

## Nicholas Georgescu-Roegen - An Atypical Economist

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### Abstract

*Nicholas Georgescu-Roegen is one of the most famous Romanian economists. From the point of view of the schools of economic thought, his writings are not part of the orthodox typology. An original and unconventional spirit, Nicholas Georgescu-Roegen is at the same time an important representative of the mathematics economics and "a profoundly humane and wise philosopher" as Paul Samuelson described him. His work is so atypical especially given the way he analyses economic phenomena and processes seen in connection with the processes taking place in the immediate environment. The economic and philosophic concept of entropy, based upon the second law of thermodynamics, is indissolubly linked to Georgescu-Roegen's name, him thus becoming a paradigm creator. In his turn, the term of bio-economics rests upon Georgescu-Roegen's idea that there is an analogy between the biological and the economical worlds.*

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### 1. Introduction

Nicholas Georgescu-Roegen was born on the 4<sup>th</sup> of February 1906 in Constanta. He lived through three dictatorships and three wars (Georgescu-Roegen, 1996a, p. 75). He had a scholarship while attending an elite educational institution in Romania, the *Dealul Monastery Military High School* in Targoviste, where King Mihai the 1<sup>st</sup> of Romania and Corneliu Zelea-Codreanu, leader of the extreme right and founder of the Romanian Christian Nationalism, also studied. He was a brilliant student, a born mathematician (he won the contest held by the *Mathematics Magazine* and was declared the best mathematics student in the country) (Drăgan, Demetrescu, 1994, p. 29). He continued to study at the Mathematics Faculty within the University of Bucharest and his teachers were among others Gh. Titeica, Traian Lalaescu and Octav Onicescu.

He had a government scholarship and obtained his PhD in Statistics at Sorbonne University in Paris. His thesis was titled "Le problème de recherché des composantes cycliques d'une phenomena". He continued his studies afterwards guided by the renowned British scholar Karl Pearson (an expert in mathematics and bio-statistics) and by J.A. Schumpeter, at Harvard University, having a Rockefeller scholarship, and became a true economist (he was into the theory of consumer choice and the theory of production).

Given the fact that Schumpeter was impressed by the scientific value of his work, Nicholas Georgescu-Roegen was asked by Schumpeter to work together on a book of economics. He respectfully declined and came back to his native country where ever since 1932 he had been a professor at the School of Statistics created by Octav Onicescu within the University of Bucharest. In the country, he had high public positions for the next decade: Director of the Central Institute of Statistics, Economic Councillor at the Ministry of Finance, Romania's representative in the Committee on Pacific Settlement of Disputes within the League of Nations, Director in the Ministry of Commerce, and Secretary General of the Romanian Truce Committee. Preoccupied by the theory of statistics, he published a course book of "The Method of Statistics. Elements of Mathematical Statistics" in 1933.

In 1948 he immigrated to the USA and went back to Harvard. Later he accepted a position as an Economics professor at Vanderbilt University, Tennessee; he also taught at Geneva and Strasbourg Universities. In 1976 he retired. In 1994 he was chosen as an honorary member of the Romanian Academy. He died on the 30<sup>th</sup> of October 1994 of diabetes, aged 88. His ashes were taken to Bellu Cemetery in Bucharest.

## 2. Theoretical background. Entropy and Economics

Nicholas Georgescu-Roegen had significant contributions to the development of Economics, especially to the theory of the consumer, to the modeling of the economic growth, to the input-output analysis and to mathematical statistics. In 1971 Harvard University Publishing House published his work that will later on make him internationally famous – *The Entropy Law and the Economic Process*, which was published in Romanian 8 years later.

At the beginning of his economic research, Nicholas Georgescu-Roegen published two essential articles "The Pure Theory of Consumers Behavior" (1936) and "Choice, Expectations and Measurability" (1954), both of them considered to be trend-setters in the field. The first article deals with the problem of integrability in the theory of demand and harshly criticizes the neoclassical theory. The orthodox analysis of demand is founded on the theory of consumer behavior which is based on the assumption that the consumer is a rational subject who maximizes a utility function under a budget constraint. Nicholas Georgescu-Roegen demonstrated that the integral curves of the differential equation that expresses the consumer equilibrium condition (an equation that equates the marginal rate of substitution to the price ratio) do not necessarily represent the consumer's indifference curves. Only when transitivity of preferences is postulated can it be demonstrated that the two types of curve coincide. In the second article, Nicholas Georgescu-Roegen shows that if the consumer's preferences are lexicographic (so-called because it recalls the order in which words are listed in a dictionary), the indifference curve does not exist; it is impossible to construct a utility function from which to extract the familiar demand curve. He was able to point out the *ordinalist fallacy* inherent in the neoclassical consumer theory: despite appearances, the ordinalist approach is not substantially different from the cardinalist one.

Later in his research, Nicholas Georgescu-Roegen published an article titled "Analytical Economics: Issues and Problems" (1966) in which he strongly contested the fundamentals of neoclassical economics, introducing the concept of entropy to his analysis. The term comes from the old Greek language and means *return*, change and it is used in many scientific fields to represent a thermodynamic condition measure which characterizes the degree of disorder of a system, whose value increases as a result of an irreversible transformation (Popa, 1996, p. 224). Entropy also means losing energy due to the increase of the disorder (Varrod, 2000, p. 880). Initially introduced to thermodynamics (defined as "the physics economic value" by Nicholas Georgescu-Roegen) by the German physicist and mathematician Rudolf Julius Emanuel Clausius (1822-1888), in the second half of the 19<sup>th</sup> century the concept of entropy was the topic of a philosophical debate given the fact that the principle of growing entropy did not go with the mechanist vision. Nicholas Georgescu-Roegen criticized the mechanist bases of the neoclassical school which presented economic activity as a circular process, in which the economic flows unfolded only within production and consumption, without emphasizing their connection with the outside world, the environment. Economically speaking, entropy is a continuous and irreversible degradation of the existing resource potential, of the environment, it is order turning into disorder (Dobrotă, 1999, p. 202). The entropic degradation of the environment comes naturally, in time, at a lower or a higher speed, augmenting the insufficiency of the resources. The economic process depends on the activity of the human being and it is entropic meaning that it turns low energy into waste. This phenomenon is relatively slow and becomes noticeable while accumulating over long periods of time (the exhaustion of certain categories of resources, pollution, climatic change). But, as Lord Keynes said, „ in the long run, we are all dead"... The concept of entropy can be correctly grasped only in relation with the law of entropy (the second law of thermodynamics) according to which heat always passes from warmer bodies to cooler ones; according to this law there occurs a quality degradation of energy: the energy used constantly grows towards a state in which it can no longer be used.

Georgescu-Roegen's way of thinking is atypical due to the fact that he believed that the force driving economic evolution is neither the free market with its self-regulating mechanism (according to Adam Smith), nor the government's control over the economy (according to Marx and other Keynes related currents), but the law of entropy, which states that the energy which is not used has the tendency to constantly increase, while the energy which is used is constantly decreasing. A steadfast opponent of the analogy made by orthodox economics between economic and mechanical activity, Nicholas Georgescu-Roegen considers economic activity to be non-mechanicist and nature to be entropic, meaning it does not consume energy and matter, but turns low entropy into high entropy, that is material goods into waste. The result is the irreversible deterioration of the environment. According to Nicholas Georgescu-Roegen, evolution means a permanent transformation of order into disorder, of low entropy (as the state of matter in which energy is available) into high entropy (as the state of matter in which energy cannot be used) (Georgescu-Roegen, 1996b, p. 275). The amount of energy does not increase, nor does it decrease. There is only its transformation from a form in which it can be used into a form it cannot be used.

### **3. Some Aspects About Romanian Economy (1929-1939)**

Nicholas Georgescu-Roegen was a member of the Committee that published the "Encyclopedia of Romania", proving himself to be an analytical historian of the Romanian economy that he understands and explains by using statistics. He publishes papers on agricultural inventory, foreign trade, prices, personal income, cost of living, and national wealth.

Nicholas Georgescu-Roegen analyses agricultural inventory in Romania given the change in the structure of agricultural ownership as a result of the land reform (Georgescu-Roegen, 1997, p. 12). The state issued laws to endow agricultural economy with what it needed, offered subsidies and tax exemptions to imports of agricultural tools and machines, yet the agricultural inventory remained insufficient in terms of quantity and quality as a consequence of the inequity between the prices of agricultural produce and the prices of manufactured goods. He considered that the fundamental cause of the low average production per hectare was not the insufficient use of motorized vehicles but the unsystematic use of the land. Since small agricultural properties were dominant, Nicholas Georgescu-Roegen thought the solution was not to endow the household with all the necessary tools and machines (which implied huge decrement costs) but to introduce association schemes to allow the introduction of rational methods to grow crops.

His experience as a statistics expert helped Nicholas Georgescu-Roegen to correctly understand the status and the future tendencies in Romania's foreign trade (Georgescu-Roegen, 1997, p. 31). The chronic insufficiency of the internal supply as a result of the constant movement of the operations theater and the high level of imports while the value of the national currency was receding led to the increase of the deficit of trade (however, between 1919 and 1938 there were 14 years in which the trade exceeded as a result of an active policy sprung from protectionism and mercantile economic nationalism). Basically, Nicholas Georgescu-Roegen considered that "when it comes to foreign trade a country's ability to export goods depends mainly on its imports or (...) a country can have a major position compared to another if their mutual trade represents a smaller percentage in the trade of the first country compared to the latter's. The interest of each country in mutual trade is proportional to this percentage".

Nicholas Georgescu-Roegen starts from the postulate that income distribution *is the cornerstone of the mechanism of any economic system* (Georgescu-Roegen, 1997, p. 85). In classical economic theory individual income is given by the marginal productivity of the factors of production, but the government can correct income distribution in accordance with the interest of society, mainly through fiscal measures. In a country in which agriculture (small property agriculture) is what most people do an analysis of the income distribution is difficult because of the fact that much of the farmers' income is consumed by the very farm that generates it. Statistics show two apparently contradictory situations. The first situation: 1. Small farms (less than 5 hectares) in which more than 50% of the produce are used on the farm; 2. 5 to 10 hectare-farms on which the value of the goods that are sold surpasses the value of the goods that are used on the farm; 3. Farms that are more than 20 hectares on which almost 70% of the produce are sold. The second situation: the

average income per hectare decreases as the surface of the farm increases since statistics refer solely to exchange economy.

Nicholas Georgescu-Roegen pertinently interprets price evolution in Romania as an element that shows the wealth or the poverty of a country in a clear and objective way (Georgescu-Roegen, 1997, p. 119). Until the monetary stabilization in 1927, there was one first disparity: domestic prices behaved contrary to international prices. The success of the stabilization was deeply affected by the 1930 crisis which caused massive amounts of capital to leave the country and exacerbated cash hoarding. There is also a second disparity between international prices of agricultural produce and manufactured goods. The prices of agricultural produce in Romania went below the remunerative level, despite the fact that the government offered incentives for corn exports and thus „protected the producer apparently at the expense of the consumer”.

The cost of living varies greatly, according to regional characteristics and Nicholas Georgescu-Roegen considered that its level is determined by the level of urbanization which in turn depends on the number of businesses, the number of their employees and the size of the population. The variation of the cost of living in towns and cities is given first of all by the level of the rent and then by the prices of the food (Georgescu-Roegen, 1997, p. 129). The less developed the town is from an economic point of view, the more reduced the correlation between the level of urbanization and the cost of living is. (Basarabia, Bucovina).

As far as Romania’s national wealth is concerned, Nicholas Georgescu-Roegen thought that it had low commercial value, and that the national income was a high percentage of the national wealth (in comparison with more developed countries) because labor was more intense in national production, but it was doubled by a major potential for development, especially since „national wealth must also include the nation’s spiritual wealth” which definitely potentiates the nation’s progress (Georgescu-Roegen, 1997, p. 141).

#### 4. Conclusions

Economic activity is an extension of man’s biological evolution. Economic rarity originates in the entropic degradation of energy and matter. The solution given by Nicholas Georgescu-Roegen to the issue of rarity is conservation achievable through reducing resource consumption (stopping the production of weapons, reducing the production of luxury goods, ignoring fashion) and managing them at a global scale.

Although he warns about the limits of using mathematics in economics, Nicholas Georgescu-Roegen makes a relevant analysis of the economic status of the country in its dynamics, based on using series of statistical data and complex mathematical calculus.

As N.N. Constantinescu said, Nicholas Georgescu-Roegen’s work is „a priceless capital in the Romanian and universal thought. There is no doubt that many generations of economists to come will contemplate the scientific ideas it comprises” (Constantinescu, 1999, p. 258).

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