the use of certain resources, especially, as is shown in the cases of Ecuador, Vietnam and China.

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References

Thesis: Complex Systems and Exosomatic Energy Metabolism of Human Societies. Read by Jesús Ramos Martín, on 31 October 2005 and directed by Joan Martínez Alier y Mario Giampietro.

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