VARIABLES IN THE SPECIFIC THOUGHT OF MULTIDISCIPLINARY RESEARCH: THE IMPORTANCE OF EPSILON

Gheorghe Săvoiu[1] and Ion Iorga Simăn[2]

[1,2]University of Piteşti
e-mail: [1]gsavoiu@yahoo.com and [2]ioniorgasiman@yahoo.com

Abstract: *Contemporary variables are more and more involved into multidisciplinary thinking and research. This paper aims to highlight the importance of variation paradigm in modern scientific research, using a process of passing relatively easy from changing levels, to variability, and finally to variables. The paper describes some of the major characteristic variables in physics, economics, sociology, history, mathematics, statistics, demography, etc. It underlines the importance of the first multidisciplinary variable in econometrics, the residual variable, which is indeed an economic, statistical and mathematical variable at the same time, but also an innovative and historical explanation for reality, followed by other increasingly interesting variables from econophysics and sociophysics. Some final remarks about the new multidisciplinary context and the role of modern multidisciplinary research variables in our investigation close, naturally and symmetrically, the circle of multidisciplinary thought.*

Keywords: *paradigm, variation process, variability, multidisciplinary, variable, epsilon.*

1. INTRODUCTION

Variables in multidisciplinary thinking assume fairly different forms, reconstructing data or databases and investigative databases in a majority of scientific disciplines, virtually all of today's sciences. Variables have been, and still is, a key concept of modern science and research, generating, apart from databases, specific methods or solutions for validating / invalidating various models that simplify reality as an object of study.

Variation and variability are essential structural components of scientific research, especially the multidisciplinary researches.

An attempt at delimiting the concept of multidisciplinary variable is a difficult process, bringing together some of the most variegated aspects of homogeneity and heterogeneity, information asymmetry and eccentricity, exogenous, explanatory or factorial character, or enhdogenous specificity, either explained or resultative, thus providing the most extensive range of information, going from the historical, demographic, mathematical, statistical, biological and economic ones to the physical, etc. data.

The multidisciplinary variable is a special species of the scientific variable, which finds more and more materializations, ranging from the econometric residual variable to the variable used in econonophysics and sociophysics, the variable in quantum economy, etc.

2. PARADIGM AND VARIABLE – ASSOCIATIONS IN MULTIDISCIPLINARY

The paradigm of variation has the significant merit of having generated the concept of variable in modern science. Science starts with a new current of thought and "every school or school of thought begins with a paradigm that is used or even constructed" (Kuhn, 1973, 1982), and to "capture the epistemological status of a scientific discipline consists in identifying its main paradigms" (Boudon, 1990).

The practice of any contemporary science is based on a number of paradigms, and multiplying the "defects" and erosion of the "traditional" paradigms leads to new crises, and thus to new solutions.

A good example in this respect is represented by the paradigm of "uility" in classical economics, a paradigm that summarizes some major characteristics of the family group of paradigms: a) ability to identify with the conceptual and procedural core of functional analysis, or the node of the information network of the new science; b a) a new way of thinking, materializing in new principles, methods and techniques for the investigation of reality.

A paradigm facilitates developing hypotheses and finally laws specific to the new science, refocusing its investigational approach towards solutions of a probabilistic, and the new model of scientific thinking, as the ensemble of whole new principles, methods, techniques and research tools, it reaches its own maturity when it was shared "by all the members of a scientific community, and especially by those who practice a discipline" (Merto, 1965), its essence being taught in school or from books, thus turning into a common possession of the scientific world.

A derived linguistic meaning of the paradigm is that of a specific language in which are conceived and translated the theories or their more important subsets, and it comprises a set of the inflected forms of a concept or of a notion, in short a true picture or model of the flexion of the meanings of a category, later reconsidered as elementary, through wear in time (through its gradual assimilation with the part of speech that designates it).

The essence of the paradigm was perceived differently, and is still being resignified in modern science: a) a synthesis or an overview of concepts and issues (Robert Merton); b) a logical model, reduced to an axiomatic structure (Don Martindale); c) a theoretical level combined with a practical level and derived from the effectiveness of practice; d) an experience transposed theoretically and organized economically – efficiently (Ernst Mach); e) a type of operative logic, a code of functional analyses, a structural hierarchy ordering and classification (Robert Merton); f) a methodological order of iteration of functional analyses; g) a simplification of the study of the contradictory correlation of phenomena and anticipating consequences; h) a refined process within the referential framework of coding the data investigated (laws, theories, applications, instruments – Paul Bran); i) a formal model, a scheme of abstracting the essence of motion and transformation, which capture the dynamics of the integrating system of science within the same coordinates (Nicholas Georgescu-Roegen).

An inflectional picture of the paradigm of variation

Table no. 1

Variation (from Latin: *variatio, variationis*)	State or status of an element, of a number of features, an individual, a population, a phenomenon to occur in different forms (in a varied form). Passing from one form to another, from one level to another, assortment, diversity, change, transformation, etc.
To vary (from Latin: *variare*)	To be varied, different, various (in keeping with places, circumstances, situations) Not being similar, not having the same appearance, structure, composition Changing, giving a different shape, transforming Changing the value (state, shape, level)
Variable	Likely to change, changeable, varying, successively assuming different values (states, forms or shapes, etc.).
Variability (from French: *variabilité*)	The feature or property of an element, a feature, an individual, a population, a phenomenon to take different forms and aspects or the property of a quantity, size or algebraic function to successively take an infinite set of different values (in economics, statistics, etc.). The tendency of organisms to deviate in a given direction from the original type, the emergence of differences between the individuals of the same species (in biology)
Simple variable	A measurable quality (*in the sense used by the present article*)
Bidisciplinary concrete variable (in statistics and mathematics)	A statistical feature having the capacity of changing its value (state or status, type, level) in time, space and organizationally and a mathematical size assuming a value out of a well-defined set with a known probability, generating two major types: a) the (random) discrete or discontinuous variable; b) the (random) continuous variable (the possible values "fill" a finite or infinite interval).
Relationship between variables (represents the essence of physics and generates modern scientific experiment)	The concept of variable is crucial in experimental physics (e.g. the effect of gravity on falling bodies: fall speed *v* is influenced, as a dependent variable, by the gravitational field *g* and height *h* by the relation: $v = \sqrt{2gh}$). A carefully studied physical process results in a relationship, a model, a balance, a duality where variables are ubiquitous ($E = mc^2$) and a physical discovery is expressed mathematically by variables, requiring in-depth study of the behaviour of the dependent variable in different instances, changing the independent variable and

	thus generating physical experiment.
Non-experimental (historical) **variable**	A variable in history is characterized precisely by the lack of experimental and the consequences of scenarios in real terms.

Source: Săvoiu, G. (2001), *Universul preţurilor şi indicii interpret* (*Price universe and interpreter indices*), Editura Independenţa Economică (Economic Independence Publishers), Piteşti, p. 316-317, recast and completed by the authors.

Variation seems to have originally appeared in philosophy as the antithesis of Socratic identity, being the natural consequence of the impossibility for multiple identical things to exist (Săvoiu, 2009). The identity formulated by Socrates "ab initio" as an intrinsic quality of reality evolves towards defining through ratio and generates *the stationary* or the "premise of variation".

Plato, according to whom knowledge, implicitly scientific one, is a subspecies of what may be defined at the same time as true and credible, placed variation in two of the five universal concepts applicable to all things, namely in *difference* and *change*, which followed *existence* and *identity*, but were placed before *resistance*.

The logic of falseness and of truth become, within the paradigm of variation, a mere variable of an alternative type. In the modern science of the last half-century, truth has been trying permanently to reach synonymy with objectivity: "Although the term has been used by some to suggest a naive version of vulgar positivism, objectivity is the foundation [essential basis] of any good research." (Kirk and Miller, 1986)

Based on the need for authentication of apparent or related variables, and also on the growing interest for real or free variables, resonance, as an essential principle of variability, developed (Odobleja, 1984).

The development of logic, and especially the use of mathematical induction, had the unexpressed premise of "limiting independent variation, which translates the same major significance of variation and variability" (Mills, 1959).

The paradigm of the variable gradually became an "isomorphism" or a structural similarity of several scientific disciplines.

The basic variable was used excessively with a different degree of "identity" in physics, mathematics, biology, economics, statistics, demography, chemistry, ecology, management and organization etc., starting from the meaning of variable (a certain value, a specific state or condition, a particular form or a certain level achieved by the function that defines a process or a phenomenon), to the sense of variance, or dispersion, or the fluctuation (equal to the arithmetic mean of the squared deviations and not expressed in measuring units, being found explicitly or implicitly formulated in most statistical methods, e.g. for risk assessment in economic models, etc.).

There were also attempts at renaming variables, as in biology where they have become apparent, but also complex, *varieties* (*a group of organisms, specifically below, which is different from other groups of the same species through characteristic features such as: adaptability, resistance and quality characteristics*).

Variety generated phenotypic variation (Vp) seen as the totality of the biological variations, while preserving a principle, developed in the meantime in statistics, viz. the rule or law or summing variabilities (dispersion). Phenotypic variation is the sum of two aggregate components, respectively variation caused by the influences that of the environmental factors (Ve or the *environmental variation* component) and the variation caused by the contribution of the segregating genes (Vg or the component of *genetic variation*), so an essential principle in modern genetics was obtained practically Vp = Ve + Vg resonant or interfering with the classical rule of adding dispersions: $(\sigma_0^2) = (\delta^2) + (\overline{\sigma}^2)$

Heritability, or the proportion of the total variation that is controlled by heredity ($H = h^2$), is a relationship or ratio between variation caused by multiple genes with additive effects (Va) and phenotypic variance (Vp): $H = h^2 = \frac{V_a}{V_p}$

or $H = h^2 = \frac{V_a}{V_e + V_g}$ hence :

$h = \sqrt{\frac{V_a}{V_p}} = \sqrt{\frac{V_a}{V_e + V_g}}$ a relation which is resonant or interfering with $R = \sqrt{\frac{(\delta^2)}{(\sigma_0^2)}} = \sqrt{\frac{(\delta^2)}{(\delta^2) + (\overline{\sigma}^2)}}$

In parallel, statistics and mathematics generated a bidisciplinary variable of their own, by the emergence of probability theory (Bernouli, 1713).

Variability and variation in the biological sciences were a prime example of evolution from the type of thinking through the unidisciplinary variable to thinking through multidisciplinary impact variables, based on specific and generally applicable rules:

Prima regula: Variation (variability) does not exist on its own, but coexist in a "mesonic" manner with stability (heredity).

Secunda regula: The total variance is the sum of two components, bringing together key, explanatory and non-essential or residual factors.

Tertia regula: The proportion of the total variance that is "controlled" by a key or essential factor is a determinable ratio.

Quarta regula: Various partial variations are correlative, and there is the possibility to establish the existence, the direction and the intensity of the relationship between variations.

Quinta regula: Evolutive processes contain both correlative and non-correlative variations, and insofar as the system where they occur is closed and there is a measuring unit of universal character, the amount of the variations is relatively constant and the regressive evolution is irreversible or entropic (Săvoiu, 2009).

Specifying quantity immediately led to measure in the Hegelian sense, but also paved the way for the appearance of the first variable of the bidisciplinary type, namely the statistical-mathematical variable. A more comprehensive discussion on the first bidisciplinary variable or on variation and variables in mathematics and statistics requires treating the continuumu and the discontinuum.

"Treating variables as constant", F. Edgeworth emphatically stated in 1932, "is the characteristic error of the... non-mathematician"(Georgescu-Roegen, 1998).

Information, which appears, in the opinion expressed by Nobert Wiener, as a continuous or discontinuous sequence of measurable events, distributed with respect to time, emphasized the perpetual mixing of discontinuum and continuum information. "The whole precedes the parts," Leibnitz said, revealing continuity in the whole.

Yet the same whole represents, in today's systems theory, much more than the mere sum of its parts…

Intuitively, the continuum is the generator of differences, and ultimately, of variation. The continuum represents that structure, composition, organization, dialectical overlapping of the constituting elements that leaves virtually no empty space, and the constitutive elements are neither divided nor separated from one another. Spatial and temporal continuum is synonymous with overlapping rather than the indivisibility of its component entities. A very precise definition of the continuum is illusory, on account of the very impossibility to completely avoid discontinuum or the essential property of any entity to be discretely distinct.

The opposition continuum-discontinuum lies in the contrast between the continuous and discrete variable. As a synthetic summary of the paradigm of statistical-mathematical variation, the statistical series, a key concept in statistical thinking, is defined as "expressing a variable in relationship to the variation of another" (Georgescu-Roegen, 1930).

Variation and variables in physics, considered jointly, raised the whole range of issues of the experiment. The variable in physics was defined as a certain class of size that was quantified or measured. A first classification of the above divided variables, in both statistics and physics, in four types: a) nominal (categorical); b) ordinal; c) of the interval type; d) of the ratio type.

The first two types were mostly qualitative, and the last two quantitative (numerical), gradually ensuring the supremacy of quantitativeness over qualitativeness, followed by redefining the qualitative by the quantitative (Thorndike said that "everything that exists is in a certain amount", and McCall went further, saying that "everything that is in a certain amount can be measured").

The classification variables in modern physics has evolved gradually, retrieving other typologies already developed in statistics and mathematics, from the independent to the dependent variable, or transiting towards the canonical variables of a mechanical system under analysis (where each pair of variables (pi, qi) are called canonically conjugate and have the property that a change of variable pi in qi, and qi in pi, does not change the form of the equations of motion, to form the complexity of the quantum, etc. type variables.

Other variables were variously specified in their own disciplines' own universe. The main characteristic feature of the economic variable is its duality, captured between the value that varies continuously (Adam Smith) and invariable measure of value (David Ricardo).

Adam Smith, the author of *The Wealth of Nations* and therefore the father of economics as a science, focused his reasoning on values that vary continuously ("Digression concerning the variations in the value of silver"), while David Ricardo chose the opposite extreme, that of stability, as being precisely what transforms a commodity made over a period of production, in its capacity as the arithmetic mean of production, into an invariable measure of value, a standard of measure, *invariable* as to the changes in relative earnings.

The historical variable involves another specific aspect, there being no experiment in history and its remarkable practical consequences for assessing the impact, the hierarchy and the confrontation of this variable, which is interesting especially in the evolution of science.

Unlike physics, history is not an experimental science.

Consequently, history "cannot measure the weight of each element (or factor) contained in it." (Boia, 2010). At the beginning of its analyses, history collected small "causes", whereas the contemporary historians working in accordance with a method guide themselves by the big causes, according to structural approaches.

The drama, or the special feature of the historical variable is related to the impossibility of predicting or of simulation. This variable, either simple causal (small causes) or major causal explanatory, does not provide, within its space of application, any modality, any way to check the validity of the solutions put forward in the model of historical analysis exploited and valued as such. There is no experiment in history, yet there do exist repetitive errors, similar endings or similar resultative variables (Boia, 2010).

The economic variable, to a much lesser extent, and mostly the historical variable are variables whose probabilistic ending is hard to identify, impossible to simulate, and inexplicable in reevaluating after the fact.

It is not time, but the large number of the variables that seems to be the cause of this rigorous unpredictability and reasonable validation in the universe of such variables as the economic and historical ones (especially the aspect of mutual compensation of most of these variables over certain periods of time, or the mutual cancellation of an infinite horizon of small causes, as some historians graphically put it).

The demographic variable, as a resultative variable, has the broadest causal horizon and the most complex causality possible. The dynamics, the structure, the partial offsetting of the immigration and emigration flows, and plenty of other elements that contribute to the knowledge of this variable call for exclusive multidisciplinary manners of data sampling, processing and interpretation, modelling and forecasting or simulation.

In turn, this complex variable, which has become explanatory in a model or specific analysis, requires multidisciplinary decomposition to be able to identify the true causes and correctly distribute probabilities within a major decision-making context, significantly modified from *a priori* to *a posteriori*.

3. THE ECONOMETRIC VARIABLE EPSILON – A PIONEERING MULTIDISCIPLINARY VARIABLE

Induction, practiced simultaneously in several areas (multidisciplinary subjects), was the factor that perfected the process of disjunction into explanatory (exogenous) variables, and explained (endogenous) variables, paving the way to better delimiting the multidisciplinary complex variable.

Inductively bringing together elements of the exclusively historical or chronological, geographical or spatial variables, with elements of structural logic content, a three-dimensional statistical variable was first created, then, through investigating, in economic processes and phenomena, their characteristic variability with various mathematical methods, the first complex multidisciplinary variable was obtained, namely the econometric variable, with special focus on the exceptional vitality of the variable epsilon.

Whenever the statistical and mathematical methods, techniques and tools are used to analyze the economic processes and phenomena, the only term that can felicitously describe such a scientific approach is the concept of econometrics, and the variable resulting from such an approach is certainly the first one that is truly multidisciplinary.

"Experience has shown that each of these points of view, i.e. that of statistics, of economics and of mathematics, is a necessary but not sufficient condition for an effective understanding of the quantitative realities of modern economy; it is their unification that ensures efficiency. Econometrics is precisely this unity" (Frisch, 1933).

ogene (factoriale), completând restul influențelor printr-o variabila reziduală (aleatoare).

Specification in the econometric model practically begins by specifying the endogenous (resultative) variable and the exogenous (factorial) variable, completing the remaining influences through a residual (random) variable.

This is perhaps the most important variable for multidisciplinary research, which is, in fact, the first alternative, that of gathering a group of variables under a common name and permanently studying to what extent the aggregate and the offset effect of residue expands and contracts, i.e. require reconsidering the previous model and describing a new one.

In order to understand the rapidity with which this first multidisciplinary variable evolved by the name of residue or epsilon in the most common notations (εi), annexing the whole econometric model, one can analyze carefully what contribution it had to the construction and validation of the model as such in the simplest econometric model of unifactorial regression (Săvoiu, 2011)

For instance, the specific assumptions of the model of classical multifactor regression are outlined below in order to explain the exceptional importance of this first multidisciplinary variable, from H1 to H11.

H1: The linearity of the model (the simple model of classical unifactorial regression is most commonly a linear model in both its parameters and the exogenous variable x_i, according to the relation: $y_i = E(y_i|x_i) + \varepsilon_i$, or detailed $y_i = \alpha + \beta (x_i) + \varepsilon_i$ where: $i = 1,n$.

H2: The absence of measurement errors in the values x_i observed (the values of the exogenous, predictable variable, specifically deterministic in the statistics of the classical type, x_i are collected and recorded without error, regardless of the experiment);

H3: The mean value of the errors equal to zero or clearly tending to zero: $E(\varepsilon_i|x_i) = E(\varepsilon_i) = 0$ or the residual variable average is null, confirming the fact that, on average, the model is well specified);

H4: The homoscedasticity of the model or the constant variance of the residual variable (the variance of residue ε_i for the given values of x_i is constant: : $var(\varepsilon_i|x_i) = E[\varepsilon_i - E(\varepsilon_i|x_i)]^2 = E(\varepsilon_i^2|x_i) = \sigma^2$ (the homoscedasticity of the model also implies a constant variance for y_i,, i.e. $var(y_i|x_i) = \sigma^2$, and once this relationship is not satisfied, it will lead to the conclusion that the model is heteroscedastic);

H5: Independent residual values or uncorrelated errors (for any two values xi and xj of variable x, with $i \neq j$, these are independent values if there is no correlation (correlation is zero), so the following statistical-mathematical relationship is valid: $cov(\varepsilon i, \varepsilon j | xi, xj) = E\{[\varepsilon i - E(\varepsilon i|xi)][\varepsilon j - E(\varepsilon j|xj)]\} = E[(\varepsilon i|xi)(\varepsilon j|xj)] = 0$;

H6: The independent residual variable as to the exogenous variable xi (covariance between xi and εi is zero: $cov(xi,\varepsilon i) = E\{[xi - E(xi)][\varepsilon i - E(\varepsilon i)]\} = E[\varepsilon i(xi - E(xi)] = E(xi,\varepsilon i) - E(xi)E(\varepsilon i) = E(xi,\varepsilon i) = 0$, thus the residual variable is independent as to the exogenous variable xi);

H7: The number of observed data *n* greater than the number of estimated parameters in the model (the number of observations *n* greater than the number of exogenous variables);

H8: Variability in the values of exogenous variable xi (the values of xi are not all identical, or *var* (xi) $= \sum_{i=1}^{n}(xi - \hat{x})^2 : (n-1)$ is a positive finite number is a hypothesis that usually has a clear visibility or can be verified by calculation if necessary);

H9: The model of regression, correctly specified (specifying the endogenous variable and the exogenous variable, filling the rest of the influences with a residual variable and correctly identifying the mathematical function of the model, which thus became specified or signified);

H10: The normally distributed residual variable (its variable εi is normally distributed $\varepsilon i \sim N(0,\sigma 2)$.

H11: Identifying multicollinearity and removing it by means of the residue or the multidisciplinary variable epsilon, calculated systematically.

Two features are crucial for this first multidisciplinary variable:

a) the multidisciplinary variable essentially brings together the rest of the variables that are not modelled or not included into the fundamental investigation, having a character of component uncertainty, or structural uncertainty, yet possessing the value of signal of the degradation of the econometric model underlying the theory, at the level of this variable;
b) the multidisciplinary variable is no longer exclusively a component of the data corpus (database or data bank in the classical sense), but an active instrument of testing, analysis and validation/invalidation of the model, of the theory, and ultimately of the realities as such.

If the essential nature of the paradigm is methodological rather than ontological in classical science, and the relevance of the paradigm depends on the coverage of the structure of the specific phenomena studied, the multidisciplinary variable supplements, by testing, analysis and validation/invalidation, the quality of the research and the theory, which is generated, in the modern universe, more and more difficultly otherwise than in a multidisciplinary manner.

4. CONCLUSIONS

Over the past editions of EDEN I, II and III, the focus was placed on some particular aspect out of those considered essential in trans- and multi-disciplinary scientific approach in the field of contemporary academic research and education, from the distinctively historical and methodological aspects, to the model of investigation specific (the unifying character of multidisciplinary modelling is strongly emphasized here), from dissipation in econophysics, sociophysics, quantum economy, etc., to the specific multiverse of trans- and multi-disciplinarity.

The present contribution looks into the profundity of the multidisciplinary multiverse, highlighting the fact that the very core of multidisciplinary research is identified not only by significant methods and original models, but also, and mainly, by what might be called perhaps its greatest contribution, as a type of research and innovative specificity: the multidisciplinary variable.

If the method is constantly improved and the model is captive towards one or more theories in point of multidisciplinarity, it is the multidisciplinary variables that lend density to a number of economic laws and theories, while also mutilating the fundamental freedom of the model or method, and acting in the spirit of the originality of the measuring, and then getting deep knowledge of the new phenomena of marked multidisciplinary character.

The present times have confirmed a process of multiplication of the econometric variable as a pioneering multidisciplinary variable. The econometric residual variable is multiplied with regard to the econophysical variable, the model lacks restrictions, the residue, or the unstable epsilon, becomes more and more complex, and the results are increasingly interesting and original.

Physical thinking contributes, by formalizing the multidisciplinary variable in the new discipline of econophysics, then in the equally original discipline of sociophysics, or the impressive trend of quantum economy, in a more or less unexpected manner, to the understanding of economic, social and demographic issues, to determining the equations that simplify and the methods that describe phenomena such as production, market, migration, traffic or transport, the financial world, etc.

The multidisciplinary variable is reluctant to work in areas where there are less reliable and short-term datasets, dominated as it is by the desire to unify things against the background of a physical tradition, while at the same time relativizing, capitalizing on experiments having to do with genuine conceptual revolutions.

The more rigorous delineation of the subject matter, through the contribution of the multidisciplinary variable, contributes to a better validity and adequation of specific models, an active discussion of the role and potential of econometrics, of the rival modelling sciences that integrate the universal thinking of physics (econophysics, sociophysics, quantum economy, etc.) into higher education and scientific research in Romania.

As final remarks on the general characterization through the paradigm of variation and the multidisciplinary variable, the following can be noted:

a) the paradigm remains either the essential core of concepts, laws, methods and variables, supported by thinking patterns or sets of principles, ways, methods and specific variables construed by rules defined by means of theoretical and practical knowledge,

b) the paradigm of variance and of the multidisciplinary variable is the priority in relation to any other (subsumed under it);

c) the paradigmatic excesses appear once the paradigms are isolated from the methods and their specific variables, which easily converts separate, unidisciplinary classical theories into theorizing without pragmatic, which lead to gradual loss of the sense of reality.

Without multidisciplinary variation and without multidisciplinary residual epsilon variables, the attempt to depart from, or shun reality through unidisciplinary "scientific" knowledge, or under the influence of a single scientific paradigm, could hardly be identified, let alone improved or diverted.

The authors of this paper can finally state that they know they do not know, as the only Socratic certainty; however, that can only bring them the greatest joy, as the new multidisciplinary variable is the very seed of our ignorance along the long, maybe endless, yet so exciting way to scientific knowledge, and also the evidence that, more and more obviously, knowledge acquired must be continuously turned into yet other knowledge, thus increasing the multidisciplinary nature of knowledge…

5. REFERENCES

[1] Bernoulli, J. (1968). *Ars conjectandi: opus posthumum. Accedit Tractatus de seriebus infinitis, et epistola Gallicè scripta de ludo pilæ reticularis.* Basileæ, Impensis Thurnisiorum, 1713, Culture et civilisation, 1968, University of Califonia.

[2] Boia, L., (2010). *Tragedia Germaniei 1914 -1944,* Ed. Humanitas, Bucureşti, pp. 64-65.

[3] Boudon, R. (1990). *Texte sociologice alese,* Bucureşti, Ed. Humanitas.

[4] Bran,P. (1995). *Economia valorii,* Bucureşti,Ed. Economică.

[5] Frisch, R., (1933), *Editor's Note.* Econometrica 1,pag.1-4

[6] Georgescu–Roegen, N. (1979). *Legea entropiei şi procesul economic,* Ed. Politică, Bucureşti.

[7] Georgescu – Roegen, N. (1998), *Metoda statistică Elemente de statistică matematică*, editată în 1930, ediția a II-a, Ed. Expert, Bucureşti.

[8] Ionescu, N. (1993). *Curs de istorie a logicii,* Bucureşti, Ed. Humanitas.

[9] Kirk, J.Miller, M. L.(1986). *Reliability and validity in qualitative research,* Beverly Hills: Sage Publications.

[10] Kuhn, T. (1973). *Structura revoluţiilor ştiinţifice*, Bucureşti, Ed. ştiinţifică şi enciclopedică.

[11] Kuhn, T. (1982). *Tensiunea esenţială*, Bucureşti: Ed. ştiinţifică şi enciclopedică.

[12] Merton, R. (1965). *Elements de theorie et de methode sociologique*, Paris: Ed. Plon.

[13] Mills, F. (1959), *Metode statistice*, Bucureşti, Editura D.C.S.

[14] Odobleja, Ş. (1984). *Introducere în logica rezonanţei,* Craiova, Ed. Scrisul românesc.

[15] Săvoiu, G. (2001), *Universul preţurilor şi indicii interpret*, Editura Independenţa economică, Piteşti, pp.316 -317.

[16] Săvoiu, G. (2009). *Paradigma şi prioritatea acesteia în raport cu metoda, în cadrul gândirii statistice.* Limbaj şi context, Anul 1, vol. 2, Ed. Alecu Russo State University of Bălți [Accessed on July 15th, 2012] *http://www.usb.md/ limbaj _context/volcop/2/2.pdf*

[17] Săvoiu, G. (2011). *Econometrie,* Bucuresti, Ed.Universitară