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## Transitions against the Problems of the 21<sup>st</sup> Century the Ecological Economy

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

The purpose of this review article is to describe the characteristics of a dissent of the hegemonic discourse of economic science such as ecological economics, reflecting the asymmetries between them as the possibilities has to understand and solve labor transitions, economic and ecological that presents the problems of the 21st century. The methodology is qualitative, and the method is documentary review. The main conclusions are that the ecological economy establishes the dialogue with other disciplines as sustenance to respond to the challenges of the present. It conceives life as a pivot, not as another variable to obtain short-term returns but as a dynamic argumentative line.

*Keywords: Biology; ecology; ecological economics; neoclassical economics; hegemony.*

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## 1. INTRODUCTION

Economic science can be said to be born at the end of the 18th century in the incipient capitalism of the United Kingdom. Indeed, according to Dr. Maldonado [1,2], economic science is the basis of social sciences and Newtonian mechanical physics is the basis of natural sciences. Furthermore, if a brief description of the birth of economics as a science is made, it begins with a scaffolding anchored in the paradigm of modernity, taking the category paradigm from the postulates of Kuhn [3,4].

In general terms, economic science from the paradigm of modernity can be understood as a social science that is instrumentalised with mathematics, given that according to Galileo "it is the language of God", which analyses the administration, production, and distribution of goods (tangible) and services (intangible) from the viewpoints of efficiency and effectiveness in virtue of the fact that everything is limited. In fact, it conceives the human being as a rational subject who seeks to optimize and maximize his or her utility through selfishness and empathy [5,6]. Above all, since it was formalized as a science, it has had an accumulation of schools or ways of understanding its object of study over time, such as the classical schools, neoclassical schools, Keynesianism, liberalism, institutionalism, among others, but all with similar characteristics from their argumentative support, that is, from the paradigm of modernity.

These schools think of a one-dimensional, anthropocentric, anthropomorphic, rational subject who seeks his individual monetary benefit to the detriment of his surroundings, be it from the point of view of the environment or his own fellow human beings [7]. Forgetting that "economic behaviors are intertwined with reasoning and impulses, with true arguments and compromises, with logic and contradictions, with calculations and affections, with lucidity and submission to prohibitions, all as manifestations of the human spirit equally inherent, without exception, to the expression of being" [8]. In other words, they understand economics as a science strengthened by mathematical scaffolding, which reflects its airs of objectivity and scientific [9]. By the way that competition, the pivot of economics or in biological terms of evolution, is a process of adjustment and refinement, in which the best, the most competitive economic agents will remain in the market as great survivors [10].

However, such statements as conceptions of the object of study of the economy have generated a number of social and environmental problems that need other transitions or ways of understanding and dynamizing them. For, "the economy must be restored to its place as a simple means of human life and not as the ultimate end. We must renounce the mad race towards ever-increasing consumption. This is required not only because of the need to avoid the ultimate destruction of the conditions of life on earth, but also to lift humanity out of psychic and moral misery" [11]. Anyway, according to Dr. Rendón of La Salle University, Bogotá, Colombia "economics has been torn between the emphasis of its own object of study and excessive formalization in the search for precision, leaving aside global welfare and interaction with other sciences" [12].

For this reason, the general objective of this review article is to describe the characteristics of a dissidence from the hegemonic discourse of economic science such as ecological economics, reflecting the asymmetries between them and the possibilities that it has to understand and generate possible solutions to the economic and ecological transitions presented by the problems of the 21st century where, in the opinion of the author of this paper and many other recognized academics (Naredo, Latouche, Escobar, Passet Georgescu, etc<sup>1</sup>.), it is necessary to look for other theoretical frameworks, other techniques that vindicate the social science that is economics. It is necessary to look for other theoretical frameworks, other techniques that vindicate the social science that is economics.

Therefore, this article is divided into an introduction, followed by the crises of the paradigm, a brief discussion of the transitions of the factors of production and their relation to the neoclassical discourse of economics, a description of ecological economics as a dissent from the conventional discourse of orthodox economics, and a brief conclusion. Subsequently, a description of what ecological economics is as a dissidence from the conventional discourse of orthodox economics is given, ending with some brief conclusions.

## 2. METHODOLOGY

The methodology used is qualitative and the method used is a documentary review by means

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<sup>1</sup> See in [13-27,28-30,21,32-37,11].

of matrices [38-40]. The matrix is an Excel table with columns identifying the authors of the paper, the general objective of the document consulted, the methodology used, the results and the conclusions of the article. The observation window is 20 years and the categories bioeconomy, ecological economics, environmental economics were researched in internationally recognized databases such as WOS, Scopus, Scielo [41,42].

### 3. RESULTS

#### 3.1 Crisis of the Paradigm

The dizzying social, economic, and political changes of the 20<sup>th</sup> and 21<sup>st</sup> century have empowered the language of economics to understand and solve problems. However, the conventional discourses of economic science have contributed to a host of negative effects. These include the increasingly shameful impoverishment of a large part of the population [43,30].

“Usando diferentes modelos de estimación, nos encontramos con un mundo en el que el 20 por ciento superior de la población controla más del 70 por ciento de los ingresos mundiales, en contraste con solo un insignificante 2 por ciento que tiene el quintil inferior en 2007 con tasas de cambio ajustadas por PPA; bajo tasas de cambio de mercado, el quintil más rico de la población mundial recibe el 83 por ciento del ingreso total mundial, y solo un 1 por ciento llega a aquellos en el 20 por ciento más pobre. Si bien es cierto que hay progreso, el ritmo de cambio es demasiado lento, se estima que se necesitarían aproximadamente 800 años para que los mil millones de personas más pobres del planeta alcanzaran el 10 por ciento de los ingresos mundiales. También es muy preocupante la prevalencia de niños y jóvenes entre los quintiles pobres – un 50 por ciento está por debajo de la línea de la pobreza de dos dólares al día” [44].

Actually, accumulation such as financial speculation has increased to the detriment of the growth and development of goods and services [45]. Besides, metaphors such as *homo economicus* to designate the rational subject have been enshrined in the *homo consumus* of the present, where solidarity and friendship have been segregated as anti-mercantilist and individualism and competitiveness have been empowered De Sousa Santos (2011).

Because of, "the progressive destruction of the habitat of animal and plant species, whose survival is increasingly threatened by the unstoppable human desire for progress, is a fact that has led scientists to predict an irreversible ecological crisis with unimaginable consequences for life on earth" (Muñoz, 2016, p.137). The orthodox or conventional perspective of economics tends to ignore the limited nature of natural capital or in common terms natural resources as well as the vulnerability of the environment [46], (Correa, 2016).

“ (...) la asignación de recursos a través del mercado lleva a la depredación del ambiente ya que el mercado no valora las externalidades y los métodos de valoración que sustituyen o complementan al mercado desde la perspectiva de la economía neoclásica (por ejemplo, la valoración de contingencias investigando la disposición a pagar) son incapaces de dar valores actualizados a las externalidades futuras e inciertas” (Martínez, 1994, p.73).

Consequently, it is necessary to rethink the objects of study of economic science and above all the need for dialogue with other disciplines, given that the problems of the 21st century have a greater possibility of being resolved with the help of other disciplines, since these are not disciplinary but multidisciplinary, transdisciplinary, and interdisciplinary problems [47].

#### 3.2 Transitions

The productive factors of the economy are three: labor, capital, and land. Precisely, if a brief historical economic analysis is made of each of the economic factors, it is evident that they have undergone changes over time. For example, if we take labor in the socio-economic system of the Roman Empire, which was slavery, this was a factor that had no rights, only duties, but was totally integrated into the system, that is, it was an integral part of its development and economic growth, due to the need for labor of these characteristics of the Empire. Hence, if we follow this timeline, the peasant in feudalism was considered part of the social hierarchy, of course, below the king, the nobles, the artisans. Nevertheless, the peasant with his tithes as his labor contributions were a structural form of feudalism etc [48,49].

However, if we analyse the labor force in the capitalist system, classified by Marx as

proletarian, it will seem that as time goes by it is less necessary for the productive apparatus, given that technologies have enriched the business fabric to the detriment of jobs, and that labor flexibilization has impoverished nominal and real wages. Not to mention that the amount of formal and informal supply is increasing while the need for this supply is decreasing. Consequently, the transitions of the economic systems regarding one of its factors such as labor make a big difference in the way it was understood before to the way it is used in the capitalist present [50,31,51,52].

The productive factor called land is becoming increasingly scarce and concentrated, I mean, there are fewer and fewer economic agents who own land and consequently a greater number of dispossessed people. By way of example, taking the territory of Colombia and using the latest Gini coefficients that measure income distributions such as that of land, from 0 to 1, where close to zero means greater distribution and next to one means worse distribution. The Colombian state since 2000 its national Gini coefficient for land was 0.85 and from then on it has risen considerably where in 2012 it was 0.87 and at present it is .0.90 when compared to other countries, such as Barbados which is 0.94, Paraguay 0.94, Chile of 0.91, where Colombia ranks fifth with the highest concentration of land ownership and consequently the highest social disorder in comparison [53-55], (World Bank, 2019); [56,57], (La Silla Vacía,2019).

If we analyse the amount of capital that exists, I mean, financial, intellectual, social, etc. capital. It is confirmed that over time the flexibilization of labor and financial capital has increased speculative accumulation to the detriment of economic growth and development through goods and services. Precisely, there are less and less people owning the means of production as well as capital and more and more people without goods and services. "In 2016, the share in National Income of just the top 10% of income earners (the top decile) was 37% in Europe, 41% in China, 46% in Russia, 47% in the US-Canada and about 55% in Sub-Saharan Africa, Brazil and India. In the Middle East, the most unequal region in the world according to our estimates, the top decile took 61% of National Income" [58]. In short, if identified in terms of the number of materials used, I mean, natural capital, rich countries with an average of only 16% of the total population consume about 10 times more than the rest of the world (Naredo, 1996).

Definitely, the transitions of the factors of production throughout history and under the baton of orthodox economics require other discourses such as other assumptions among others, such as ecological economics or simply contributing to the extinction of life as the accumulation of a few to the detriment of the majority, since the "lack of responses of neoclassical economics to the growing environmental problems resulting from the economic activities that have begun to develop new visions are created" [59]. For this reason, the following section presents a brief description of ecological economics as a dissident discourse of conventional economics [60].

Ecological economics was born in the first instance as a response to the poor results obtained in the face of the progress proclaimed by the neoclassical economists, as well as the first stages or items of pollution such as the extinction of natural capital. Precisely, The Rome and Brundtland reports and others from the 1960s reflected the impossibility of indefinite economic growth in the face of a limited factor such as planet Earth [61,62].

In the 1960s, Dr. Georgescu Roegen, mathematician and economist and friend of Shumpeter, carried out a compendium of research and epistemological and structural analyses of economic sciences, which generated a large number of dissertations. Indeed [35-33], he will demonstrate that both the capitalist and socialist systems are not able to organize and distribute natural resources in a fair and rational way. Indeed, he will conceive conventional economic theory as a discourse that remains anchored in the predicaments of the 19th century. Hence, in his postulates, he did not introduce the theories of thermodynamics, nor did he forget "the close interdependence between the economy and the biosphere as a whole requires that the search for efficient combinations that characterize the former must be within the limits of the regulations that are indispensable for the reproduction of the biosphere. It therefore requires a multidisciplinary approach" [8].

In other words, ecological economics conceives of economic science as contingent on life cycles and not only on the relationships of its factors [4]. Consequently, ecological economics establishes that exchange relationships should be in accordance with the cycles of nature and not only with human times and cycles, given that man is above all another species that interacts

negatively or positively with its environment [63]. Given that, the human being as another animal is not a one-dimensional being as the orthodox economy proclaims but that "economic behaviors are intertwined with reasoning and drives, with true arguments and compromises, with logic and contradictions, with calculations and affections, with lucidity and submission to prohibitions, all as manifestations of the human spirit equally inherent, without exception, to the expression of being" [8].

Another of the contributions of ecological economics is that the chrematistics of goods and services are not able to understand how to value environmental social dynamics, as they are not able to understand how to value environmental social dynamics:

"la asignación de recursos a través del mercado lleva a la depredación del ambiente ya que el mercado no valora las externalidades y los métodos de valoración que sustituyen o complementan al mercado desde la perspectiva de la economía neoclásica (por ejemplo, la valoración de contingencias investigando la disposición a pagar) son incapaces de dar valores actualizados a las externalidades futuras e inciertas" [64].

In addition, Ecological economics is based on the fact that ecosystems are characterized by complex interrelationships at different spatial and temporal scales that are not easily identified by hegemonic economic models, if these include social and cultural aspects that revolve around social and environmental representations, making it even more complex. In short, homogenizing the environment with manufactured capital is considered a limited perspective [65], I mean, weak sustainability as advocated by environmental economics and Bioeconomic from the New Economy. Therefore, strong sustainability considers natural capital as the supply of some functions that are not substituted by manufactured capital "(...) the starting point of the strong sustainability or ecological paradigm is the impossibility of substitution of many of the environmental functions and services; the result of this consideration is that natural capital and manufactured capital should be seen as complementary resources and not as a substitute [66].

Finally, the ecological economy, which at the beginning was called Bioeconomy by Georgescu

Roegen but with the passing of time was changing its words, given that the conventional discourse in counter argumentation created the environmental economy that in general terms is the valuation of ecosystem services, as the Bioeconomy from the new economy, which understands life as added value and is divided into improvements for agribusiness as stem cells, will conceive to use the categories economy and ecology. Therefore, the ecological economy evidences the multidisciplinary dialogue as found in the so-called Bioeconomy's but having life (Bio) as a pivot in the first instance in order to potentiate it and not only take advantage under short-term returns as other Bioeconomy's from the modern paradigm such as the environmental economy and the other Bioeconomy from the New economy [67-69].

#### 4. DISCUSSION

Ecological economics, agroecology and metabolisms are approaches which, according to their characteristic lines of argument, are developed along the lines of strong sustainability. Thus, they contribute to the empowerment of life beyond the hegemonic discourses of the bioeconomy derived from the postulates of weak sustainability. Consequently, this view agrees with the postulates of this paper and is in line with the contributions of [70,71,72], when they affirm the need to understand and dynamize socio-ecological systems beyond the closed structure of the conventional economy. Likewise, with [66,73] when they argue that the monetary calculus exhibited by conventional economics on socio-ecological systems are absurd. Given that these are subsets that do not encompass such services on average. The bioeconomy structured by multilateral bodies is reductionist and self-referenced, and instead of improving the quality of life of people and ecosystems, it multiplies environmental conflicts [74,75].

However, the purpose of this paper is not to demonize the bioeconomy based on the postulates of multilateral bodies. On the contrary. It is established that these approaches have possibilities as long as they are in tune with the territories and territorialities without ignoring the fact that they are based on weak sustainability and this means that they are not the best of the best, but another way of trying to generate balances. Therefore, the article agrees with the postulates of [76-78] when they establish the possibilities that Latin America has to develop through the Bioeconomy from the neoclassical

economy, given the amount of natural resources that the continent offers and its potential to be the world's pantry.

## 5. CONCLUSION

Ecological economics as a dissidence from the hegemonic discourse of classical and neoclassical economics contributes to the debate as well as to the academic dynamism of economic science. Indeed, its beginnings at the end of the 1960s coincided with the need to find other epistemological paths to understand how to dynamize development and economic growth, given the first environmental contingencies of the planet and the impossibility of infinite growth in a finite territory such as planet Earth.

The shift from the paradigm of modernity to another is imperative for economic science to strengthen the social fabric as it interacts with the environment. In fact, economic science, whether neoclassical, neoliberal, or other schools, persists in conceiving the individual as a rational being that seeks optimization as the maximization of its returns, turning it into a machine that is only interested in the short term, competition, and competitiveness.

The transitions of the factors of production over time ratify how these, instead of improving and expanding the capacities of individuals and their environment, have led to a greater concentration of the means of production and income in the hands of a few, as well as a pauperization of both working conditions and wages. This confirms the need to use other frameworks, other methodologies and methods that contribute to the reconfiguration of the social fabric, given that economic science is first and foremost a social science.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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