ECONO - SCIENCES VERSUS ECONO - DISCIPLINES

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Abstract. *Some definitional and methodological aspects regarding science, economics and econo-sciences are detailed in the introduction of the paper. The first section presents the concept of econo-discipline, taxonomy and diversity of this enriched educational group or population, derived from economics combined with other disciplines and the importance and the impact of this contemporary paradigm. The second section is a direct approach to the complexity of modern economics, and, using a systemic investigation, it underlines the collaboration of, and the adversity between different sciences, especially disciplines inside present and future economics and its econo-sciences and econo-disciplines. The third section details the gap between contemporary econo- sciences and the classic econo-disciplines and the expected trends in economics as a complex reunification of these econo-subsystems. Some final remarks reflect an optimistic vision for the future of the econo-disciplines of the third rank of complexity.*

Keywords: *science, disciplina, econo-sciene, econo-discipline.*

1. INTRODUCTION

Either classic or modern, *science*, a term derived from the Latin word *scientia*, with its static meaning of *knowledge* or *body of knowledge*, can be defined in many different ways, as follows in the next six conceptualizations:

a) a special case of the combination of experience and reason (a study of reality beginning with the material aspect of the universe, where inspiration or intuition often plays an important role) [1];

b) *a systematic enterprise that builds and organizes knowledge in the testable explanations and predictions forms about the universe* [2];

c) *a particular way of knowing about the world, in which explanations are restricted to those that can be inferred from the confirmable data and the results obtained through observations and experiments that can be substantiated by other sciences (a search for natural explanations for natural phenomena, where natural means existing in nature or the observable world, neither supernatural nor magical)* [3];

d) *a discovery (that nature generally enacts regularly enough to be described by laws and even by mathematics), as well as an invention (devising the techniques, abstractions, apparatus, and organization for exhibiting the regularities and securing their law-like descriptions)* [4];

e) a knowledge or a system of knowledge covering general truths or the operation of general laws, especially as obtained and tested through scientific method [5];

f) *an ensemble of knowledge connected with nature, society, and reasoning or thinking (the four major elements of a science are, and remain the following: a characteristic piece of reality, a method for investigation, an original theory and a special model for projection and all of these are somehow similar to the earth, air, water, and fire of scientific thought, combining the dangers of the new connexion between reality and theory, with idealization and pragmatism, sometimes even in an excessive manner)* [6], etc.

Science has another dynamic meaning that of *a process of permanent discovery,* a process of asking questions about the reality and testing answers to those questions, but only if the answer can be reliably reproduced every time the test was performed, no matter who does the test Ever since Aristotle's time, science (*episteme*), as the final result of a research process, could be of an applied type (techne) or theoretical (*theoria*), which reflects a *duality of science as a whole* which still applies nearly two and a half millennia after the Greek cultural miracle. Nearly half a century ago, in his *Truth and Method*, Hans-Georg Gadamer said that scientific research, which is in a constant search for truth, may be completely different in the so-called hard sciences and natural sciences, where the essential goal was, and remained, that of the forecast, compared to the so-called spiritual sciences, which have as an objective knowledge "with no prediction" [7], and Roger Penrose, in his book *Our Daily Mind* [8], tried to determine still finer shades for the previous distinction or cleavage, acknowledging the existence, in the field of knowledge and research, of four types of theories: *superb, useful, tentative,* and *"apparently" misguided or targeted*.

Science as a process that allows to scientists to link isolated facts into some comprehensive understandings of the coherent surroundings known as reality or natural world, has a lot of static and dynamic characteristics: a) non-linearity and interactivity contents; b) iterativity and successive investigations; c) unpredictability, non-predetermination and serendipity; d) originality, complexity, alternativity and possibility of access through different paths; e) testing hypotheses and theories; f) identification of solutions to the problems of a specific reality; g) intertwined with society; h) accuracy and consistency of the logic arguments; i) new assumptions, new investigation and new applications; j) true or false controversy; k) diversity and specializations; l) new predictions and new expectations, etc.

The knowledge gained through research and generated by science must be a powerful and reliable process and continually refining and expanding its area, without being really "finished". An answer is scientific only if you get that answer every time you do the test, no matter who does the test. A general remark underlines the importance of the study of reality as the primary focus for the science, by means of a characteristic pattern or model, as well as all the methods of acquiring knowledge must use specific concepts and variables, data collections associations and correlations, experimental and applied aspects, predictive trends or

normative formal limits. The criterion of validation for science remains the most difficult problem. Karl Popper, in his *Logic of Research*, published in 1934, greatly clarifies the problem of the demarcation between science and pseudoscience, listing four distinct lines along which a theory can be tested and evaluated critically, following its intention to become a true science [9; 10]: 1) controlling the internal consistency of the theory as a hypothetical-deductive system; 2) examining the logical form of the theory or future science to determine if its content is informative, or the theory or science is somewhat tautological; 3) comparing or confronting the empirical consequences derived from such a theory or future science with those derived from competing theories or sciences to determine whether or not the first has a knowledge value superior compared to the other, assuming that it will successfully pass the tests the empirical evidence proposes; 4) assessing the future science or theory in light of these tests.

The distinction between science and pseudoscience may be restricted to a key by Popper, in 1934, fully valid in exact sciences or in natural sciences, i.e. the amount and value of knowledge that various scientific theories and future sciences possess, which depends on the degree of falsifiability (defined by the relationship between theory and the basic statements) or of testability (the degree of testability increases with the degree of generality and precision of the theory or future science), and the involvement in empirical predictions that prohibit a considerable part of the possible observations selecting finally, out of all the theories that pass all the tests, those with a true value of knowledge (superb or useful, in the sense assigned by Penrose. *The success of a science depends on the structural properties of the phenomena investigated, and also on understanding that nature or the outside world has a high degree of order, perceived by human reason as objective laws* [11]. However, general sciences includes withal the sciences of the spirit, in the specific sense given by Gadamer, the value of which is recognized through their vast amount of explanatory power, or of knowledge "*with no forecast*", i.e. those which Roger Penrose refers to, as tentative and "*apparently" misguided or targeted*.

To be able to properly understand the content of a *superb* science, it is necessary to start with an example, belonging to Albert Einstein, developed in his inaugural speech to the Prussian Academy of Sciences in 1914, and *On the method of theoretical physics* in 1934, namely that of a superb science whose value was deducted from his predictions, namely physics. The scientific research or process of the physicist can be phased in: a) *formulating the concepts and basic principles of a new physical theory* (the product of creativity or of the activity of creative imagination, which is not guided by any rule, except by facts, observations, experiments and so on, and cannot practically be learned); b) *formulating all the consequences that may be derived from them* (being driven solely by rules and logical regulations, it can always be learned) [12]. A science like physics is by definition *unifying*, bringing together an increasingly large number of facts and experimental observations, hence its maximum value of knowledge in the world of scientific research (which exceeds even that of the kind of science, specific to logic, mathematics, etc.) [13]

But even science has its own limits, such as: a) questions that science does not answer; b) moral or aesthetic judgments that science cannot make; c) the adequate use of scientific knowledge that science does not indicate; d) supernatural explanations that science does not draw conclusions about, etc.

However, questions that arise within these domains generally cannot be resolved by science, but the future solution could be the extension of the scientific community in some so called "forbidden domains", such as ethics, aesthetics, religion, etc. that provides the cumulative knowledge base on which a new universe of science could be built.

Researchers have noted that they understand explanations that come from many scientific studies, but only a minority of them can understand explanations that come from econo-sciences, cannot identify the fundamental world-view and how it works, and just generally, cannot find the real sense.

Economic science, as any another science, develops itself from *hypothesis,* through *apodeixis* (demonstration), implies gradually and becomes finally a *theoria* or *theoretike* (theory). The science of economics is treated differently even by economists, with the optimists at one extreme, those who say that the only thing preventing economics from becoming a numerical science in a pure sense (like mathematics or physics) is in fact "*the immensity of the equations*" (Pareto, 1894; Cournot, 1897), and continuing with Jevons, Walras and Schumpeter, who reaches the limit of exaggeration in saying that economics would be "*the most quantitative of all sciences*" because the facts that this science "observes are transformed into numbers by life itself" [14], while the extreme of the pessimists seems to be equally condensed, and their references to the value of knowledge and the degree of precision of the same scientific research in economics, from Knight, who recognizes, as the only merit of economics, the fact that it shows "*what is wrong rather than what is correct*", to Edgeworth, who highlights the ignorance of economics in modelling the specific "*qualitative factors*", or Veblen, correlated economics with cultural development, and Hayek, who would emphasize the link between economics and "*understanding how people think*", both types of modelling being difficult to achieve in economic research.

Of course the truth lies along the "royal road" between the two extremes, having virtually "*no strict evidence*" of total validation or total invalidation of any economic model resulting from science of economics, as underlined by N. Georgescu-Roegen in *The law of entropy and the economic process* [15]. Ludwig von Mises tries to emphasize the status of economics as a pure science and thus he proposes the concept of "*praxeology*" (as the logic of action) for the branch of knowledge exemplified by economics [16], and describes economic reasoning, which consists of the following:

1) *an understanding of the categories of action and the meaning of a change occurring in such things as values, preferences, knowledge, means, costs, etc*;

2) *a description of a world in which the categories of action assume concrete meaning, where definite people are identified as actors with definite objects specified as their means of action, with some definite goals identified as values and definite things specified as costs.*

3) *a logical deduction of the consequences which result from the performance of some specified action within this world, or of the consequences which result for a specific actor if this situation is changed*.

Praxeology requires from economics to be a *useful* science, and thus economics must be deductible by means of formal logic from the incontestably true material knowledge regarding the meaning of action [17].

Some academics and scientists have offered major critiques to economics concerning the classification as a useful science and sometimes even to the quality of science for economics.

The offer of economics includes theories that work in restricted areas and regions or in horizontal or longitudinal levels of aggregation, and purely formal attempts to condense them into a single science, a lot of unfounded axioms and relative laws (such as the Adam Smith's claim that all content of economic processes can be reduced to the price role as an invisible hand), and some phenomena that do not fit into the accepted framework are many times suppressed, ready to put emphasis on manipulating nature and leading it inevitably to manipulate economies and countries, as well [18;19].

Some exemplified convictions that greed is good within relative limits, that demanding interest is useful or that all production in the world can be split into labour and capital, are not pure scientific truths, but relative doctrinal statements. A new econo-phenomenology appears and tries not to disregard global economics as a pure science, and calls other sciences to join for openness to the natural and alternative resources of the world, and to help humanity to undo the damage done by a classical economics that takes part in the utilitarian exploitation of the natural world. [20].

In the history of science classification one can find only two major moments and personalities: Ikhwan al-Safa' who are believed to have lived in Basra in Iraq in the course of the 10th century and described in *Epistles of the Brethren of Purity* (*Rasa'il Ikhwan a-Safa*) two systems of scientific classification [21]: the first of a hierarchical nature and the second as set out by the coterie of scholars in *Epistle VII* (his unique work consisting of approximately fifty-two epistles (*rasa'il*) and Charles Sanders Peirce, who elaborated the first modern classification of the sciences in 1902 and 1903 [22], inspired by the biological taxa of Louis Agassiz [23].

Again, Arabian culture seems to be the first to refer to economics in term of economic growth, in 1377, when Ibn Khaldun, a historian well known for his remarkable mind, for the first time in *Muqaddima*, wrote on economics, relating his thoughts to the division of labour: the greater the social cohesion, the more complex the division may be, the greater the economic growth and he offered one of the most famous examples of the distinction to be made between the transmitted sciences and the intellectual sciences. [24]

These paper's proposals for redefining econo-sciences and econo-disciplines through new perspectives inspired by reality and adequation of the original taxonomies offer a little more advanced and updated description of economics components mentioned and detailed in Wikipedia (https://en.wikipedia.org/wiki/List_of_academic_disciplines). There are many options or alternative solutions to detail economics, from the only two econo-sciences or branches like macro- and micro-economics, to more econo-components of "economics, finance and business" reunited as a general econo-science, a category being a part of the domain or field of the social sciences, and containing either five distinctive sub-categories of econo-sciences like Business and Management, Economics and Econometrics, Finance, Industrial relations and other economic sciences, or more than 50 econo-sciences (Annex 1).

The most synthetic fields of science, used to be classified in the contemporary concept of R&D, include: a) natural sciences; b) engineering and technology; c) medical and health sciences; d) agricultural sciences; e) social sciences (including economics); f) humanities (http://www.uis.unesco.org/). There are many general classification schemes like: a) universal decimal classification (http://udcdata.info/) Dewey decimal classification (http://www.oclc.org/dewey/); Dutch Basic Classification (http://www.kb.nl/vak/basis/bc04.pdf) or specialized in economics like: Journal of Economic Literature (JEL) Classification System (http://www.aeaweb.org/journal/jel_class_system. php), etc.

Over the last two centuries, many economists practiced economics as a doctrinal *disciplina* and not as useful science, introducing from time to time a bit of *dogma* and doctrinal reasoning in economics and, thus, transforming a normal relation between any science and its appropriate disciplines or derived from it, into a typical adversity between econo-science and its corresponding econo-discipline.

2. THE PARADIGM OF THE DISCIPLINA AND THE SPECIFICITY OF THE ECONO-DISCIPLINES

Scientics or scientology currently represents the science of science, an investigation into the way in which the study of nature through observation and reasoning has evolved all through several millennia of human activity. Sometimes science is defined as a specific process in an educational system (in the university or academia) and this meaning may seem like a collection of isolated and static facts listed in a textbook of a scientific discipline. The scientific discipline as the primary unit of internal differentiation of science is an invention of the 19th century society The concept of *disciplina* (or specialism) has a long semantic prehistory as a term for "*the ordering of knowledge for the purposes of instruction in schools and universities* or *as a scientific disciplina it means social and cognitive unit of knowledge production in science*"[25], being assimilated with knowledge or wisdom, expertise, skills, people, projects, communities, problems, challenges, inquires, approaches, studies, and research areas and associated with a specific academic fields or areas of study of professional practice (the gravitation being associated with the academic discipline of physics, it is considered to be part of the physics' disciplina, as well as he analysis of the production, distribution, and consumption of goods and services could explain how economics' disciplina works and interacts).

An academic disciplina remains a branch or body of knowledge given to or received by students (disciples). An academic disciplina that is taught and researched at the university level describes *a unity of teaching and research as a norm in university teaching which demands that this teaching has to be based on recent research knowledge or even has to participate in processes of scientific knowledge production* [25] and tends to "*co-evolve with systems of professions and closely follows the boundaries of modern academic departments, creating and maintaining disciplinary communities*" [26]. Academic disciplina's favourite actions mean to "*characterize, classify, specialize, distribute along a scale, around a norm, hierarchize individuals in relation to one another and, if necessary, disqualify and invalidate*" [27].

One of the most important of the methodological disciplina is taxonomy. The definition of taxonomy is relative different from source to source, but the core of it remains the same everywhere and anytime, and it means conception, naming, and classification of organism groups or populations. Thus, taxonomy as a major component of systematics encompasses description, identification, nomenclature, and classification [28]. Taxonomy comes from another Latin word, *taxa*, and uses eight levels in classical botany or zoology (domain, kingdom, phylum class, order, family, genus and species), being multiplicated to 14 in other modern biology (rank, division, subdivision, class, subclass, superorder, order, suborder, infraorder, superfamily, family, subfamily, tribe and subtribe). A modern and generalized taxonomy could be reduced to only five levels as class, sub-class, family, genus and species form or may be enlarged to 11 levels or 11 points on a *continuum* over a population of disciplines or education processes: a) isolation (fragmentation, anarchy); b) awareness (documentation and communication); c) harmonization (connection, consultation); d) nesting (infusion); e) temporal co-ordination (parallel education or concurrent teaching); f) sharing (joint teaching); g) correlation (concomitant or democratic programme); h) complementary (mixed programmes); g) multidisciplinary (webbed, contributory); h) interdisciplinary (monolithic); i) transdisciplinary (fusion, immersion, authentic) [29; 30].

Braxton and Hargens in their 1996 book chapter titled *Variation among Academic Disciplines: Analytical Frameworks and Research* consider that "*the differences among academic disciplines are profound and extensive*" [31] and reproduce several taxonomies of sciences or scientific disciplines, including their own scheme or model. The most important taxonomies of the academic disciplines constructed as interesting, viable and reproductible schemes, which have been detailed by Braxton and Hargens in their book are: a) the model of Hagstrom's taxonomy (1964) based on the idea of disciplinary consensus; b) the model of Hargens' taxonomy (1975), based on normative and functional integration; c) the model of Zuckerman and Merton' s taxonomy, based on disciplinary codification; d) the model of Lodahl and Gordon taxonomy (1972), based on levels of paradigm development; e) the model of Biglan's taxonomy (1973), based on three criteria: hard/soft, pure/applied, and life/non-life distinctions [32]; f) the model of taxonomy constructed by Holand based on its own Theory of Occupational Classification (1973), developed by Smart, Feldman & Ethington (2000). John Smart and his colleagues' new classification's schema *of scientific or academic disciplines is a taxonomy based on four from the six Holland* personality types: *investigative, artistic, social, enterprising*, but not realistic, and conventional.

The synthesis of Smart's taxonomy schema

Table no 1

Type	Sciences and Scientific Academic Disciplines
Investigative	Biology and life sciences, economics, geography, math/statistics, physical sciences, finance, aeronautical engineering, civil engineering, chemical engineering, astronomy, earth science, pharmacy, anthropology, ethnic studies, geography, and sociology
Artistic	Architecture, fine arts (art, drama, music), foreign languages, English, music, speech, theater, and environmental design
Social	Ethnic studies, home economics, humanities (history, philosophy, religion, rhetoric), library science, physical and health education, psychology, social sciences (anthropology, political science, social work), education
Enterprising	Business, communications, computer/information science, law, public affairs, journalism, marketing, industrial engineering.

Source: (Holland, 1973, 1997); Smart, et al. (2000) [33; 34; 35]

Smart schema postulates that scientific or academic disciplines have a primary category and a secondary category, and thus a field such as economics, for example remains primarily a social field, but also has qualities of an investigative field. The triple stratified classification of scientific disciplines based on criteria of hard/soft, life/non-life and pure/applied categories and which belongs to Anthony Biglan, uses a specific characterization of the academic disciplines, being inspired by a modern and holistic approach and less by a classical one.

Economics inside Biglan's classification of scientific or academic disciplines

Table no 2

	Hard		*Soft*	
	Life	*Non-life*	*Life*	*Non-life*
Pure	Biology, Biochemistry Genetics, Physiology, etc.	Mathematics, Physics, Chemistry, Geology, Astronomy, Oceanography, etc.	Psychology, Sociology, Anthropology Area Study, Political Science, etc.	Linguistics, Literature, Communications, **Economics,** Philosophy, Archaeology, Geography, History, etc.
Applied	Agriculture, Psychiatry, Medicine, Pharmacy, Dentistry, Horticulture, etc.,	Civil Engineering Telecommunication Engineering, Mechanical Engineering, Chemical Engineering, Electrical Engineering, Computer Science, etc.	Recreation, Nursing, Education, Conservation, Counseling, *Management*, etc.	*Finance, Accounting, Banking, Marketing*, Journalism, Library & Archival Science, Law, Arts, Architecture, Crafts, Dance, Music, etc.

Source: Goel, S. (2010). *Well Rounded Curriculum-An Insight from Biglan's classification of disciplines*, Retrieved [2013.06.10] from http://goelsan.wordpress.com/2010/07/27/biglans-classification-of-disciplines/

Economics as a soft-pure and non-life scientific discipline is concerned with particular cases, but without losing the holistic approach, and *rely more on the breadth of intellectual ideas, creativity and expression* [36]. Though the Smart schema of taxonomy has been a popular theoretical classification for identifying differences of the scientific or academic disciplines, the Biglan's classification remains even today one of the most used classification scheme, based on the idea that the disciplines vary in their level of consensus.

The overall structure of the sciences and scientific or academic disciplines' classification is related to the organizational structures of universities and other research institutions and it is similar to all the standard and modern guides or manuals, that contains common divisions as Natural science, Technology, Arts & Humanities and Social Sciences. The most recent classifications like *Frascati Manual* (*2002)*, revised in 2007, and *Oslo Manual (2005)* are really relevant

for the social sciences content, where economics belongs [37; 38; 39].

Structural confrontation between Frascati Manual (2002) and the revision from 2007 (2005)

Table no 3

Frascati Manual Revised (2005)	Frascati Manual (2002)
5. Social Sciences	**5. Social Sciences**
5.1 Psychology 5.2 Economics and business 5.3 Educational sciences 5.3 Sociology 5.5 Law 5.6 Political Science 5.7 Social and economic geography 5.8 Media and communications 5.9 Other social sciences	5.1 Psychology 5.2 Economics 5.3 Educational sciences 5.4 Other social sciences

Source: http://www.oecd.org/sti/inno/38235147.pdf

But as well as the scientific truth, the methodologies concerning the taxonomy of the sciences or the classification of disciplines, even the most obvious ones, have their relative aspects and limits and are exposed to revision or new changing proposals. Glänzel & Schubert [40] offer a *new classification scheme of science fields and disciplines,* where *social sciences and disciplines are divided in two sections:*
A) Social Sciences I (General, Regional & Community Issues) including two complex subsections: Education & Information and General, Regional&Community Issues;
B) Social Sciences II (Economical & Political Issues) containing another two complex subsection like: Economics, Business & Management and History, Politics & Law.

The revisional objectives have been satisfied by three successive steps allowing multiple understand and feedback throughout the entire taxonomic process: a) a multilateral "cognitive" approach (setting the categories) combined with a multiple experience of scientometricians experts; b) a multidisciplinary "pragmatic" approach, adjusted according to some reasonable limits of the economic realities; c) a "scientometric" approach (relatively unambiguously solutions based on the basic fields/subfield structure of economics as a modern science. The results of this revision of a standard classification had a complex impact on the final economics' system, restructured from nearby 15 to first-level categories (fields) and aproximatively 70 to 60 second-level categories (subfields) of the sciences in. The results and ranks of a simple statistical investigation of the 15 levels of sciences obtained from a Google's search are presented in Table no.4.

Some relative results and ranks from Google's searches

Table no 4

The investigated domain of science	Results in millions Words references	Google's Rank
Agriculture & Environment	467	III
Biology	243	IX
Biosciences	13	XIV
Biomedical Research	66	XII
General & Internal Medicine	370	IV
Non-Internal Medicine	52	XIII
Neuroscience & Behavior	199	X
Chemistry	305	VI
Physics	300	VII
Geosciences & Space Sciences	10	XV
Engineering (inclusive Computer Science/Information Technology	353	V
Mathematics	265	VIII
Social Sciences I	15479	I
- *Education,* - *Information,* - *General Issues,* - *Regional Issues,* - *Community issues*	*2700* *7190* *2350* *789* *2450*	
Social Sciences II (Economical & Political Issues) - **Economics,** - *Business,* - *Management,* - *History,* - *Politics,* - *Law*	10140 **321** *1460* *2760* *3240* *939* *1740*	II
Arts & Humanities	***113***	XI

Source: https://www.google.ro/

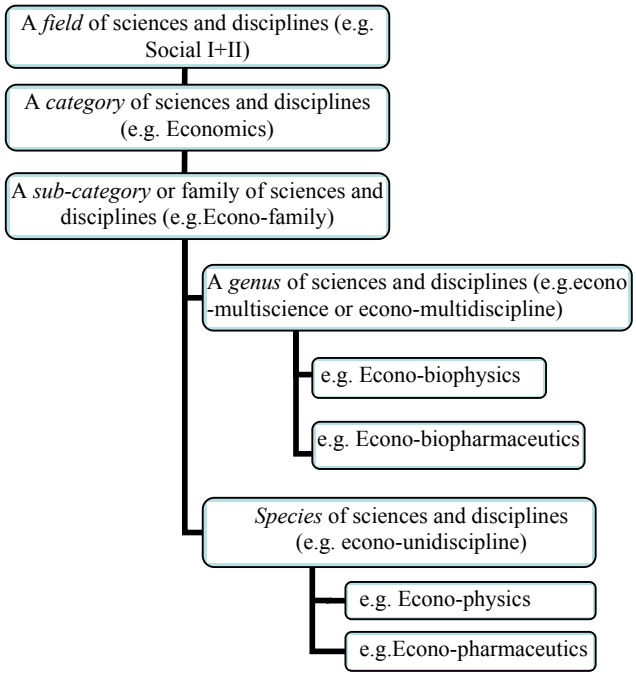
The word "history" in social sciences or disciplines appears about ten times more often than "economics", "management" nine times and "business" five times more frequently than the same word. These statistics underlines the relative trend of the diminishing importance in using for the general term of economics versus history, business and management in the contemporary Internet communication.

Social academic disciplines generally represent the study of society and human behaviour and the authors of this article consider that inside this generous and extended *domain* economics represents a *general class* and econo-sciences covered by distinctive econo-disciplines forming a real family. This paper is based on a multidisciplinary approach or a point of view that involves drawing appropriately from multiple econo-disciplines and non-econo-disciplines to redefine and to model phenomena and processes with their specific problems outside of normal boundaries and reach solutions based on a new holistic understanding of complex situations. Thus this paper also proposes two other detailed levels: econo-multidisciplines as *genus* (e.g. econo-biophysics or econo-biopharmaceutics) and econo-unidiscipline as *species* (econo-physics or econo- pharmaceutics).

As a synthesis the proposed taxonomy based on "*multi-*" or "*inter-*" approaches in modern sciences and derived disciplines could be represented in two different ways changing the idea of classical taxonomy. Thus, the first solution entitled *iterative taxonomy* can be resumed to a double upside-down pyramid (like a double funnel), successively replaced, as in Figure 1:

A modern exemplified taxonomy of contemporary sciences and disciplines (the Ist option)

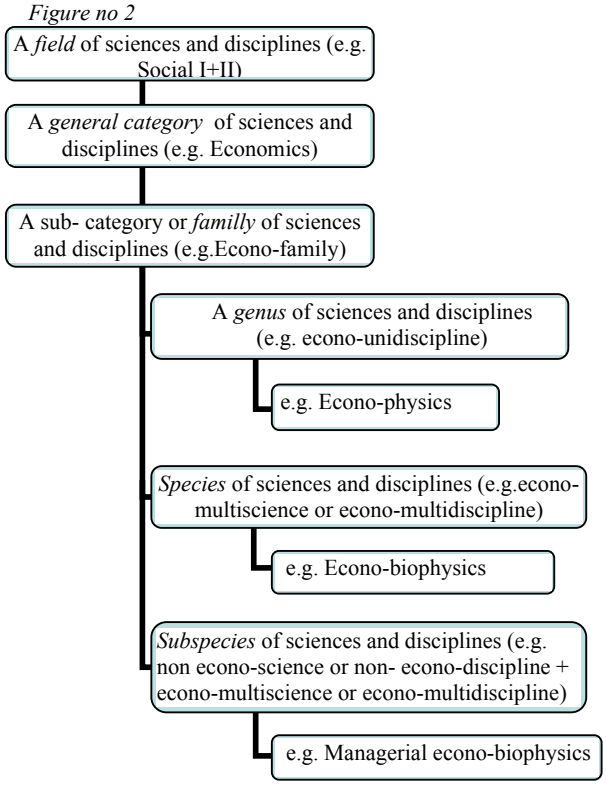
Figure no 1



There is also an alternative with *two faces taxonomy* or a *symmetrical (mirror or papillon) taxonomy*, all of it being centred on a *family* of science and allowing adaptation to the evolution of the modern multidisciplinary sciences through the formation of new interdisciplinary sciences that can allow to enlarge the angles of analysis and to create more open scientific investigation over complex contemporary reality (as in figure no. 2)

A modern exemplified taxonomy of contemporary sciences and disciplines (the IInd option)

Figure no 2



The econo-sciences' family explores the major aspects or the essence of economics, and each new econo-science implies not only many econo-disciplines, but even a lot of other non-econo-disciplines. Classical taxonomy is not able to reflect the changes and the enlarged trend of complex reunion between econo and non-econoscioences and disciplines. The functional relations between sciences and disciplines have revealed not only simultaneous connection and cooperation, but also adversity. What is the contribution of a general class as economics? A classic answer was given by Alfred Marshall, the author of the first modern academic lectures, printed and entitled *Principles of Economics* [41] and places emphasis on the "*man's actions in the ordinary business of life"* and "*how man gets his income and how he uses it*", while George Stigler opinion is entirely different [42], underlying that this class of sciences describes "*operations of economic organizations, based on social arrangements to deal with the production and distribution of economic goods and services.*"

A more detailed structure of the family of contemporary econo-disciplines is presented in the Table no. 5:

Some contemporary Econo-disciplines and their content

Table no 5

No	Econo-disciplines	General content
1	Behavioural economics	Usual effects of social, cognitive and emotional factors on the economic decisions of individuals and institutions and the consequences for market prices, returns and the resource allocation
2	Bioeconomics	Applied laws of thermodynamics to economic theory
3	Comparative economics	Comparative study of different systems of economic organization
4	Computational economics	Interface between computer science and economic and management science
5	Development economics	Economic aspects of the development process in low-income countries
6	Economic geography	Location, distribution and spatial organization of economic activities across the world
7	Economic history	Economies or economic phenomena in the past
8	Economic sociology	Both the social effects and the social causes of various economic phenomena
9	Energy economics	Broad scientific subject area which includes topics related to supply and use of energy in societies
10	Economic methodology	Methods, especially the scientific method, in relation to economics, including principles underlying economic reasoning
11	Econometrics	Application of mathematics and statistical methods to economic data
12	Financial econometrics	Application of econometrics to financial economics
13	Economic statistics	Collection, processing, compilation, dissemination, and analysis of economic data.
14	Experimental economics	Application of experimental methods to study economic questions
15	Entrepreneurial economics	Entrepreneur and entrepreneurship within the economy.
16	Environmental economics	Complex environmental issues
17	Evolutionary	Mainstream economics as well as

	economics	heterodox school of economic thought that is inspired by evolutionary biology
18	Financial economics	Allocation and deployment of economic resources, both spatially and across time, in an uncertain environment
19	Heterodox economics	Schools of economic thought that are considered outside of "mainstream economics" and sometimes contrasted by expositors with neoclassical economics
20	Green economics	Improvement of the human well-being and social equity, while significantly reducing environmental risks
21	Feminist economics	Highlighting the androcentric biases of traditional economics through critical examinations of economic methodology, epistemology, history and empirical study
22	Islamic economics	Islamic studies literature that "identifies and promotes an economic order that conforms to Islamic scripture and traditions" based on interest-free Islamic banking system or Sharia's condemnation of interest (riba)
23	Industrial organization	Theory of the firm in examining the structure of, and boundaries between, firms and markets.
24	International economics	Effects upon economic activity of international differences in productive resources and consumer preferences and the institutions that affect them
25	Institutional economics	Role of the evolutionary process and the role of institutions in shaping economic behaviour
26	Labor economics	Understanding the functioning and dynamics of the markets for labour
27	Law and economics	Application of economic methods to analysis of law
28	Managerial economics	Economic conceptualization, economic analysis to the problems of rational managerial decisions
29	Mathematical economics	Applied mathematical methods to represent economic theories and analyze problems posed in economics.
30	Monetary economics	Economics that historically prefigured and remains linked to macroeconomics
31	Neuroeconomics	Explaining human decision making, the ability to process multiple alternatives and how to choose an optimal course of action.
32	Public finance	Role of the government in the economy
33	Public economics	Government policy through the lens of economic efficiency and equity
34	Real estate economics	Economic techniques to real estate markets
35	Resource economics	Supply, demand, and allocation of the Earth's natural resources.
36	Political economy	Production, buying, and selling, relations with law, custom, and government, as well as with the distribution of national income and wealth, including through the budget process
37	Socioeconomics	Behavioral interactions of individuals and groups through social capital and social markets (not excluding for example, sorting by marriage) and formation of social norms
38	Time series	Sequence of data points, measured typically at successive time instants spaced at uniform time intervals
39	Transport economics	Allocation of resources within the transport sector and has strong linkages with civil engineering.
40	Welfare economics	microeconomic techniques to evaluate economic well-being, relative to competitive general equilibrium within an economy and economic efficiency or the resulting income distribution associated

Source: https://en.wikipedia.org/wiki/Outline_of_science

If modern Economics explains somewhat diffusely how economies work and how economic agents interact, and even how peoples access to income and use it, the econo-sciences family tries to extend and to specify more accurately by combining with other scientific areas, taking methods and models from other sciences to estimate with a higher level the future.

The general types of classical economies as systems of human activities related to the production, distribution, exchange, and consumption of goods and services of a country or other area can be structured on multiple criteria: a) based on a political and social ideological basis (capitalist economy, communist economy, corporate economy, fascist economy, laissez-faire, mercantilism, natural economy, primitive communism, social market economy, socialist economy, etc.); b) by scope (Anglo-Saxon economy, American school, hunter-gatherer economy, information economy, new industrial economy, palace economy, plantation economy, token economy, traditional economy, transition economy, national economy, international economy or world economy, etc.); c) based on their regulation (closed economy, dual economy, gift economy, informal economy, market economy, mixed economy, open economy, participatory economy, planned economy, subsistence economy, underground economy, virtual economy, etc.). This structural process of economics is not even finished. Anyone can find other new criteria to classify the economy from different points of view like: coordination, regional model, sectors, transition, etc.

Economics as a general class of econo-disciplines as components of the multi-, trans-, and interdisciplinary programmes in education can be identified in US Classification of Instructional Programs (CIP) created by National Center for Education Statistics (NCES), detailed and codified in Integrated Postsecondary Education Data System (IPEDS). Statistical data and Information about economics from CIP are the closest to the idea of the new approach and the specific taxonomy proposed in this article, and can integrate this new solution in many sciences using either the general class of economics, or the necessary family of econo-disciplines (see Table no. 6)

Economics as a general class or an econo-discipline component of the educational programme in US

Table no 6

Code & subcode	Domain/Class/Family of econo- sciences or economics applied multi, trans & interdisciplinary
01/01/03	Agriculture, Agriculture Operations, and Related Sciences / Agricultural Business & Management/ Agricultural Economics
An application of economics to the analysis of resource allocation, productivity, investment, trends in domestically and internationally agricultural sector (including instruction in economics)	
03/02/04	Natural Resources and Conservation/ Natural Resources

	Management and Policy/Natural Resource Economics
An application of economic concepts and methods to the analysis of issues such as air and water pollution, land use planning, waste disposal, invasive species and pest control, conservation policies, and related environmental problems (including instruction in cost-benefit analysis, and studying how environmental developments affect the economic system)	
13/13/08	Education/Teacher Education& Professional Development Specific Subject Areas/Family and Consumer Sciences/ Home Economics, Teacher Education
An application of preparing individuals to teach vocational home economics programs at various educational levels	
19/04/02	Family and Consumer Sciences/Human Sciences/ Family and Consumer Economics and Related Studies/Consumer Economics
An application of micro- and macro-economic theory to consumer behaviour and individual and family consumption of goods and services. Includes instruction in modelling, economic forecasting, indexing, price theory, and analysis of individual commodities and services and/or groups of related commodities and services.	
28/07/99	Military Science, Leadership and Operational Art/Military Economics and Management/Military Economics and Management, Other
Any instructional program in military economics and management	
45/06	Social Sciences
45/06/01	Economics, General
A systematic study of the production, conservation and allocation of resources in conditions of scarcity, together with the organizational frameworks related to these processes (including instruction in economic theory, micro- and macroeconomics, comparative economic systems, money and banking systems, international economics, quantitative analytical methods, and applications to specific industries and public policy issues).	
45/06/02	Applied Economics
An application of economic principles and analytical techniques to the study of particular industries, activities, or the exploitation of particular resources (including instruction in economic theory; microeconomic analysis and modelling of specific industries, commodities; the economic consequences of resource allocation decisions; regulatory and consumer factors; and the technical aspects of specific subjects as they relate to economic analysis).	
45/06/03	Econometrics and Quantitative Economics
A systematic study of mathematical and statistical analysis of economic phenomena and problems (including instruction in economic statistics, optimization, cost/benefit analysis, price theory, economic modelling, forecasting and evaluation)	
45/06/04	Development Economics & International Development
A systematic study of the economic development process and its application to the problems of specific countries and regions (including instruction in economic development, industrialization, land reform, infrastructural development, investment policy, the role of governments and business in international development and organizations, and the study of social, health, environmental influences on economic development)	
45/06/05	International Economics
A systematic study and analysis of international commercial behaviour and trade policy (including instruction in international trade theory, tariffs and quotas, commercial policy, trade factor flows, international finance and investment, currency regulation and trade exchange rates and markets, international trade negotiation, and international payments and accounting policy)	
45/06/99	Economics, Other
Any instructional program or study in economics not listed above.	
51/20/07	Health Professions and Related Programs/Pharmacy, Pharmaceutical Sciences, and Administration/Pharmaco-economics/Pharmaceutical Economics
An application of economics and policy analysis to the study of the relationship of pharmacy services, pharmaceutical processes and products to the health care system and their impact on health care organizations (including instruction in health economics, pharmaco economics, health care systems, health care organization and management, statistics and biostatistics, outcomes research, health care policy,pharmacy services, pharmaceutical industry operations)	
52/06/01	Business, Management, Marketing, and Related Support Services/ Business/Managerial Economics/ Business/ Managerial Economics
An application of economics principles to the analysis of the organization and operation of business enterprises (including instruction in monetary theory, banking and financial systems, theory of competition, pricing theory, wage and salary/incentive theory, analysis of markets, and applications of econometrics and quantitative methods to the study of particular businesses and business problems)	

Source: http://nces.ed.gov/ipeds/cipcode/browse.aspx?y=55

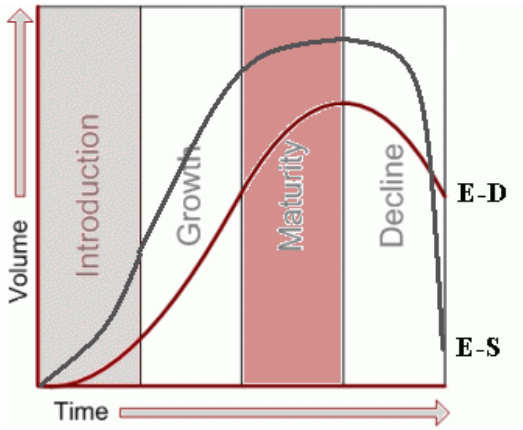
The econo-disciplines are contiguous disciplines and extend their areas day by day. While the econo-disciplines may share a common classical science such as economics, specifically a respect for knowledge and intellectual inquiry into the precarity of the resources and about growth and welfare [43], differences between them are vast, and important in creating many adversities and sometimes even wars.

3. THE GAP BETWEEN CONTEMPORARY ECONO-SCIENCES AND THE CLASSIC ECONO-DISCIPLINES

In the history of science, there was a real war between sciences. In fact, this science war took place principally in the United States, and this was a series of intellectual exchanges, between scientific realists and postmodernist or poststructuralist critics, about the nature of scientific theory and intellectual inquiry. The first group of scientific realists (Norman Levitt, Paul R. Gross, Jean Bricmont and Alan Sokal and others) have accused the postmodernists or poststructuralists (Jacques Derrida, Gilles Deleuze, Jean-François Lyotard and others) of having effectively rejected scientific objectivity, the scientific methods and models, and even scientific knowledge, and considered and declared their work to be incomprehensible or meaningless (this war included many scientific fields in this trend, including cultural studies, cultural anthropology, feminist studies, comparative literature, media studies, and science and technology studies). *Contemporary econo-sciences and econo-disciplines are not in a real war, but there a lot of adversities and conflicts.* Indeed the economics is becoming more a focus of study, with increased attention to the disciplinary impacts on academic organization and leadership, between the lifecycle of an econo-sciences and econo-disciplines the gap, is truly less than it was one hundred years ago, but still continues to exist, as can be seen in Figure no. 3.

The gap between life cycles of econo-sciences (E-S) and econo-disciplines (E-D)

Figure no 3



Another important aspect is the level of importance generated by the volume of research papers and books, institutions and all other applied aspects and the intensity of the decline. All econo-sciences are higher both as level or volume and as time it takes to reach the climax, but the decline is really more emphasized than in an econo-discipline case. In better understanding econo-discipline is a pale shadow of the econo-science during the introduction or appearance but its characteristics are manifested in moderate way, compared with econo-sciences groups, during the rest of the life cycle. This is easy to demonstrate following the modern econo-sciences like: Financial econometrics, Econophysics, Quantum economics, Neuroeconomics, Sociophysics, Econo-engineering, Thermoeconomics, etc.

This approach could generate a new a theory of science – discipline differences, more visible in economics than elsewhere, in the changing universe of the sciences and the disciplines.

Much of the disciplines variation focused primarily on the volume, but the most important remains the slope of decline. The problem of the new war is not group of scientific realists versus empiricists vs postmodernists or poststructuralists (underlying the rejected scientific objectivity, and emphasizing the absence of methods, models or knowledge), but econo-sciences versus econo-disciplines, because the gap highlight the desire of resistance and survive more specific to econo-disciplines than to the sciences. Econo-sciences mean too many assumptions, methods, models, many of which are hard to believe, validate or even used in the real economic phenomenon and this transform the econo-sciences' life cycle in its last part in graphic more pronounced decline. An example is the so called socialist economy as econo-science that is now really in a generalized real decline, but the econo-discipline continues to survive.

It is that econo-science is too axiomatised a way to deliver something accurate concerning its own crisis prediction. And in this case of less room to experiments for an econo-science like socialist economics was, how could econo-discipline with the same name survive?

It is absolutely true that we need both approaches and life cycles: econo-sciences models and methods, and econo-disciplines methodology and education to give coherence to this adversity framework and to multiply the empirical findings. However, the gap is shorter than the period of the last decades. Because an academic econo-disciplina may be said to posess knowledge and the privilege or responsibility of validating and authorizing new knowledge extensions in particular so-called disciplinary areas the immediate adversity with the new econo-science becomes more and more clear. When reality challenges some claims or just a statement of a classical econo-disciplina then the new econo-science uses its new methods and models and declares it automatically just history or simply obsolete, providing more alternatives in the new science – disciplina approach. Closely associated solutions for econo-sciences in the conflict with disciplina include immediately multi, trans, interdisciplinarity, and even crossdisciplinarity.

4. CONCLUSIONS

A real difference exists between econo-sciences and econo-disciplines that stretch in almost all universities all over the world having a long history, but there is still an opinion about the existence of at least four heterogenous branches of new econo-sciences, all of which point out serious weaknesses in the basic fundamental assumptions of neo-classical economics: a) Econophysics; b) Ecological economics (Herman Daly and his steady-state economics, 1991); c) Sociophysics; d) Biophysical economics (Hall and Klitgaard, 2006). All these new econo-sciences have represented a great breath of fresh air for decades, destroying the dogmatism of classical economics, dressed in modern mathematics or modern statistics that worked at one time, but do not reference the conditions out of which they sprang.

The new econo-sciences must generate new econo-disciplines during the next years and thus to reinvigorate and revive economics, and build a realistic body of knowledge of economics that is really based on testable theories and hypotheses that have predictive value, on new models from other more competitive sciences. The Economics theory of both science and discipline could get out of the dark ages and apply the world view and techniques of science to the economic phenomenon as a complex dynamic system. New econo-sciences are more flexible than Physics because there is free will, greed and fear to add into the equations… But for this future all the econosciences and econo-disciplines must co-operate and the economists must do the same thing with physiscists, engineers and others experts in different domains. Classical and neo-classical economists have about as much to offer, as alchemists had to offer to chemistry in its early days. The new econo-sciences and econo-disciplines do not get diluted or swallowed by classical Economics, because in fact economics is just a part of Sociology, and thus new Sociophysics, Thermoeconomics Quantum economics, Complexity economics or econo-complexity science and Evolutionary economics have progressed to the point where our social and economic systems are nothing else but biophysical systems which must obey the laws of thermodynamics and, more general to Quantum Physics and all of the other known constraints on such systems that are known from the study of physics, chemistry, and biology. The adversity between econo-sciences and econo-disciplines must finish soon and the new econophysicists or sociophysists or econo-engineers must learn the science first, then build on and expand the science-based models, hypotheses, laws, and techniques, and only after that analyse the economic phenomena.

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Annex 1

The contemporary econo-sciences' list and several relative new econosciences

No	Econo-sciences
1	Accounting
2	Agricultural Economics

3	Banking
4	Behavioural economics
5	Bioeconomics
6	Comparative economics
7	Computational economics
8	Consumer economics
9	Contract theory
10	Development economics
11	Business administration
12	Business ethics
13	Economic geography
14	Economic history
15	Economic sociology
16	Energy economics
17	Economic methodology
18	Econometrics
19	Economic statistics
20	Education economics
21	Experimental economics
22	Entrepreneurial economics
23	Environmental economics
24	Finance
25	Financial economics
26	Heterodox economics
27	Green economics
28	Feminist economics
29	Islamic economics
30	Industrial organization
31	International economics
32	International Trade
33	Institutional economics
34	Labor economics
35	Law and economics
36	Managerial economics
37	Marketing
38	Mathematical economics
39	Monetary economics
40	Political economy
41	Praxeology
42	Public finance
43	Public economics
44	Real estate economics
45	Risk management and insurance
46	Socioeconomics
47	Transport economics
48	Welfare economics
Relative new econo-sciences	
1	Bioeconomics
2	Biophysical economics
3	Complexity economics or econo-complexity science
4	Collective bargaining and game theory
5	Constitutional economics
6	E-Business
7	Evolutionary economics
8	Ecological economics
9	Econo-engineering
10	Econo - information technology
11	Econo-health informatics
12	Econo-organizational studies
13	Econophysics
14	Econo-regional science
14	Econo-systems science
15	Econo-pharmaceutics
16	Financial econometrics
17	E-managerial economics
18	Management information systems
19	Military economics
20	Natural Resource Economics
21	Neuroeconomics
22	Quantum economics
23	Social and economic choice theory
24	Sociophysics
25	Thermoeconomics
26	Time series in economics
	etc.