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CONTENTS

A STATISTICAL CONFRONTATION OF VOLUME & AREA IN NEW PLATONIC SOLID INDEX NUMBERS FOR A BETTER ESTIMATION OF GENERAL DEMOGRAPHIC (IM)BALANCE'S DYNAMICS [DEMO(GRA)STATISTICS AND DEMOGRAPHYSICS WITH VPSIN & APSIN]

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Abstract. *This paper aims at extending and deepening the understanding of the significance of the theoretical and pragmatic confrontation of two new statistical models of Index Numbers (hereafter: INs) in demography. The purpose of the article is to provide an example of the applied model at the demographic level that can and should be taken into account for increased quality of political, economic and social management decisions (hereafter: MD) aiming at ensuring the required efficiency and effectiveness at all three, from micro- to mezzo- and macro demographic levels. The originality of the Volume of Platonic Solid Index Number (hereafter: VPSIN) and Area of Platonic Solid Index Number (hereafter: APSIN) remains unbeatable, yet a statistical confrontation between VPSIN & APSIN, as well as between regular polyhedra inscribable in a sphere and regular polygons ("n-gons") inscribable in a circle at the same time, deepens the horizons of demographic research and improves the quality of political, economic and social decisions. A section of methodology and data clarifies the number of factors and the level of errors in the new models, implying a birth to the initial signs of a useful statistical confrontation simplified by an expression of the volumes, areas, versus type that has become standard in micro-, mezzo- and macro demography, including some new interdisciplinary science of demo(gra)statistics and demographysics for any managerial decisions: VPSIN vs. APSIN. The pragmatic structure of the paper contains a chapter dedicated to practical approaches through applied results and discussions about the validity and performance of both IN models as indices systems of factors in demographic policies of modern management. In a new proposed demo(gra)-statistics and a future demo(gra)physics context of some naturally dynamic imbalances, the statistical confrontation becomes a solid and originally determined path from a better demographic decision-making point of view with a great impact in political, economic and social management. The new instrumental abilities of VPSIN & APSIN are practically evaluated and many of the inquiring approaches finally allowed some decision-making hierarchies. This paper emphasized and can underline specific valences of the demo(gra)-statistics and demo(gra)physics as some new interdisciplinary sciences and valorizations of the IN functions. Final remarks recognize both, the advantages and disadvantages of VPSIN & APSIN, and identify several instrumental limits and perspectives of capitalization in contemporary demography, but especially in the future of political, economic and social management.*

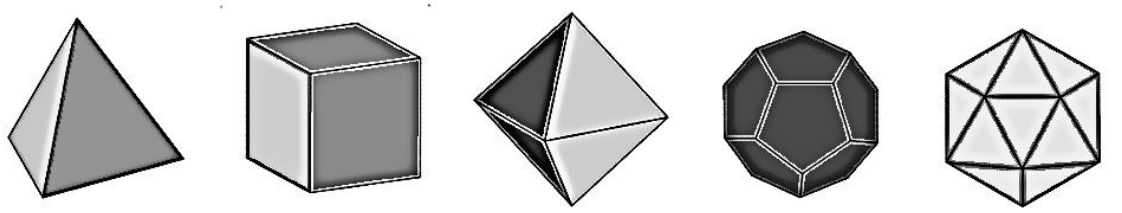
Keywords: *Euler's Polyhedral Formula (EPF); Geometric Area Index Number (GAIN); Index Number (IN); Index Numbers' Method (INM); Management Decision (MD); Demographic Imbalances Dynamics (DID); Platonic Solids (PS); Regular Polygons (n-gons); Regular Polyhedra (RPH); Volume & Area of Platonic Solid Index Number (VPSIN & APSIN); Demography; Demo(gra)statistics; Demographysics.*

1. INTRODUCTION

In the origin of this article, like in the history of Euclidean geometry, three names are closely related to regular convex polyhedra: Pythagoras, Plato and Archimedes. Of those three names, Plato's name, perhaps rather as the first parent of the first higher form of education and not necessarily as the great philosopher or mathematician, Plato was selected and attached to this pure geometric construction, both as volume and area, transforming them into Platonic solids [1,2]. A Platonic solid or regular polyhedron (RPH) can be defined mathematically as a three-dimensional solid that has identical faces generated by two-dimensional regular polygons. A mathematical demonstration identifies and limits the number of regular convex polyhedra to five usual types of "*polyhedra*": tetrahedron or pyramid, hexahedron or cube, octahedron or double pyramid, dodecahedron and icosahedron. In the famous Timaeus dialogue, Plato substituted the perfection and essence of this type of polyhedron (polyhedron) with the vital importance of the five elements of nature ([3]:

i) the tetrahedron with fire;
ii) the hexahedron with earth;
iii) the octahedron with air;
iv) the dodecahedron with ether;
v) the icosahedron with water.

There was an interesting and really scientific reason for Plato to choose the dodecahedron as the best representation of the whole universe. This reason can be a good cause even today, because geometrically the dodecahedron was and remains most closely approximates for the volume and area of a sphere, which was believed to be the shape of the universe at the time. Theaetetus, a contemporary of Plato, is the One who discovered the uniqueness of the five polyhedra, referring to the sum of less than 360^0 of the equal angles that meet in a polyhedron corner. The limit of 360^0 corresponded to exits from three-dimensional or geometric space and re-entry into two-dimensional or the plane of classical geometry. A polygon of 6 (six) or more 6 (six) sides naturally or Euclidean having an angle over 120^0 constituted the constructive limit, which naturally included only the equilateral triangle, the cube and the equilateral pentagon in the restrictive list of real constructive possibilities which they possess or lack are all explained according to their various purposes [4]. As Plato's Academy considered that the universe is the work of a Master who brought order to an initially disordered state of affairs, this article, and implicitly the research behind it, appeals to the uniqueness of the geometric (mathematical) model to explain not only the balances or imbalances of the classical Greek world but also those of the contemporary management of any economic entity, composed of fire (for visibility) and earth (for tangibility), but also of elements that ensure mediation like air and water, in a proportional progression ethereal to bind them together into a unitary, concordant whole [5]. Just as Euclidean geometry equated the shape of the body of the universe with a sphere, so the construction of an index number focused on Volume of Platonic Solids IN (hereafter: VPSIN) also starts from a sphere, being systematically confronted with another construction of an index number focused on Area of Platonic Solids IN (hereafter: APSIN derived from the creative idea of new geometric areas IN, known as GAIN) [6]. Figure 1 depicts the five usual types of "*polyhedra*" with the purpose to visualize similarities and differences between them, calling at the same time for conceptualization of a model for effective decision-making based on new statistical instruments & new economic symbols for water, ether, air, earth, and fire



Fire–Control **Tetrahedron** | *Earth*–Production **Hexahedron** | *Air*–Stimulation **Octahedron** | *Ether(Universe)*–Quality **Dodecahedron** | *Water*–Demand **Icosahedron**

Source: Realised by the author.

Fig. 1. The five usual images of the "*regular polyhedra*" (RPH)

The foundation of effective management lies in effective decision-making (even in demographical cases), taking into account that management in a changing environment is profoundly based on everyday decision-making at strategic, tactical and operational levels. The highly fuzzy and volatile human environment put pressure on management to continuously revise and adopt management decision approaches and systems. Effective decision-making framework requires a holistic perspective, ambidexter view and incorporated change dynamism, considering external forces, internal development needs, and qualitative and quantitative tangible and intangible aspects of populations and individuals that influence the efficiency and effectiveness of management and decisions in general [7-10]. With that in mind, the key research question remains *which components or derived factors should be taken into account in a decision-making process, procedure, project, plan of action, programme, or scheme, designed for application in real-life practice, using the models based on the Index Numbers Method (hereafter: INM) and the New Index Numbers (INs) systems generated by VPSIN & APSIN?* There are also many key aspects that need to be discussed and clarified from a methodological point of view: i) *are all platonic solids useful indeed in the construction of the new indices or must exist an option for two or even only one* (choosing from icosahedron or dodecahedron, probably for their degree of proximity to the universal sphere of the investigated phenomenon and the appropriate managerial decision)?

The domain of IN or INs analysis must be completed here with good reasons to select from many detailed aspects regarding the mathematical (geometrical) way of calculating the volume and

the area after changing the unit radius of the sphere in which the Platonic solid is inscribed (r_i), circumscribed (r_c) or even median (r_m), or regarding the groups or classes of IN extracted from the real phenomena (3-4 indices per social, economic, food, demographic field, etc.) or even connected to the aggregate INs calculus per domain and volume or area reconstruction depending on this similarity increase in volume and area (factors of equal importance) etc. Simultaneously, inside this paper, the statistical confrontation of some INs constructions (especially VPSIN & APSIN) must be realised and also some INs must solve the similitude to the number of phenomena's factors; ii) *is the new and optimal PSIN (VPSIN vs. APSIN) able to reflect a ratio between two platonic solids in the different units of time, space and even structure*? iii)*from a valid scientific test, how only one PSIN, chosen from VPSIN & APSIN, can offer a final quality of the construction after the confrontation* (new statistical-mathematical criteria are needed): by the level of error, the simplicity of the calculation, the complete statistical three-dimensional coverage (space, time and structure or from another criterion)? iv) *but the difficult task is not the calculus of the final volume or area, but the selection of the adequate objective method to choose the final applied aggregate* PSIN *(VPSIN vs. APSIN)?* The major research purpose of the article is to provide an example of the developed management model at the microeconomic level that can and should be taken into account for increased quality of management decisions (hereafter: MD) aiming at ensuring the required efficiency and effectiveness at both, microeconomic and macroeconomic levels. A statistical confrontation between VPSIN & APSIN, as well as between regular polyhedra inscribable in a sphere and regular polygons ("*n-gons*") inscribable in a circle at the same time, extends and deepens the horizons of managerial research and improves the quality of decisions.

The paper is structured as follows. The second section is dedicated to the literature review. The literature review unfolds the conceptual foundations of management, decision-making and the statistical index numbers method (INM). It exhibits background on the research problem and the significance of the new trend of perfection inside the management decisions based on new statistical instruments and new economic symbols for water, air, earth and fire. The research methodology is then introduced and includes the developed model for effective decision-making in the microeconomic area.

Afterwards, a section on the practical construction of VPSIN and APSIN was naturally required inside the article, the results and discussions of the study are also presented there. Finally, the paper concludes with the implications and recommendations for theory and practice, along with suggestions for future research. Some remarks of practically evaluated approach recognize both, advantages and disadvantages of PSIN and GAIN, and signify instrumental limitations and future perspectives of capitalization in contemporary management.

2. BRIEF LITERATURE REVIEW ABOUT NEW INTERDISCIPLINARY SCIENCES: DEMOGRA-STATISTICS OR DEMOGRAPHYSICS, AND SOME MAJOR THEORIES OF MANAGEMENT

Classic demography as an unidisciplinary science is no longer able to cover either traditional approaches or modern methods and techniques, not even accepting a lot of errors, trying to diminish all of these, from the calculus of their specific demographic indices, rates, quotas, weights in the classical and unilateral manner.

Analogous to classic demography, neither standard statistical investigations, nor even the holistic approaches, offered by the three-dimensional method of index number (temporal, spatial and structural) and, unfortunately, not even the science of (statistical) physics alone or applied individually can research, analyze and predict the complexity of the modern demography as an unidisciplinary or isolated science. Nowadays, none of the listed sciences is able to cover through the traditional diversity approaches in depth, to interpret without difficulty or from the classical and implicitly unilateral point of view the state, internal and external dynamics, explosion or implosion, rejuvenation or ageing, rurality or urbanity, the educational structure, the proportion of genders always changing or transgendering, the impact of the causes of death, the importance of the rate of fertility, the criteria structuring of the average life expectancy of human populations.

The first interdisciplinarity that is visibly created is placed at the intersection of demography and statistics, which can be defined as demographic statistics or demo(gra)statistics, with new accents generated by the creation of new indexes of greater complexity, but especially with physics (e.g. statistical physics), the last two or three sciences together becoming demographysics [11-13]. This literature confirms the need for an alternative interpretation of the demographical processes through statistics, physics, statistical physics and various subsystems that compose the demographic phenomena, such as migration or natural movement of human populations. Rigorous scientific research of the human population and of the global demographical system can be conferred by the vision of integrative interdisciplinarity offered through new sciences like demo(gra)statistics or demographysics, whose essential investigative approach or specific systems analysis is based on the premise that the properties do not reduce the number of individuals as units (atoms, particles,

etc.). The keystone of the construction of the new systemic vision in the demo(gra)statistics or demographysics, developed in statistics for the first time, and subsequently in statistical physics starting using the existing deviations and variations in the area of statistical units. The same physical thought transforms the human populations in the studied objects and the system in interactions between subsystems using the probabilistic or stochastic nature of the behaviour units (as major components of the analyzed systems). The new approach of these interdisciplinary options is based first on statistics and demography [e.g. demo (gra)statistics as an intersection of these apparently independent sciences) and after this attempt on statistical physics and demography (e.g. demographysics as a reunion of both sciences).

As migration flows and natural movements represent the subsystems of the entire human beings system, so on all of these reunion aspects between the demographical theory and statistical or physical models become more adequate and comparable, sometimes even similar, to those conferred by statistics, statistical physics, and physics to sociology or economics, which have defined during the last three decades the new sciences called sociophysics and econophysics.

The demographysical science and its models are built in the same trans-, inter-, & multidisciplinary logic. Thus, the gravity or push-pull models in demography represented the beginnings of migration preoccupations, where the volume of a flow of international migration was defined as the result of the simultaneous action of the distance and the population of the two areas, that of origin and the intended destinations (i.e. John Quincy Stewart's model, introduced by the Princeton University astrophysicist in 1947-1948, "*focused on interdisciplinarity between demography and statistics or physics, based on a collection of repeatabilities and regularities, in the sense of demographic statistics*") [13]. New categories of the push-pull models included this major idea of identifying simplified perspectives and laws of demographic behaviour under the influence of the force of demographic attraction, demographic energy, demographic force of gravity, potential and gravity gradient, conceptualized by physics way and measured in a statistical manner by John Quincy Stewart. [i.e. the model of human gravity, well-known later as Carey-Stewart-Warntz model of the new school of quantitative geography, followed as importance based entirely on the Stewart major idea (Quincy, 1948; Garling, Golledge, 1993; Sen, Smith, 1995] [14-16].

In fact, demographic trans-, inter- and multi-disciplinary models are the real proof of the current and future delimitations of the development of the much-awaited and necessary sciences such as demo(gra)statistics and demographysics. This assertion is valid starting with the first model of Stewart and continuing with the relatively recent "*fractals*" models (Frankhauser, 1994), "*cluster & limited diffusion agglomeration* (C&ALD)" models (Gligor, 2012), or "*demographic implosion models by making use of cavitation*" (Săvoiu, Iorga, 2017) [17-19], The contributions of the author in the new domains of demo(gra)statistics or demographysics, were and still are influenced by specificity of statistical thinking, which is visible even in this paper dedicated to new geometrical index numbers, and by the hope of a necessary recognition, adequate to such a dynamic development,

The physical, statistical and mathematical laws, (i.e. especially geometrical figures, and solids with some regular area and volume in this paper) express not only the conservation of a quantity, but as well as the conservation of symmetries and kurtosis, or the space and time homogeneousness and structurality, and also the dynamic evolutions or involutions of populations' level.

In my opinion, the interdisciplinary needs of demography are placed inside the intersection with statistics, mathematics and physics, and seem to be nowadays the adequate expression of the accurate and integrated approach to the human population, through the reunited sphere of the preoccupations of these numerous sciences, which search to explain in a more and more various and detailed way, our human beings' dynamics, both in its quantitative side and, especially, in the qualitative one. The quality of the management decisions in modern demography, and also of the projections or forecasts essentially depends on the quality of the demo(gra)statistical data series processed with new demographysics methods and models, based on permanent new instruments and techniques [8]. The new inter-, trans-, and multidisciplinary sciences, succinctly described above, remains just modest expressions of the expansion of modern statistical thinking, of the passion for the essential details of statistical physics and of the contribution of physical thinking through the depths of the laws of physics, exploring together the universe of demography in general, from early interdisciplinary through trans-, and multidisciplinarity, to a really useful and necessary holistic approach.

Any synthesis of management significances tries to cover both their multitude and diversity and the continuous extension of the defined areas or of the approaches from the scholastic type (elevated and structuralized) to the procedural class (functional and interconnected) from the systemic attempts (disjoined into technological and human parts, but reunited afterwards predominantly attributively), to those of a chaotic [20] or random type (volatile and energy consuming through stability objectives) ending with those of a situational or contingent type (opportune and factually adequate), or to those based on total quality (Total Quality Management,

whose only gift and generalized objective remains the quality) or the cultural ones (Cross-Cultural Management) [21].

Performance, development, continuous training, and knowledge have generated new practical methods, techniques & instruments of management, including in a perennial circuit, through theorizing and rendering essential on the level managerial models, subsequently validated or invalidated by resuming, a circuit specific to all sciences in general, although these exceed two thousand models, and many more thousands of techniques & instruments. Management theories represent a huge amount of different ideas, approaches, frameworks and guidelines with the purpose of better solving a vast variety of problems, from political to economic and social aspects (i.e. including demographical connections), which human societies have faced over their evolutionary and transformational journeys. However, the most prominent classification of management theories (MT) is recognized in three distinct and broad theories: i) classical or traditional theory; ii) neo-classical theory; iii) modern theory. Another approach distinguishes three other main categories altogether, respectively: a) technicist and nationalist economic theories; b) behavioural theories; c) cognitive ones [21-23]. In accordance with the first typology, management theories have evolved and multiplied over time and a brief presentation, naturally realised by the author in figure no. 2, tries to highlight their essences and differences.

I.CLASSICAL/TRADITIONAL MANAGEMENT THEORY

Born and evolved in the 19th century (eldest MT).
Major purpose: To streamline work processes.
Included sub-theories: Scientific MT, and Bureaucratic organization & administrative MT.
Basic (fundamental) ideas:
i) rigid hierarchical structure;
ii) autocratic administration;
iii) pyramid order;
iv) strong control & command-based system.
Basic principle: To focus on task efficiency & employees' motivation through economic & monetary rewards.
Out of date in the contemporary world
Classic instruments: methods, indicators, diagrams, etc

2. NEO-CLASSICAL MANAGEMENT THEORY

Born and evolved in Elton Mayo experiments (systemic MT) – 1924-1932.
Major purpose: A company recognition as a social system.
Included sub-theories: Human relations school, Maslow's hierarchy of needs, X-and-Y, Herzberg's two-factor theory, *behavioural school, Lateral process within the hierarchy.*
Basic ideas:
i) the birth of the humanised organization,
ii) focused on the human orientation,
iii) underlines behavioural aspect of employees,
iv) drives forces of people;
Basic principle: To revise the hierarchical structure of any organization and to point out that humans are the most valuable asset.
Out of date in the contemporary world
Neo-classic instruments: models, methods, techniques, factors, indicators, samples, graphs, etc

3.MODERN &POSTMODERN MANAGEMENT THEORY

Born and evolved from 1960 to the present (MT as an open system)
Major purpose: A company is a distinct response to more and more complex external and internal factors, because "*one size does not fit all*" (keeping in mind systems, contingent approach, management science (MS) & organizational humanism at the core of organizational operations in a dynamic business environment).
Included sub-theories: system theory (SMT), modern behavioural school (MBS), organizational humanism, contingency (OHCMT), operations management theory (OMT), management science (MST), contingency approach theory (CAMT) post-modern to modernity era,
Basic ideas:
i) MS is a quantitative approach to solving the various decision-making problems in organizations and societies;
ii) MS develops mathematical models of distinct problems;
iii) any construct of mathematically oriented models may be solved using various mathematical techniques;
iv) MS encompasses a logical approach to problem-solving by applying mathematical models and computing technology & techniques;
v) MS is a multidisciplinary field or domain for many related disciplines (e.g. mathematics, engineering, natural sciences statistics, informatics, econometrics, physics, etc.)..
Basic principle: To redefine all management components of planning, organizing, commanding, coordinating and controlling into modern innovation, active organizing and encouraging, both entrepreneurship and self-control.
Up date: uninterrupted trend in the contemporary world
Modern & postmodern instruments: mathematical vision & engineering approach, complex statistics, physics & econometrics models based on more factors to solve less and less certain or stable variables and problems

Source: Realised by the author from [25-29].

Fig. 2. A brief presentation of major management theories (sub-theories) implied in economic, social and demographical evolutions

The new digital economy, the phenomenon of Big Data, robots and Chatbots, Machine Learning solutions, and especially the new Artificial Intelligence (AI) radically changed both the nature and the essence of human beings' associations and relationships, together with management science (MST) and artificial support for human intelligence. All of these transformed a traditional population into a more and more practical one, nearly eliminating the spatial or territorial constraints on human activities through a virtual contiguity process assuring a better communication bridge, and thus generating processing based on the systematic new spatial models associated with the combined time-territorial phenomenon of working online.

The first usual and generally acknowledged management methods remain [30]:

i) previsional management method (MP),
ii) method through objectives (MPO),
iii) method through exception (MPE),
iv) method through projects (MPP),
v) method on the product (MPPr),
vi) method through budgets (MPB),

vii) method through results (MPR),
viii method through systems (MPS),
ix) method through innovation (MPI),
x) collegial method (MC),
xi) method through consensus (MPC)
xii) specific statistical methods (SSM), etc.

Modern management science (MS), is more than a sub-theory of modern management theory (MST), being founded on an excessive quantitative approach combined with adequate psychological support to solve the various decision-making problems that confront management in any kind of organization and in human societies by developing statistical methods, including Index Number Method (INM) and its specific indicators, and mathematical models of all those problems.

3. METHODOLOGY & DATA, GEOMETRICAL RESEARCH METHODS FOR STATISTICAL CONFRONTATION

Despite numerous and distinctive approaches and factors that differ from one population to another, from an economic agent to another, from region to region or from market to market, a coherent managerial decision involves some basic criteria, sub-criteria, alternatives and, finally, all of these include systems of distinctive classic factors and even more neo-factors for constructing and developing an adequate structure inside statistical VPSIN & APSIN.

3.1. A general approach to a demographysics model based on the management decision theory

In the geometry of polyhedra, three types of radii related to the circumscribed (r_c), inscribed (r_i) and median (r_m) spheres are the most frequently used. In the case of the platonic solid type (regular polyhedron or RPH), the selection of the radius of the circumscribed sphere (r_c) ensures the maximum degree of variability of the final ratio that constitutes the volume or surface index (VPSIN or APSIN). An extensive variation and a maximum variability of the instrumental type in the case of the Index Numbers Method (INM) as in any other confrontation method, constitute perennial and valid statistical reasons for a better scientific measurement.

A significant methodological criterion for quantifying the variability of the investigated phenomena (demographic, economic, social, etc.) presupposes that each of the management decision factors is initially equal to a circumscribed sphere's radius of one unit (r = 1 or r = 100%).

A general management model is shown below in figure no. 3, to exemplify the complexity of the decision-making and the construct frame, including some major characteristics of demographic phenomenon.

External & Internal Factors	Management Decision Foundations (MDF)		Perspectives	Common goal
Political Legal Economic Demographics Socio-cultural Ecological Technological SWOT factors Searched advantages Studied disadvantages Risks vs opportunities Unknown errors' top Uncertainty level	Management functions applied in demography	Planning-Organizing-Leading-Staffing-Controlling (P-O-L-S-C)	Learning & growth Internal/external stakeholders Security& privacy Internal/external processes Organizational capacity Human-centric Organizational culture Population's traditions	Survival Health growth Sustainability Well-being Prosperity Reciprocity Balance Sense of good achievement Self content Satisfaction Trust
	Managers' Types & Roles in Organization (Population)	Decisional role + Interpersonal role + Informational role		
	Effective Management of Organizational Resources	Allocating resources: i) time; ii) people; iii) money; iv) assets		
	Applied Dimensions of Emotional and Partnership Intelligence (EQ & PQ)	a) self-awareness; b) social awareness c) self-management; d) social skills; e) partnership ability;		
	Know-how in Business development (surviving and improving life conditions for population)	Business goals' alignment with MDF (vision, mission, strategies, leadership, systems, structure, culture) + Strategist & operational levels' alignment		

Source: Realised by the author from [7-11 & 24, 31].

Fig. 3. A general approach to demographysics based on the management model as a foundation for decision-making construct

3.2. About the necessity of geometrical IN

Some methodological difficulties or problems can be eliminated or improved by the generation of new IN constructions like VPSIN & APSIN etc. These are specific geometric IN based on volume and area, focused on "*n-gons*", and on Platonic solids (especially on RPH) able to quantify the dynamics of complex phenomena and to meliorate many other aspects:

i) expanding the population of index numbers capable of correctly interpreting various other multidimensional markets, activities or fields under the impact of Big data or IoT - Internet of things (domestic robots market, suitability of managerial decisions for complex IT markets, etc.);

ii) the relative instrumental optimization and stabilization of the number of factors and their influence in the complex phenomenon analyzed dynamically or spatially and the constant updating and improvement of the sampling frame, etc.;

iii) solving through statistical confrontations the family of geometric indexes (VPSIN vs, APSIN) in the objective of spatial coverage, limitations and errors, in parallel with the identification and detailing of new weighting coefficients chained chronologically or spatially;

iv) the establishment of relevance limits or error thresholds with minimal anticipated effect in the annual change of the geometric indexes (surface, volume, etc.);

v) data optimization with regard to periodicity & non-periodicity, aggregation & disaggregation, elementary index chaining & ***interruption*** (aiming at the identification of n-gons and appropriate platonic solids, rather than artificial units);

vi) providing databases resulting from surface or volume geometric INs capable of leading to the calculation of elasticity, association, and correlation coefficients in the IN universe;

vii) based on modern statistical thinking, whose trends are increasingly approaching from inter- to trans-, & multidisciplinarity evolutions, a geometric IN (VPSIN or APSIN) becomes naturally a "*interpretive IN"* & a tool for regular confrontation with chronological & territorial coverage, adequate methodologies, with increasingly extensive and intensive quantification values, from the classic and economic area to the social, psychological, geographical, historical domains, etc (Săvoiu, 2015; Săvoiu *et al*, 2022) [6, 24].

The statistical confrontation method is a simple procedure of a strong practical purpose meant to validate a statistical solution, but, neither by conflict, nor by challenge, and only by a complete scientific dialogue or academic discussion about a statistical issue (variable, variability, instrument, method, methodology, etc.).Statistical confrontation involves opposing scientific viewpoints not only in time but also in space or even structurally, all of which are being viewed and finally considered just as trans-, inter- & multidisciplinary approaches.

"*Statistical thinking* [based on indices method respectively more precisely it means to interpret or analyze through quantitative values' interpretation with qualitative consequences the general level of an aggregate IN from the individual IN], *but, only hoping for ergodicity; ensuring not only stability, but also comparability, through confrontation method as a state of mind, visualizing, analysing and interpreting, in a manner that is not exclusivist or smooth, respectively uni- or two-dimensional, but rather, by extension, three-dimensional (simultaneously in a temporal, spatial and structural or organizational way)*" *(Savoiu, 2015, p. 16)* [24].

There are two mathematical notions in geometry such as polyhedron & polytope, based on different significances:

a) *polyhedron* is the generic notion of an object developed in any dimension;

b) *polytope* is just a bounded polyhedron and is more.

This paper used a generic notion or concept but with standard different dimensions of polytope generating multiple types such as nullitope (-1), moron (0), dion (1), polygon (2), polyhedron (3), polychoron (n) etc.

All the surfaces that delimit the Platonic solids are specific to three types of n-gons (where *n* is the number of sides or edges and n = 3, 4, 5) which have a special symmetry and equivalence. If a regular polygon is an n-sided or n-edged polygon (from the n-gons family) than the sides or the edges are all of the same length and are symmetrically placed about a common center and thus the polygon is both equiangular and equilateral. As a natural consequence, regular polyhedra (RPH) or Platonic solids (PS) are convex polyhedra and all possess the maximum symmetry, starting from three essential (regular) polygons: the equilateral triangle, the square and the pentagon [32-34].

A researcher can find an infinite number of regular polygons or n-gons, one for each positive number of sides or edges (n) such that $n \geq 3$, but the same researcher will find that this is not the case for the Platonic solids. RPH and especially Platonic solids are only five unique three-dimensional solids which consist of a collection of polygons joined at their edges, convex (the planes that bound the solids do not enter its interior and with all faces congruent regular polygons, and with the same number of faces at each vertex) (DeHovitz 2016) [34]. Starting from the usual elements of any regular polyhedral which are geometrical edges or sides (E), faces (F) and vertices (V), anyone can discover the combinatorial description of Schläfli symbolic or standard abbreviation where only sides or edges and faces are considered essential {n_S = the number of edges or sides surrounding each face, m_S = the number of faces, meeting at each vertex}. Two relations are important to validate the existence of only five Platonic solids. The first is purely geometric and underlines that by definition polyhedron is simply connected if every simple closed curve drawn on the surface can be shrunk to a point, and the second is known as Euler's Polyhedral Formula (EPF). (DeHovitz, 2016, p. 16) [34].

The derived equation of Euler theorem:

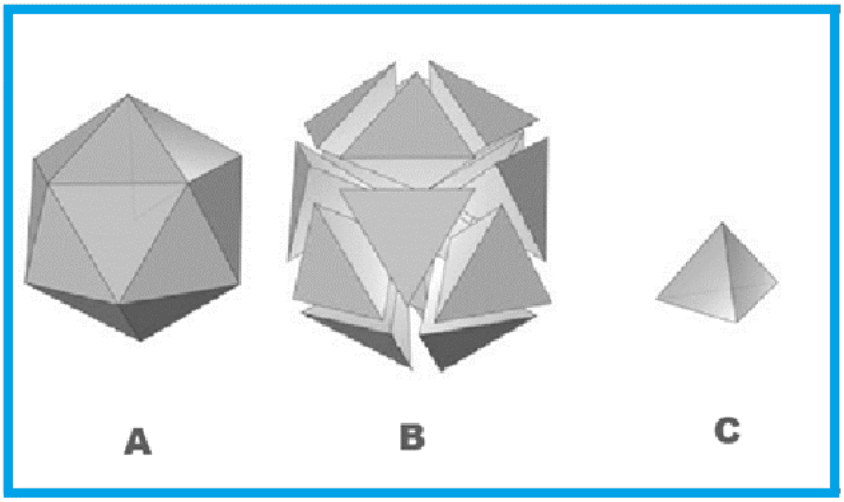
$$\mathbf{m \times V = 2E = n \times F} \quad (1)$$

leads to inequality:

$$\mathbf{4 > (n - 2)(m - 2)} \quad (2)$$

Knowing that n and m must each be at least 3, it can be seen that there are only 5 possibilities in Schläfli symbolic or standard abbreviation for {n, m}: {3, 3}, {4, 3}, {3, 4}, {5, 3}, {3, 5}.

Thus, this inequality has the well-known 5 ordered pair solutions that each corresponds to one of five Platonic solids. Finally, n and m become the limited values of n_S and m_S (3, 4, 5). Any of the Platonic Solids can be restructured or divided into equivalent or identical volume sub-components able to generate a stable number of substitutes or factors, identifying all sub-components (i.e. B from A) extracting one from the entire PS (i.e. C from A) in icosahedron's case as anyone can see in Figure no. 4:



Source: Realised by the author.

Fig. 4. The image of the entire icosahedron and the 20 equivalent or identical volume identical or standard subcomponents (substitutes or factors)

In fact, a statistical confrontation becomes necessary including not only a validated Euler formula but also identifying some substitutes identical to the final factors in the small RPHs' world able to generate PSIN, detailed through volume as VPSIN or area as APSIN (Table no. 1).

Table no. 1: Statistical confrontation based on vertices, edges (sides), faces and substitutes or factors

Regular Polyhedron (RPH)/Platonic Solid (PS) – using standard symbol Schläfli* {n_S, m_S}	Vertices (V)	Edges (sides) (E)	Feţe (F)	Validarea relaţiei lui Euclid V + F – E = 2	Number of identical volume subcomponents (substitutes or factors)
Tetrahedron {**3**, 3}	**4**	6	4	4 + 4 – 6 = 2	**4 with 3 - gon base**
Hexahedron {**4**, 3}	**8**	12	6	8 + 6 – 12 =2	**6 with 4- gon base**
Octahedron {**3**, 4}	**6**	12	8	6 + 8 – 12 = 2	**8 with 3 - gon base**
Dodecahedron {5, 3}	**12**	30	20	12 + 20 – 30 = 2	**12 with 5 - gon base** **60 with 3 - gon base**
Icosahedron {**3**, 5}	**20**	30	12	20 + 12 – 30 = 2	**20 with 3-gon base**

*Source: Realised by the author. *Note: RPH are identified by Schläfli standard symbol* {n_S, m_S}, *where n means the number of sides surrounding each face and m the number of faces that surround each vertex.*

There is an important aspect in dodecahedron's structure duality, based either on a 5-gon as essential area or face (e.g. dodecahedron is able to be split into 12 identical volume subcomponents or substitutes or factors based on 12 equivalent regular pentagons) but also on 3-gon (e.g. dodecahedron is able to be divided into 20 identical volume subcomponents or substitutes or factors based on 20 equivalent regular trigons). The tables below present the circumradius and the derived edge or side, length, volume and specific errors (Table no. 2a) and surface distinct errors (Table no. 2b), for each of the Platonic solids. The preference for the circumradius (r_c) from all the three possible values (r_c, r_m, r_i) is obvious from the calculus of statistical errors (Table no. 2a, and 2b).

The entire methodological analysis that follows is the result of Occam's razor-type logic, from the natural desire for simplification. In fact, the methodological attitude is a theatrical one in this case, the theatre performance or the theatrical act itself imposing a necessary densification of the space-time-conflict type, which facilitates or explains the scene of the decision itself. The conflicting states become the object of the managerial analysis of the decision-making factors or the determining indicators in the decision (macro or microeconomics).The confrontation is not purely mathematical or purely statistical [35-37], but hides behind planar or spatial geometry the intention to detect and optimize a system of decision indicators appropriate to the investigated phenomenon.

Table no. 2a: Errors' calculus for Circumscribed Sphere Volume (CSV)

PLATONIC SOLID (PS)	s =Platonic solid's edge or side (PSE) length based on circumradius equal to unity (r_c=1 or 100%)	PLATONIC SOLIDS' VOLUME(PSV)	- % from CSV Circumscribed Sphere's Volume**-	ERROR's LEVEL -%-
Tetrahedron	s=(r_c):[0.612372435] =1.6329931	$V=[(\sqrt{2}):12]\times s^3 = 0.5132002$	12.2517523	> 87.74
Hexahedron	s=(r_c):[0.866025403] =1.1547005	$V=[(s^3)] = 1.5396007$	36.7552593	> 63.24
Octahedron	s=(r_c):[0.707106781] = 1.4142136	$V=[(\sqrt{2}):3]\times s^3 = 1.3333333$	31.8309878	> 68.16
Dodecahedron	s=(r_c):[1.401258538] = 0.7136442	$V=[(15+7\sqrt{5}):4]\times s^3= 2.7851639$	66.4908903	= 33.51
Icosahedron	s=(r_c):[0.951056516] =1.0514622	$V=[(15+5\sqrt{5}):12]\times s^3 = 2.5361507$	60.5461381	= 39.45

*Source: Realised by the author. *Note: Value of* π *= 3.1415926536 and of circumradius (r_c) = 1 or 100%*

***Note: Circumscribed Sphere's Volume (CSV) = 4.1887902*

The decision to select a unique Platonic solid based on minimum error identifies in the dodecahedron the model of a system able to generate a minimum decisional error.

Table no. 2b: Errors' calculus for Circumscribed Sphere Surface (CSS)

PLATONIC SOLID (PS)	s =Platonic solid's edge or side (PSE) length based on circumradius equal to unity (r_c=1 or 100%)	PLATONIC SOLIDS' SURFACE (PSS) OR AREA (APS)	% from CSS - Circumscribed Sphere's Surface***	ERROR's LEVEL - % -
Tetrahedron	s = (r_c): [0.612372435] = 1.6329931	$S=[(\sqrt{3})\times s^2] = 4.6188022$	36.7552601	> 63.2
Hexahedron	s = (r_c): [0.866025403] =1.1547005	$S=[6\times s^2] = 8.0000000$	63.6619773	> 36.3
Octahedron	s = (r_c): [0.707106781] =1.4142136	$S=[2\sqrt{3}\times s^2] = 6.9282032$	55.1328893	> 44.8
Dodecahedron	s = (r_c): [1.401258538] =0.7136442	$S=[3\sqrt{25+10\sqrt{5}}]\times s^2= 10.5146222$	83.6727049	= 16.3
Icosahedron	s = (r_c): [0.951056516] =1.0514622	$S=[5\sqrt{3}\times s^2] = 9.5745414$	76.1917796	= 23.8

*Source: Realised by the author. *Note: Value of* π *= 3.1415926536 and of circumradius (r_c) = 1 or 100%*

****Note: Circumscribed Sphere's Surface (CSS) = 12.5663706*

The methodological confrontation between revealing polyhedra and n-polygons for the optimization of the adequate selection of the indicator system (Table no. 3) leads to the same choice of the dodecahedron and the icosahedron as decision tools or solutions in management (micro or macroeconomic).

Table no. 3: Statistical confrontation based on edges and errors

Regular Polyhedron (RPH)/Platonic Solid (PS) - using standard symbol Schläfli**** {n_S, m_S}	Platonic solid's Factors (PSF)		"n-gons"	Polygons (n-gons) Factors (n-GF)		Differences (PSF) – (n-GF)	
	Edges (sides)	Errors		Edges (sides)	Errors	Edges (sides)	Errors
Tetrahedron {3, 3},	4	87.74	Trigon-Triangle	3	58.65	1	29.09
Hexahedron {4, 3},	8	63.24	Tetragon-Square	4	36.34	4	26.90
Octahedron {3, 4},	6	68.16	Hexagon	6	17.30	2	50.86
Dodecahedron {5, 3},	20	**33.51**	Dodecagon	12	4.52	12	28.99
Icosahedron {3, 5},	12	**39.45**	Icosagon	20	1.64	-8	37.81

*Source: Realised by the author. ****Note: RPH are identified by Schläfli standard symbol {n_S, m_S}, where n means the number of sides surrounding each face and m is the number of faces that surround each vertex.*

Finally, the methodology seeks to minimize the number of indicators selected by the system and correlated with the level of errors. Even the last confrontation of the last two Platonic solids with "*n-gons*" [6] leads to the selection of both constructions, dodecahedron and icosahedron for the level of errors (as minimum value) but also only to the icosahedron for the number of factors (as minimum value too).

The selection of *dodecagon* and *icosahedron* was caused not only by their duality but especially by the error level and a number of factors assimilated as the importance of complex phenomena. These two complex RPHs appear in biology (i.e. natural species well-known in scientific language as *Coccolithophore Braarudosphaera Bigelowii* and their *regular dodecahedral structure* & *Radiolarian Circogonia Icosahedra etc.).*

PSIN has many ways of calculus but the paper is structured in two manners (VPSIN and ASPIN) either as general formula or detailed to *dodecagon* and *icosahedron.* The starting point remains the ratio or the mathematical report in the simple way of thinking and evaluating, specific to statistical INM, used in the construction of any IN, including PSIN (VPSIN and ASPIN) and the value of circumradius (r_c) = 1 or 100%. A general PSIN's calculus is a statistical ratio or share between two volumes estimated in different units of time (t_0 and t_1), space (t_0 and t_1) or even structure (st_0 and st_1), following the volume variation (VPSIN) or the surface of the phenomenon (APSIN):

$$\text{VPSIN} = \frac{\text{Vi1}}{\text{Vi0}} = \frac{\sum_{i=1}^{n}(\text{Vi1})}{\sum_{i=1}^{n}(\text{Vi0})} \quad (3)$$

or

$$\text{VPSIN} = [\text{V}_{i0} + \sum_{n=1}^{12}(\Delta\, V_n)]: \text{V}_{i0} \quad (4)$$

where Vi is the entire volume of the investigated phenomenon, estimated in different units 0 and 1, for any PS, based on the value of circumradius (r_c) = 1 or 100% for unit 0 and circumradius (r_c) variation for each factor's index for unit 1.

$$\text{APSIN} = \frac{\text{Ai1}}{\text{Ai0}} = \frac{\sum_{i=1}^{n}(\text{Ai1})}{\sum_{i=1}^{n}(\text{Ai0})} \quad (5)$$

or

$$\text{APSIN} = [\text{A}_{i0} + \sum_{n=1}^{12}(\Delta\, A_n)]: \text{A}_{i0} \quad (6)$$

Obviously for any PS, PSIN's calculus (VPSIN and APSIN) can be detailed following the pure volume criterion (VPSIN) and the surface criterion of the phenomenon as convex volumetric coverage (APSIN). The number n is generated by PS, respectively it becomes the number of identical volume subcomponents (substitutes or factors) from the last statistical comparison column of table 1:

i) n = 4 with 3-gon base;
ii) n = 6 with 4-gon base;
iii) n = 8 with 3-gon base;
iv) n = 12 with 5-gon base / n = 60 with 3-gon base;
v) n = 20 with 3-gon base.

In this research, the author follows only the criterion of minimizing the statistical errors, and according to the data in tables 2a and 2b, the calculus was actually detailed exclusively for dodecahedron (1.e. n = 12 with 5-gon base) and icosahedron (i.e. n = 20 with 3-gon base) in mathematical relations {(7), (8), (9), (10)}.

First of all, any detailed PSIN's calculus (I - VPSIN and I - APSIN) describes the statistical-mathematical formulas that make the distinction in relation to classical indices and respects the conceptualization of the method (INM)

I – VPSIN (7)

$$= \frac{\sum_{i=1}^{n}(\text{Vi1})}{\sum_{i=1}^{n}(\text{Vi0})} = \frac{\sum_{i=1}^{n}\left([(15+7\sqrt{5}):4]\right)\times(\text{Si1})^3}{\sum_{i=1}^{n}\left([(15+7\sqrt{5}):4]\right)\times(\text{Si0})^3} = \frac{\sum_{i=1}^{n}(\text{Si1})^3}{\sum_{i=1}^{n}(\text{Si0})^3}$$

I – APSIN (8)

$$= \frac{\sum_{i=1}^{n}(\text{Ai1})}{\sum_{i=1}^{n}(\text{Ai0})} = \frac{\sum_{i=1}^{n}\left(\left[3\sqrt{25+10\sqrt{5}}\right]\right)\times(\text{Si1})^2}{\sum_{i=1}^{n}\left(\left[3\sqrt{25+10\sqrt{5}}\right]\right)\times(\text{Si0})^2} = \frac{\sum_{i=1}^{n}(\text{Si1})^2}{\sum_{i=1}^{n}(\text{Si0})^2}$$

where n = 12, s = Platonic solid's edge or side (PSE) length based on circumradius equal to unity in a standard case for IN calculus (r_c=1 or 100%) and s = (r_c): [1.401258538] =0.7136442.

I –VPSIN (9)

$$= \frac{\sum_{i=1}^{n}(\text{Vi1})}{\sum_{i=1}^{n}(\text{Vi0})} = \frac{\sum_{i=1}^{n}\left([(15+5\sqrt{5}):12]\right)\times(\text{Si1})^3}{\sum_{i=1}^{n}\left([(15+5\sqrt{5}):12]\right)\times(\text{Si0})^3} = \frac{\sum_{i=1}^{n}(\text{Si1})^3}{\sum_{i=1}^{n}(\text{Si0})^3}$$

I – APSIN (10)

$$= \frac{\sum_{i=1}^{n}(\text{Ai1})}{\sum_{i=1}^{n}(\text{Ai0})} = \frac{\sum_{i=1}^{n(}\left[5\sqrt{3}\right])\times(\text{Si1})^2}{\sum_{i=1}^{n}\left([5\sqrt{3}]\right)\times(\text{Si0})^2} = \frac{\sum_{i=1}^{n}(\text{Si1})^2}{\sum_{i=1}^{n}(\text{Si0})^2}$$

where n = 20, s = Platonic solid's edge or side (PSE) length based on circumradius equal to unity in a standard case for IN calculus (r_c=1 or 100%) and s = (r_c) : [0.951056516] = 1.0514622.

Exemplifying with the help of 12 and 20 factorial index values according to Tables 4a, 4b and 4c, and in parallel 5a, 5b and 5c (in the second case of icosahedron keeping unchanged the first of the initial set of 12 values and completing it with another 8 values). Some statistical advantages of PSIN (VPSIN and APSIN) are obtained based on their specific graphic expressions from the Figure 4 and 5, completed by the normal distributions (Figure 5 and 6). Some significant differences to

the extreme values are confirmed in the cases of the distinct volumetric and surface developments similar to mathematical functions $f(x^2)$ and $f(x^3)$ types of the new detailed PSIN, where x is assimilated to a classic IN [38-41].

Volume's changes are visible after circumradius is modified for each of 12 substitutes or factors transformed in statistical indicators (indices) in dodecahedron case:

Table no. 4a: Statistical confrontation of classic IN, VPSIN and APSIN
(based on the aggregate of volumes and areas in calculus in dodecahedron)

Classic calculus of IN *Standard value IN = 1.000*	**Volume calculus (VPSIN)** *Standard value for IN =1 and (r_c) = 1* $V=[(15+7\sqrt{5}):4]\times s^3= 2.7851639$	**Area calculus (APSIN)** *Standard value for IN =1 and (r_c) = 1* $S=[3\sqrt{25+10\sqrt{5}}]\times s^2= 10.5146222$
0.902	2.0439504546	8.5547387149
0.941	2.3207033114	9.3104982178
0.970	2.5419438584	9.8932080679
0.987	2.6779484315	10.2430190352
1.000	2.7851638631	10.5146222424
1.001	2.7935277130	10.5356620015
1.030	3.0434237527	11.1549627369
1.050	3.224175317	11.5923710222
1.068	3.392848829	11.9932304806
1.075	3.4600003635	12.1509603289
1.081	3.5182592124	12.2869774822
1.100	3.7070531018	12.7226929133
12.205 : 12 = **1.0170833333**	35.5089982084 : 12=2.959083183 2.959083183 : 2.7851638631= **1.062444915**	130.9529432438 : 12 = 10.91274527 10.91274527 : 10.5146222424 = **1.03786375**

Source: Realised by the author

*Note: Value of $\boldsymbol{\pi}$ = 3.1415926536 and of circumradius (r_c) = 1 or 100%

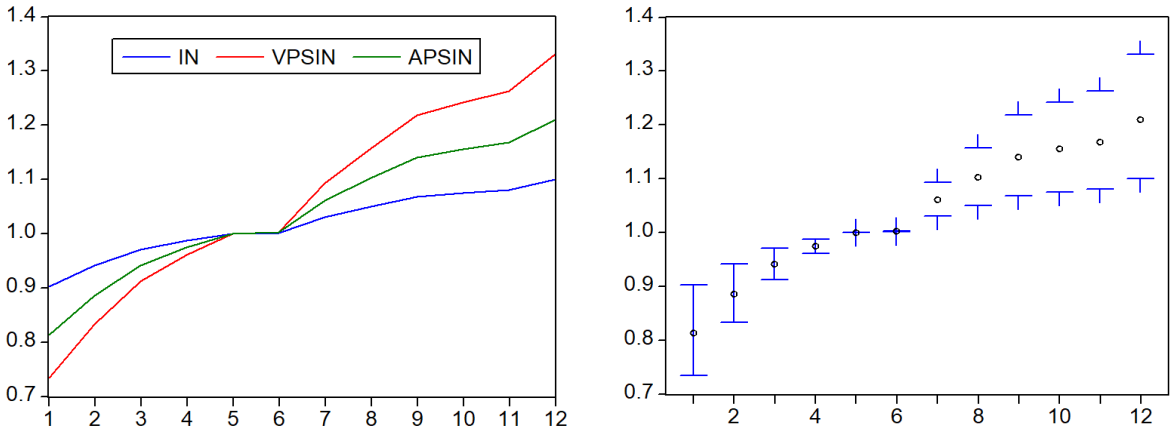
Table no. 4b: Statistical confrontation of classic IN, VPSIN and APSIN
(based on direct indices of volume and area in dodecahedron)

Classic calculus of IN *Standard value IN = 1.000*	**VPSIN** *Standard value for IN =1 and (r_c) = 1*	**APSIN** *Standard value for IN =1 and (r_c) = 1*
0.902	0.7338708082	0.8136039946
0.941	0.8332376213	0.8854809941
0.970	0.9126730003	0.9408999938
0.987	0.9615048033	0.9741689935
1.000	1.00000000000	0.9999999934
1.001	1.0030030014	1.0020009934
1.030	1.0927270004	1.0608999930
1.050	1.1576250004	1.1024999927
1.068	1.2181864324	1.1406239925
1.075	1.2422968754	1.1556249924
1.081	1.2632144414	1.1685609923
1.100	1.3310000005	1.2099999920
12.205 : 12 = **1.01708333**	12.749338985 :12 = **1.062444915**	12.4543649177 : 12 = **1.03786375**

Source: Realised by the author

* Note: Value of $\boldsymbol{\pi}$ = 3.1415926536 and of circumradius (r_c) = 1 or 100%

** Note: The major statistical advantage of PSIN (VPSIN and APSIN) is offered in the comparison in Table 4b by the extensive variation of the values of the new volume and area indices in the dodecahedron case.



Source: Realised by author based on data from table 4b

Fig. 5. Visual differences between classic IN and PSIN (VPSIN and APSIN) as the extended variation of the extreme or limiting values in the dodecahedron case

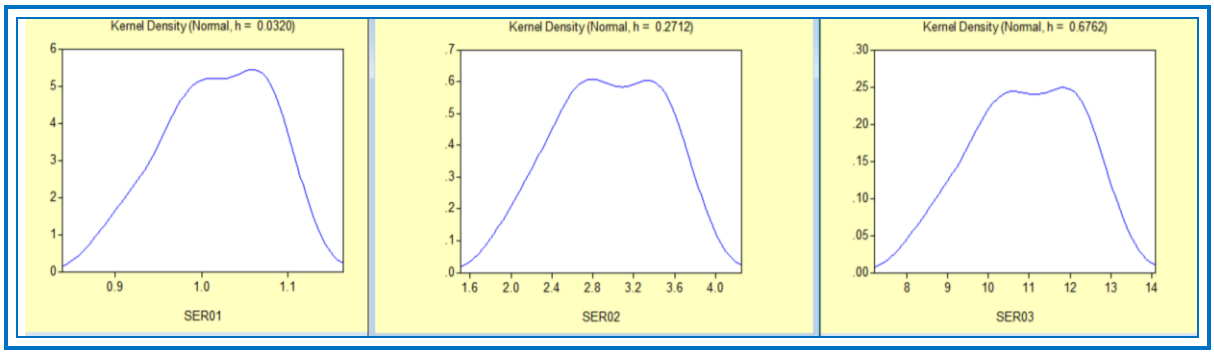
PSIN (VPSIN and APSIN) values are still highly correlated on a level relatively identical to classic IN according to the Correlation Matrix based on data from Table 4b:

Table no. 4c: Correlation Matrix between IN, VPSIN and APSIN in dodecahedron case

	IN	**VPSIN**	**APSIN**
IN	1.000000	0.998357	0.999582
VPSIN	0.998357	1.000000	0.999597
APSIN	0.999582	0.999597	1.000000

Source: Realised by the author based on data from the Table 4b

Even Kernel distributions are relatively similar for the three series of data (classic IN, VPSIN and APSIN (Figure no. 6):



Source: Realised by the authors based on data from Tables 4a

Fig. 6. Visual relative identity between classic IN and PSIN (VPSIN and APSIN) as Kernel distribution in dodecahedron case

Table no. 5a: Statistical confrontation of classic IN, VPSIN and APSIN based calculus in Statistical confrontation of classic IN, VPSIN and APSIN
(based on the aggregate of volumes and areas in calculus in the icosahedron)

Classic calculus of IN *Standard value IN = 1.000*	**Volume calculus (VPSIN)** *Standard value for IN =1 and (r_c) = 1* $V=[(15+5\sqrt{5}):12]\times s^3 = 2.5361507101$	**Area calculus (APSIN)** *Standard value for IN =1 and (r_c) = 1* $S=[5\sqrt{3}\times s^2] = 9.5745413833$
0.900	1.8488538677	7.7553785205
0.902	1.8612069708	7.7898851676
0.925	2.0072444050	8.1922169711
0.941	2.1132161842	8.4780744786
0.950	2.1744322151	8.6410235984
0.965	2.2790665020	8.9160522996
0.970	2.3146762771	9.0086859875
0.975	2.3506550621	9.1017984025
0.980	2.3870047592	9.1953895445
0.987	2.4385210889	9.3272214048
1.000	2.5361507101	9.5745413833
1.001	2.5437667732	9.5937000406
1.030	2.7713203570	10.1576309535
1.040	2.8528246324	10.3558239601
1.050	2.9359114658	10.5559318751
1.056	2.9865295239	10.6769157800
1.068	3.0895043846	10.9209516908
1.075	3.1506521017	11.0645793860
1.081	3.2037022016	11.1884356534
1.100	3.3756165952	11.5851950738
19.996 : 20 = **0.9998**	51.2208560776 : 20 = 2.561042804 2.561042804:2.5361507101= **1.0098149**	192.0794321717 : 20 = 9.603971605 9.603971605: 9.5745413833 = **1.0030738**

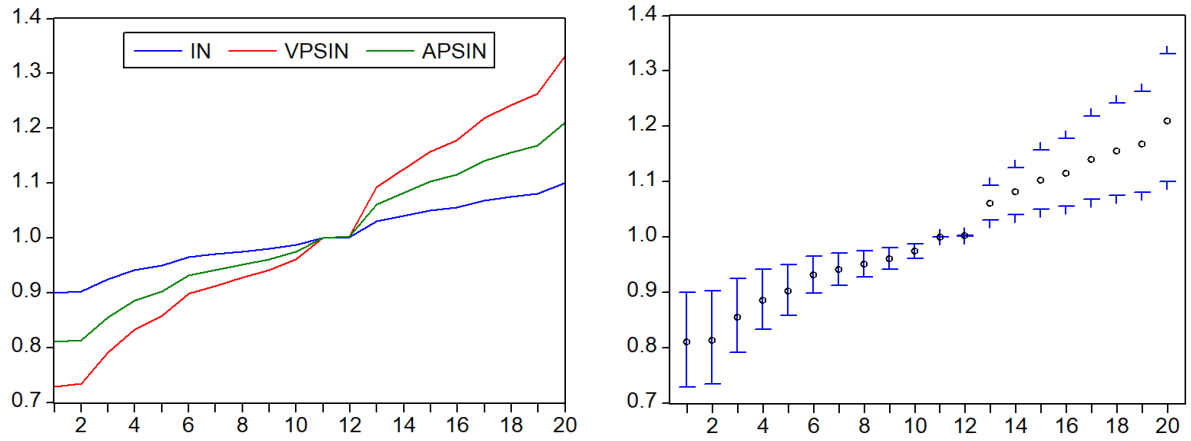
Source: Realised by the author. *Note: Value of π = 3.1415926536 and of the circumradius (r_c) = 1 or 100%

Table no. 5b: Statistical confrontation of classic IN, VPSIN and APSIN
(based on direct indices of volume and area in icosahedron)

Classic calculus of IN *Standard value IN = 1.000*	**VPSIN** *Standard value for IN =1 and (r_c) = 1*	**APSIN** *Standard value for IN =1 and (r_c) = 1*
0.900	0.7289999998	0.8099999933
0.902	0.7338708078	0.8136039932
0.925	0.7914531248	0.8556249929
0.941	0.8332376208	0.8854809926
0.950	0.8573749998	0.9024999925
0.965	0.8986321248	0.9312249923
0.970	0.9126729998	0.9408999922
0.975	0.9268593748	0.9506249921
0.980	0.9411919998	0.9603999920
0.987	0.9615048028	0.9741689919
1.000	0.9999999998	0.9999999917
1.001	1.0030030008	1.0020009917
1.030	1.0927269997	1.0608999912
1.040	1.1248639997	1.0815999910
1.050	1.1576249997	1.1024999909
1.056	1.1775836157	1.1151359907
1.068	1.2181864317	1.1406239905
1.075	1.2422968747	1.1556249904
1.081	1.2632144407	1.1685609903
1.100	1.3309999997	1.2099999900
19.996 : 20 = **0.9998**	20.1962982172 : 20 = **1.0098149**	20.0614758334 : 20 = **1.0030738**

Source: Realised by the author *Note: Value of π = 3.1415926536 and of circumradius (r_c) = 1 or 100%

The major statistical advantage of PSIN (VPSIN and APSIN) is also maintained in the case of the icosahedron and it is offered in the comparison in table 5b by the extensive variation of the values of the new volume and area indices.



Source: Realised by the author based on data from Table 5b

Fig. 7. Extended variation of the extreme or limiting values underlined from visual differences between classic IN and PSIN (VPSIN and APSIN) in icosahedron case

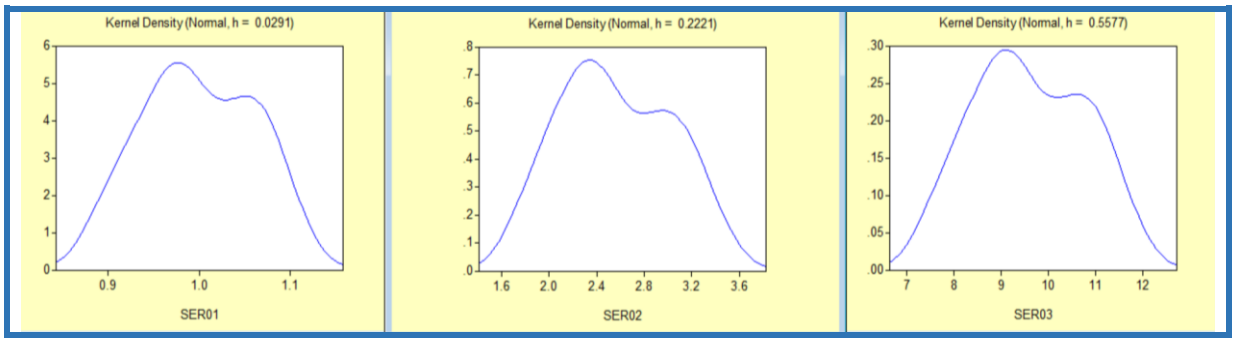
In the icosahedron case, PSIN (VPSIN and APSIN) values remain also highly correlated on a level relatively identical to classic IN according to the Correlation Matrix based on data from Table 5b:

Table no. 5c: Correlation Matrix between IN, VPSIN and APSIN in the icosahedron case

	IN	VPSIN	APSIN
IN	1.000000	0.998442	0.999605
VPSIN	0.998442	1.000000	0.999615
APSIN	0.999605	0.999615	1.000000

Source: Realised by the author based on data from Table 5b

Kernel distributions remains also relative similar for the three series of data (classic IN, VPSIN and APSIN (Figure no. 8) and in the icosahedron case:



Source: Realised by the author based on data from Tables 5a

Fig. 8. Visual relative identity between classic IN and PSIN (VPSIN and APSIN) as Kernel distribution in the icosahedron case

In conformity with Kernel Density and its formal graph (assuming a normal distribution of the PSIN data (VPSIN and APSIN) does not reveal disadvantages either apparent or of statistical substance or in-depth in relation to classic IN, either for the dodecahedron or for the icosahedron. Dodecahedron and Icosahedron cases have some major advantages from confrontation with other PS and these aspects refer to: a minimum level of error, an optimal number of substitutes or factors in the investigated phenomenon, and an extended variation of individual IN values from PSIN.

These examples and the entire methodological section underline the advantages of PSIN (VPSIN and APSIN) confronted with the classical IN in the dodecahedron. In fact, the advantages are really more visible than disadvantages, especially in the case of dual factors of the dodecahedron (12 or 60 subcomponents) and the icosahedron (20) not only as lower error level from the statistical confrontation with volume of circumscribed sphere in VPSIN calculus (33.51% from Table 2a) and area of circumscribed sphere in APSIN calculus (16.3 % from Table 2b), but also as smaller number of substitutes or factors in the investigated phenomenon and as the biggest variation of the factorial indices, etc.

4. RESULTS AND DISCUSSIONS

Any time when a "demographic change" appears also it requires not only verified measurements and an aggregate vision but also some urgent economic & social policy developments. Whenever a "major demographic change" appears it also requires not only new and profoundly verified measurements, together with an aggregate vision based on a relevant selection of some demographical index numbers (INs), but also a synthetic indicator about the population's evolution (involution). This new type of IN must be able to characterize demographic trends as a whole, starting from a reasonable number of constructive details focused on essential sub-phenomena and allowing the identification of urgent economic & social policy solutions based on new developments.

Everything becomes similar to the understanding of the impact between two populations in time and space, but even structurally, like a collision of an asteroid with the Earth based on a single final indicator to bring together all the existing speeds, from those related to opposite impulses to those of mutual attraction and repulsion, from gravitational ones to anti-gravitational ones, etc. Such a multidisciplinary approach with holistic tendencies [42-43] can by extension ensure a comparability of all types of velocities or dynamics that appear, from areolar to angular velocity, from orbital to gravitational velocity, from absolute to relative velocity, from the speed of attraction to the speed of repulsion, etc.

Classical demographic dynamics require an aggregate index that, by analogy with Kepler, validates the third law of planetary motion, where "*the square of the period of the planet's revolution should be in a relatively proportional relationship with the cube of the semi-major axis of the orbit*" [44-45]. This first physical aspect leads to a demographic type of thinking that measures, correlates and even confronts the evolution of multiple dimensions and speeds in geometric terms of surface or area and volume or space. In this stage, prior to a more or less generalized space-time relativization, the new geometric index, proposed in this article and entitled PSIN (APSIN from area or VPSIN from volume) can be constructed with the help of either only 12 factors in the dodecahedron or another 20 factors in icosahedron where partial or individual index numbers (visible images as factorial statistical variables) describe the very different ratios of the speeds of fertility, death, birth, migration (immigration and emigration), rejuvenation or ageing, nuptiality or divorce, illiteracy or education, etc. How could these connections between demography speeds as demographical phenomena measured through individual indices influence the balance of the human universe, finally quantified through an aggregate index number as a result? The way in which these influences, associations and interconnections between the different demographic speeds could influence the balance of the human universe can be given as an example of the complexity of the relationships (i.e. the speed of ageing changes productivity and well-being, ultimately influencing the speed of population growth, by increasing emigration or by reducing demographic nuptials).

The initial vision is statistical and the final justifying one becomes physical and the jump from classical demography to demo(gra)statistics and finally to demography becomes a necessary and much easier to understand transformation in the dynamics of human populations or even in abstract populations.

The new instruments' application in a new domain of demo(gra)statistics or demographysics must be followed by a necessary statistical confrontation, and this research paper does it consequently. In a natural practice of the new geometric indices proposed from the two PSIN cases (VPSIN and APSIN) and in order to facilitate the management requirements and make the appropriate or optimal decisions, both political, economic, social and cultural related to the demography of an extended area (i.e. the European Union) implies first of all, the identification of a set of derived demographic phenomena that must contain both 12 and 20 key decisional factors, respectively the use of a dodecahedron (12 factors)

or icosahedron (20 factors) PSIN type index (VPSIN or APSIN).

In this specific way of demo(gra)statistical or demographic physical thinking or in this more profound and distinctive sense, tables no. 6 and no. 7 represent the selected factors and together with 6a, 6b, and 7a, 7b, offer a demographic PSIN calculus and statistical comparison. In another typically statistical way of thinking and parsimony-focused vein, all calculations as referred to all VPSIN and APSIN indicators in a dodecahedron & icosahedron as major hypotheses, based on 12 and 20 factors transformed into classical INs are similarly resumed. The final aggregated value of such an original Index Number, based on Platonic Solids (PSIN), express naturally in a geometric manner, more complex & more truthful in relation to the methods, techniques and instruments focused on classical indices (i.e. classical Index Number Theory -INT & classical results, known as Index Numbers-INs).

Table no. 6: Some Major Demographical Factors (generating the 12 PSIN's key factors in EU)

Previous year = 1.000000

No	A key factor and derived Index Number	Value*
1.	Deaths (2020/2021)	0.9786276
	5,184,078 : 5,297,294 = 0.978627578	
2.	Life births (2021/2020)	1.0041778
	4,088,494 : 4,071,484 = 1.004177838	
3.	Net natural change (2021/2020)	0.9969231
	(0.972) : (0.975) = 0.996923076	
4.	Infant mortality rate (2021/2020)	0.9762795
	3.14568 3.22211 : = 0.976279518	
5.	*Immigration from outside EU (2021/2020)*	1.1760124
	2,255,406 : 1,917,842 = 1.176012414	
6.	Emigration to outside EU (2020/2021)	0.8570580
	956,247 : 1,115,732 = 0.857057967	
7.	Healthy life years at birth (2021/2020)	0.9907121
	64.0 : 64.6 = 0.990712074	
8.	Fertility rate (2021/2020)	1.02
	1.53 : 1.50 = 1.02	
9.	Ageing (65 years & more) (2020/2021)	0.9855769
	0.205 : 0.208 = 0.985576923	
10.	Crude divorce rate (2020/2021)**	0.9657647
	1.6:1.7 = 0.94117647+final correction = 0.965764705	
11.	*Crude marriage rate (2021/2020)***	1.1273125
	3.9 : 3.2 = 1.21875 + final correction =1.1273125	
12.	Life expectancy at birth (2021/2020)	0.9962627
	80.1: 80.4 = 0.99626268656	

Source: Realised by the author from available online data at: https://ec.europa.eu/eurostat/databrowser/ product/view/

*All of the demographic key factors' information is selected from https://chat.openai.com being analyzed by the author based on the criterion of a maximum of 12 dodecahedron's indicators, and thus becoming a narrow list of a more extensive one in relation to the data availability. The data construction of comparable indicators is based on both statistical and demographic standards. *Note: Each value is expressed as index numbers (IN) according to the positive impact of the key factor on the demographic evolution of the EU, dividing the indicator from 2021 to that of 2020 (i.e. births) or vice versa (i.e. deaths). **Note: 58.2 % of children are born inside marriages two corrections were needed to IN from lines 11-12.*

Once the 12 significant indicators have been selected (Table no. 6) that describe, in the spirit of the classic number index, the relationship between various fertility rates, natural movement, migratory movement, life expectancy (including healthy life expectancy), urbanization, ageing speeds, divorce and nuptiality, as well as speeds or accelerations related to structural changes and the replacement of some age structures with others etc. a demographic-type geometric index can be determined, which is a final aggregate of these demographic speeds according to the examples in the methodological section.

Table no. 6a: Statistical confrontation of the demographical IN and PSIN (VPSIN & APSIN), based on aggregates of volumes & areas, through a pragmatic calculation focused on a dodecahedron

IN Classic calculus *Standard value IN = 1.000*	**Volume calculus (VPSIN)** *Standard values IN =1 &(r_c) = 1* V=[$(15+7\sqrt{5}):4$] ×s^3 = 2.7851639	**Area calculus (APSIN)** *Standard values IN =1& (r_c) = 1* S=[$3\sqrt{25+10\sqrt{5}}$]×s^2 = 10.5146222
0.9786276	2.6103763817	10.0699796813
1.0041778	2.8202174758	10.6026617423
0.9969231	2.7595338740	10.4500169053
0.9762795	2.5916315709	10.0217142282
1.1760124	4.5298774688	14.5417768688
0.8570580	1.7534015694	7.7234991063
0.9907121	2.7082774485	10.3202117673
1.02	2.9556381729	10.9394129810
0.9855769	2.6663815738	10.2135026591
0.9657647	2.5087924474	9.8070034723
1.1273125	3.9900994434	13.362333898
0.9962627	2.7540534436	10.4361765090
12.074707: 12=**1.0062256**	(34.6482808702:12): 2.7851638631 = = **1.0366919**	(128.4882898189:12) : 10.5146222424 = =**1.0018330**

Source: Realised by the author. *Note: Value of π = 3.1415926536 and of circumradius (r_c) = 1 or 100%

After finishing the geometric calculations in Table no. 6a, the statistical comparison of the two demographic PSIN values (VPSIN and APSIN based directly on the volume and surface indices in the dodecahedron) is carried out in Table no. 6b, starting from the degree of proximity to the general dynamics of the population in the EU between 2020 and 2021 (i.e. described in Table no. 6c).

Table no. 6b: Statistical confrontation of the demographical IN and PSIN (VPSIN & APSIN), based on direct indices of volume & area in dodecahedron

IN Classic calculus *Standard*	**VPSIN -** *Standard values IN =1 &*	**APSIN -** *Standard values IN =1 &*

value IN = 1	*(r_c) = 1*	*(r_c) = 1*
0.9786276	0.9372433760	0.9577119795
1.0041778	1.0125858350	1.0083730540
0.9969231	0.9907976728	0.9938556673
0.9762795	0.9305131397	0.9531216621
1.1760124	1.6264312232	1.3830051650
0.8570580	0.6295505958	0.7345484154
0.9907121	0.9723942941	0.9815104651
1.02	1.0612080000	1.0404000000
0.9855769	0.9573517771	0.9713618258
0.9657647	0.9007701416	0.9327014558
1.1273125	1.4326264592	1.2708334727
0.9962627	0.9888299500	0.9925393674
12.074707: 12= **1.0062256**	12.4403024645:12 = **1.0366919**	12.219962530:12 = **1.0018330**

*Source: Realised by the author. *Note: Value of* π *= 3.1415926536 and of circumradius (r_c) = 1 or 100%.*

*** Note: The major statistical advantage of PSIN (VPSIN and APSIN), visible both in Table 6b and in 6a, is offered by the extensive variability of the values of the new volume and area indices in this specific case of the dodecahedron used as Platonic Solid (PS).*

From the completely new result presented in Table no. 6a and 6b anyone can see that the original determination of the PSIN (VPSIN and APSIN) offers an interpretive framework with a greater potential, compared to the gross change index in classical IN calculus. When the research needs or demands a more performing PSIN (VPSIN or APSIN), the number of demographic factors can increase and the icosahedron may be used as a Platonic Solid with 20 equal surfaces or under the influence of 20 distinct factors, also extracted from the demographic family in this case (Table no. 7, 7a, 7b).

The increase in the number of factors practically amplifies the quality of the new PSIN as a geometric index of volume or surface and diminishes the gap compared to the classic index of the demographic evolution of the entire population. New values reveal that immigration and marriages have a slightly corrected impact on the ensemble of the final innovative construction.

Table no. 7: Some Major Demographical Factors (generating the 20 PSIN's key factors in EU)

Previous year = 1.000000

No	Key factor and derived Index Number	Value*
1.	Deaths (2020/2021)	0.9786276
2.	Life births (2021/2020)	1.0041778
3.	Net natural change (2021/2020)	0.9969231
4.	Infant mortality rate (2021/2020)	0.9762795
5.	*Immigration from outside EU* (2021/2020)	1.1760124
6.	Emigration to outside EU (2020/2021)	0.8570580
7.	Healthy life years at birth (2021/2020)	0.9907121
8.	Fertility rate (2021/2020)	1.02
9.	Ageing (65 years & more) 2020/2021	0.9855769
10.	Crude divorce rate (2020/2021)**	0.9657647
11.	*Crude marriage rate* (2021/2020)**	1.1273125
12.	Life expectancy at birth (2021/2020)	0.9962627
13.	Net migration (2021/2020)	1.0049068
	1.024 : 101.9 = 1.00490677	
14.	Healthy life years at birth - F (2021/2020)	0.9907834
	64.5 : 65.1 = 0.99078341	
15.	Healthy life years at birth - M (2021/2020)	0.9890966
	63.5 : 64.2 = 0.989096573	
16.	Urban population (2021/2020)	1.0020585
	336,283,387: 335,592,576 = 1.002058481	
17.	Total-age dependency ratio (2020/2021)	0.9910714
	0.555 : 0.560 = 0.991071428	
18.	Age Structure (15-64)/Total (2021/2020)	0.9953416
	0.641 :0.644 = 0.995341614	
19.	Age structure (≥65)/ Total (2020/2021)	0.9855769
	0.205 :0.208 = 0.985576923	
20.	Employment rate (2021/2020)	1.0195258
	0.731 : 0.717 = 1.019525802	

Source:https://ec.europa.eu/eurostat/databrowser/bookmark/e7fb6d0d-90e4-4024-a53d-30b15751c3bd?lang=en

*All of the demographic key factors' information is selected from https://chat.openai.com being analyzed by the author based on the criterion of a maximum of 12 dodecahedron's indicators, and thus becoming a narrow list of a more extensive one in relation to the data availability. The data construction of comparable indicators is based on both statistical and demographic standards. *Note: Each value is expressed as index numbers (IN) according to the positive impact of the key factor on the demographic evolution of the EU, dividing the indicator from 2021 to that of 2020 (i.e. births) or vice versa (i.e. deaths). **Note: 58.2 % of children are born inside marriages two corrections were needed to IN from lines 11-12.*

Table no. 7a: Statistical confrontation of the demographical IN and PSIN (VPSIN & APSIN), based on aggregates of volumes & areas, through a pragmatic calculation focused on the icosahedron

IN Classic calculus *Standard value IN =1*	**VPSIN-***Standard values IN =1 & (r_c) = 1* V=[$(15+5\sqrt{5}):12]\times s^3$ = 2.5361507101	**APSIN -** *Standard values IN =1 & (r_c)=1* S=[$5\sqrt{3}\times s^2$] = 9.5745413833
0.9786276	2.3769904535	9.1696529808
1.0041778	2.5680702844	9.6547095354
0.9969231	2.5128122215	9.5157122157
0.9762795	2.3599215601	9.1257027973
1.1760124	4.1248747018	13.2416401851
0.8570580	1.5966351905	7.0329642009
0.9907121	2.4661384793	9.3975125661
1.02	2.6913834228	9.9613528552
0.9855769	2.4279883892	9.3003439994
0.9657647	2.2844888343	8.9301886865
1.1273125	3.6333566117	12.1676476752
0.9962627	2.5078217800	9.5031092478
1.0049068	2.5736673490	9.6687326258
0.9907834	2.4666709700	9.3988652633
0.9890966	2.4540939499	9.3668895353
1.0020585	2.5518449712	9.6140003415
0.9910714	2.4688226243	9.4043301643
0.9953416	2.5008723490	9.4855450703
0.9855769	2.4279883892	9.3003439994
1.0195258	2.6876314793	9.9520929032
20.0530683:20 =**1.0026534**	**(51.682074011:20) : : 2.5361507101 = = 1.0189078**	(193.1913368485: 20):9.5745413833 = **1.0088804**

*Source: Realised by the author. *Note: Value of* $\boldsymbol{\pi}$ *= 3.1415926536 and of circumradius* (r_c) *= 1 or 100%*

Table no. 7b: Statistical confrontation of the demographical IN and PSIN (VPSIN & APSIN), based on direct indices of volume & area in the icosahedron

IN Classic calculus *Standard value IN = 1*	**VPSIN -** *Standard values IN =1 &* (r_c) *= 1*	**APSIN -** *Standard values IN =1 &* (r_c) *= 1*
0.9786276	0.9372433757	0.9577119715
1.0041778	1.0125858347	1.0083730456
0.9969231	0.9907976726	0.9938556591
0.9762795	0.9305131395	0.9531216542
1.1760124	1.6264312229	1.3830051535
0.8570580	0.6295505956	0.7345484093
0.9907121	0.9723942938	0.9815104569
1.02	1.0612079998	1.0403999914
0.9855769	0.9573517768	0.9713618178
0.9657647	0.9007701414	0.9327014480
1.1273125	1.4326264588	1.2708334621
0.9962627	0.9888299498	0.9925393592
1.0049068	1.0147927480	1.0098376683
0.9907834	0.9726042540	0.9816517376
0.9890966	0.9676451559	0.9783120760
1.0020585	1.0061882208	1.0041212291
0.9910714	0.9734526477	0.9822225117
0.9953416	0.9860898008	0.9907048925
0.9855769	0.9573517768	0.9713618178
1.0195258	1.0597286147	1.0394328482
20.0530683:20 = **1.0026534**	20.3781556801 : 20 = **1.0189078**	20.1776072098 : 20 = **1.0088804**

Source: Realised by the author. *Note: Value of $\boldsymbol{\pi}$ = 3.1415926536 and of circumradius (r_c) = 1 or 100%

All the 20 demographic indicators selected as factors or variables represent useful tools to measure, understand & describe the major characteristics of any human population with a real impact on population evolutions or involutions (i.e. deaths, life births and the real difference as net natural change, together with immigration from outside and emigration to outside for estimating the limits of population's size in the future).

But many other factors are implied in these estimations and the results are different if the factors changings are higher. Thus the impact of each factor and variable must be carefully analysed (i.e. in human population prediction the impact of fertility rate or marriage rate levels, are more than significant for any demographic estimation). In the end, which aggregate indicator as an index number will be chosen from the six indices, two classic and four of the VPSIN and APSIN type? As the author of these original statistical constructions, I believe in VPSIN and APSIN as new types of IN calculus, especially when the evolutions tend more and more to exponentiality and not linearity.

But among the four original constructions focused on the dodecahedron and the icosahedron, which PSIN is preferable to be chosen? For factors or variables, one focused on the icosahedron, and for beginnings, the one focused on facets (APSIN = **1.0088804**) and if an upward continuity or even an exaggeration is identified, VPSIN is the final solution (**1.0189078**).

5. CONCLUSIONS

RPH is a geometric solid if the next conditions are met: a) convexity (normal variability, neither explosion, nor implosion, in VPSIN or APSIN cases, the final PSIN remaining positive as values); b) symmetry (but in the area or volume images)10; c) identity of all surface polygons to each other (equality of factors as importance in VPSIN or APSIN cases of PSIN) d) identity of the dihedral angles (equality of radius as factors of the initial construction of VPSIN or APSIN cases of PSIN).

The constructive option initiated methodologically as PSIN (VPSIN or APSIN) after GAIN [6; 42-43]; and GIN [46] develops the idea from a simple circle and regular polygon area to a sphere and to the polyhedra volume. The originality of the general IN, defined as PSIN (VPSIN or APSIN) is not limited to just a few constructive options of this new concept, but it offers also a normal evolution, related to the history of IN and INM. Derived from GAIN [6], the original construction and methodology of PSIN (VPSIN or APSIN) opted for the regularly inscribed polyhedra in a sphere because it involves: (1) a careful analysis of the Platonic solids typology; (2) a reasonable statistical error level; and (3) a valid confrontation ensuring of a real degree of comparability between VPSIN and APSIN…

VPSIN is focused on volumes or (three) dimensionality and APSIN remains addicted to surfaces or (bi)dimensionality as the dominant way of thinking but also ensures temporal, territorial, and structural aspects. Addressing the research gap in the creative development of statistical confrontation the paper underlines the novel mathematical (geometrical) application, defines the research problems, and analyses why, the authors chose a particular issue to research on means, comparing various methods with their pros and cons, formulating logical premise and choosing the adequate hypothesis, and selecting the precise data source and collection to analyze and discuss the results. VPSIN creatively ensures an ascending and significant degree of coverage of simultaneous evolutions balanced/unbalanced by the number of factors and variables in parallel, with a limiting statistical error descending evolutionary… VPSIN and APSIN are practically and historically some coherent, constructive instruments and offer multidimensional confrontation, starting from various statistical databases chosen for the adequate field of microeconomic management…

Some future research can offer some useful statistical tables, based on geometric calculus for every 0.001 difference (or for each + or - 0,1%) or based on (in)sphere radius (r_i) median radius (r_m) and not only (circum)sphere radius (r_c), and

especially an aggregate or PSIN case. A particularly interesting fact is the combination of PS subcomponents (4, 6, 8, 12 and 60, 20) that allow the construction of weighted indices with specific weighting coefficients (4 becoming 25% per component, 6 approximately 16.666%, 8 translating a structure of 12.5%, 12 about 8.333 % (or half of 6), 20 exactly 5%, and 60 approximately 1.666 or 1/10 of 6. In this case, sums can be generated and various equalities with 100% capitalizing on all forms of PS, to emphasize the different importance of the factors, calculating previous error for PSIN aggregated or weighted in this way [e.g. 100 % means two subcomponents of tetrahedron (two 4-hedron = 50%) plus two components of Hexahedron (two 6-hedron = 33.333%) plus 10 from 60 components of dodecahedron (ten 60-hedron = 16.666%)] etc.

6. SOME FINAL REMARKS

As new subdomais in scientific research, demo(gra)statistics and demographysics can combine better time projections of human populations' phenomena with much better calibrated extrapolations or interpolations in the economic, demographical, crime-related, electoral world. This aspect defines a real supremacy of statistical physics and modern statistical thinking incorporated by, and it appears at the very first moment as a better provider to the first practical substantial solutions, within the framework of the same subjects investigated by economics, sociology, demography, etc. The concrete forms of dissecting the thought of statistical thinking and statistical physics in the diversity of the real world redefine these new sciences such as econophysics, sociophysics, quantum economics, quantum, demo(gra)statistics, demographysics, etc. based on new instruments, techniques, methods and models considered to be more precisely and adequate [24]. In 2017, I tried in another paper, about population implosion to generate a model of cavitation applied to demography. The originality of that model was based on the hypothesis that in all states of flux (including demographic flux), as in all liquids, the phenomenon of cavitation appears when the local (or demographic) pressure decreases below the vaporization value (the demographic point of survival) respectively, under the saturation pressure (defined by the fertility rate), at the given temperature of gases (general demographic conditions), dissolved in the liquid [19].

Other new Index Numbers were created by me and exemplified in the economy (e.g. GAIN [6] to quantify the evolution of a complex economy such as England really is) or in tourist activity (e.g. [46], where the new GIN_V or GIN_A based on the volume and surface of minimal Platonic Solids focused on the pyramid and the cube are used to measure the real evolution, as accurately as possible, of this type of multidisciplinary activity, with multiple impacts.

In this paper, the new interdisciplinary science demographysics seems to have been anticipated by demo(gra)statistics and the specificity of the article's research offers a creative model of the geometric aggregate index number (PSIN), based on volume (VPSIN) or area (APSIN). From the methodological point of view, the new model insists on the need for a complex, more realistic and non-linear approach...

The instrumental future of PSIN is decided not only in relation to Euclidean geometries but can be adapted to non-Euclidean ones as well, which brings it closer to the universe of physics, sociophysics and econophysics. An aggregate tool of a holistic type, such as the statistical index, can be developed using weighting coefficients by simultaneously capitalizing on Platonic solids whose sections can reach and ensure the integrity of the whole (100%).

Within the next few years, I hope that this new instrument named PSIN (APSIN or VPSIN) will be expected to develop many demo(gra)statistical or demographysical methods in understanding human populations evolution processes generating new disciplines like demographysics, indexphysics or physicalprognosis, as result of new demographical (as essence), mathematical (as geometrical thought, especially), statistical (as instrumental solutions) and physical (as real and complex interactions) and even more or with many more classical sciences.

The most important and new domain, called demographysics (e.g. based on describing international migration) will need some special area of marketing and management, some distinctive aggregate index numbers (not as classical INs are, from poverty index to corruption or globalization index, from Consumer Price Index to Dow Jones Industrial Average, etc.) but most of all to prognosis or spatial and temporal estimation.

The accuracy of the new demo(gra)statistical or demographysical indices could be improved together by statistics and by statistical physics with their careful thinking in terms of geometrical or dimensional analysis, combined with better data analysis correlating variables as major factors to the phenomena, such as speeds, senses, orientations, spins, cords, for which many new index numbers (INs) are or can be designed.

The future of these new demo(gra)statistical or demographysical models, which start with GAIN, GIN and PSIN in an attempt to explain the mutations of birth and mortality, death and divorces, life expectancy and marriages, but more especially of fertility, ageing and migration, "*cannot maintain the old isolating and unidisciplinary mark, allowing access of the flourishing evolution of trans-, inter- and multidisciplinarity modelling*" and especially of a new holistic approach in scientific research [13].

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EVOLUTION AND IMPACT OF ECONOPHYSICS & SOCIOPHYSICS ANOTHER BOOK PROPROSAL AFTER THE PUBLISHING OF ECONOPHYSICS: BACKGROUND AND APPLICATIONS IN ECONOMICS, FINANCE, AND SOCIOPHYSICS, ACADEMIC PRESS, ELSEVIER

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Abstract. *The project of a second volume dedicated especially to Econophysics & Sociophysics is actually the essence of this article. The initial title of this second book was intended to be "Econophysics & Sociophysics" but the final remained "Evolution and Impact of Econophysics & Sociophysics". This book was proposed to the ELSEVIER ACADEMIC PRESS as publishing house that also printed the first successful volume entitled "Econophysics: Background and Applications in Economics, Finance, and Sociophysics, Academic Press, Elsevier Publishers"* (2012) [1]. *The editor and an important contributor for the two books remains the same Gheorghe Săvoiu. The major question for the author of this paper is whether such a book can still be relevant. Any publishing house can still analyze and decide, together with any of the readers of this Journal. In fact, even this issue of ESMSJ may or may not be among the last published issues, in relation to the dialogue generated by its three articles, the last two of which are proposals for books not contracted and not finalized so far with any publishing house...*

Keywords: *book proposal, Econophysics, Sociophysics, publishing house, relevancy of a book.*

1. INTRODUCTION OF A PROJECT OR ABOUT A PROPOSAL OF A NEW BOOKBOOK

This second project of Econophysics had the next proposed title *"EVOLUTION AND IMPACT OF ECONOPHYSICS & SOCIOPHYSICS"* and as subtitle **"*Econophysics, Sociophysics & other inter-, trans-, and (multi)sciences, based on physical models*".** The editor remained *Gheorghe Săvoiu*, the same editor as in the first one and the initial list of contributors included *Radu Chişleag, Ioana-Roxana Chişleag Losada, Mircea Gligor, Constantin Andronache, Ion Iorga Simăn, and Gheorghe Săvoiu*.

2. BRIEF DESCRIPTION OF PROJECT'S SCOPE AND CONTENT

This book is intended as a sequel to the scientific undertaking of the first volume titled *Econophysics: Background and Applications in Economics, Finance, and Sociophysics*, published by Academic Press, Elsevier Publishers, in 2012 [1], presenting the results of the activity of a number of Romanian researchers, with an interest in multi-, trans- and interdisciplinarity, grouped around the international workshop **E**xploratory **D**omains of **E**conophysics. **N**ews (EDEN), which is held annually at the University in Piteşti, Romania. Because Elsevier did not accept more than one project I send this second project to Palgrave (sometimes in real life a change is better than I think). This second independent book continues the specific approach to multi-, trans- and interdisciplinary sciences, based on characteristic scenarios and models (e.g. Econophysics, Sociophysics, Quantum economics, Demographysics, Socio-optics, born from the apparently isolated knowledge of classical sciences such as Economics, Sociology, Demography, Optics, Physics and extended through physical models into new or beyond unknown frontiers). Multi-, trans- and interdisciplinarity approaches apparently have a common origin, and define characteristic forms of the antonym of unidisciplinarity, or knowledge acquired by means of a single discipline.

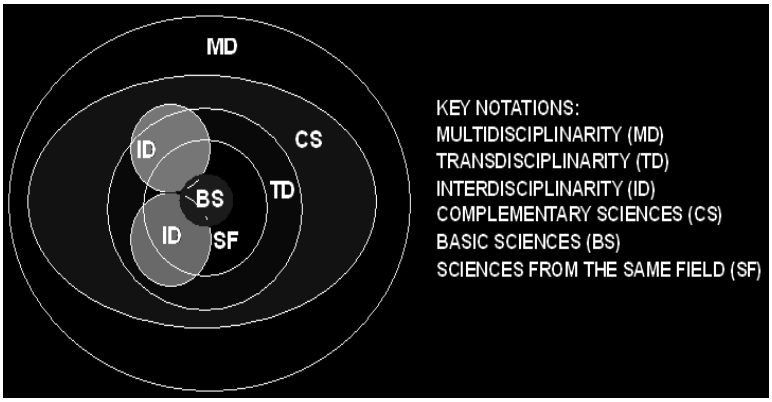

Fig. 1 Inter-, trans-, and multidisciplinarity in the universe of sciences

In its open meaning, with no claim of completeness, *unidisciplinarity* represents turning to account the concepts, variables, methods, theory and models of a single science, defining an early stage of knowing and understanding reality.

Having recourse to a single scientific type of thinking (*unidisciplinarity*) rarely occurs in practically solving complex problems; the unidisciplinary model built from the dominant thinking of one discipline is less and less capable of providing a sufficiently comprehensive scientific knowledge in modern science and scientific research. While sciences or scientific disciplines may share an increasingly common field as a result of multi-, trans- and interdisciplinarity, specifically from respect for various knowledge and several intellectual inquiries, not only the differences between them become more and more vast, but also the common intersected areas are expanded

Traditional philosophers' minds have often had a native inclination for creating a unified theory of reality and knowledge, and this means a passion for multidisciplinarity; likewise, the researchers' minds had real inclination for plurality and a leaning to trans- and interdsciplinarity.

How can one balance the usual or traditional philosophers' minds and the researcher's minds in the contemporary scientific approach?

Therefore, this book, as the second one written by the members of the group of the international workshop EDEN, offers a different approach from the classical one, based on physics, models, methods and theory, needed for a better understanding of the more complex reality from economical and sociological phenomena. The book also presents new scientific concepts and fields like Quantum economics, Demographysics, Socio-optics, etc., and new models and solutions for the changing reality, and the key points necessary for a better knowledge approach are somehow supported – and expressed in pragmatic models and methods, by examples, case studies and prospective aspects.

This new approach will distinguish this book from other publications, textbooks and academic journal articles. In order to reach a large audience, and to address key policies in educational systems issues in academic institutions, as well as highlighting how multi-, trans, and interdisciplinarity based on physics models and thinking relate to systemic knowledge and global world issues, the book is written in multi-scientific language, harmonized by one member of EDEN workshop's team, specializing in philology, lexicography, etymology and scientific language. Despite the need for audience the clarity and rigour cannot avoid scientific explanations, ranging from methods to models, from laws to algorithms. The old project of this second book was drafted per chapters in proportion of 60%, and the book could be edited within 10-12 months (the following structure of the new book being ready eight years ago).

3. PROPOSED CONTENTS

The periodical meeting of the multidisciplinary group of academic professors and researchers, capable, during the workshops EDEN, of making up a first significant nucleus of an academic orientation in Romania towards the new scientific universes of the 21st century (from the universe of classical economics or physics to that of the "*statistical and quantum econo-, socio- and bio-physics*" or to that centred on the theory of the "*networks and cords*", etc.), has resulted in several potentially significant outcomes; the expansion of the latter, but from contradicting, confirms the general expansion of the multi-, trans- and interdisciplinary universes in today's disciplinary and scientific multiverse. (For EDEN or Romanian School of Econophysics Sociophysics, and see: http://www.eoht.info/page/Romanian+school+of+physical+socioeconomics).

3.A. THE FIRST PART

THE MODERN MULTIVERSE OF INTER-, TRANS-, AND MULTISCIENCES, BASED ON PHYSICAL MODELS

Chapter 1

Author: Gheorghe Săvoiu

MODERN INTER-, TRANS-, AND MULTI-SCIENCES AND THE SPECIFIC TAXONOMY IN THE MULTIVERSE OF SCIENCES

The first chapter describes not only the contemporary relations between economics and physics, but also between many, many other sciences, or more correctly scientific Universes, in a so-called "Multiverse" of disciplines in the field of contemporary scientific research. The idea of a multi-, trans- and interdisciplinarity fields, resulting from the reunited universes of Econophysics, Sociophysics, Quantum Economics, Demographysics, etc. is a normal consequence of the development of inter-, trans- and multi-disciplinary thinking during the XXth century and especially in the next one. The definitional issues of this new disciplinary Multiverse are detailed against a short historical background of teaching and researching physics about the Universe. Two special examples about Multiverse as a synthesis, or a reunion of universes of multi-, trans- and interdisciplinarities, are detailed through the work of two scientific researchers in the field of mathematics and history of logics field, Dan Barbilian & Ştefan Odobleja, and Anton Dumitriu some important ideas from their books and papers are described in the lines of this chapter. Any of the science's conceptualizations focused on four

significant elements, variables of a specific reality, as well as characteristic and distinctive methods, theory and models. The beginnings of taxonomy in the Universe of sciences and finally in the Multiverse of sciences, and its rigorous development, emphasizing the role of three moments, books and personalities, are the subject of the first chapter. The second section describes the context of the new century, in which multi-, trans-, and interdisciplinarity are amply increasing, exponentially developing the universe of scientific research, generating new and original approaches through new sciences and derived disciplines. In the third section, arguing the need for principledly and adaptively rethinking the classification of sciences, two taxonomy alternatives are presented, which are graphically called "iterative" and "symmetrical, or mirror", as alternatives to the current situation. Some final remarks emphasize the importance of the creative approach in trying to adapt to a more dynamic reality resulting from the multiple requirements of inter-, trans-, and multi-disciplinary as well as inter-, trans- and multi-scientific researches [2-3].

***Keywords**: Universe, Multiverse, Sociophysics, Quantum Physics, Quantum Economics, Demographysics, scientific research, science, taxonomy, inter-, trans- and multidisciplinarity, iterative and symmetric taxonomy.*

Chapter 2
Author: Gheorghe Săvoiu
VARIABLES IN THE SPECIFIC THOUGHT OF INTER- TRANS-, AND MULTI-SCIENCES AND RESEARCHES: THE IMPORTANCE OF EPSILON

Contemporary variables are more and more involved into multi-, trans- and interdisciplinary thinking and research. This chapter 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 (underlying the importance of epsilon). The chapter describes some of the major characteristic variables in physics, economics, sociology, history, mathematics, statistics, demography, etc. It emphasizes the importance of the first inter-, trans-, and 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, Sociophysics and other inter-, trans- and multidisciplinary sciences. Some final remarks about the new inter-, trans- and multidisciplinary context and the role of modern inter-, trans- and multidisciplinary research variables in this investigation close, naturally and symmetrically, the circle of the scientific thought [4].

***Keywords:** Paradigm, variation process, variability, multidisciplinary, (residual) variable, epsilon.*

Chapter 3
Author: Gheorghe Săvoiu
SOCIOPHYSICS & QUANTUM ECONOMICS

The contemporary economic reality could be more adequate for new Sociophysics and Quantum economics' models and methods. These new inter-, trans- and multidisciplinary thinking, research, and sciences are able to perform economical and social analysis, better than contemporary econometrics or economic statistics, sociology or social statistics, in general. Other aspects inside this second chapter are related to the significance of time concept in the contemporary Economics through Physics way of thinking and to the integration of the inter-, trans- and multi-disciplines thought into a better statistical evaluation of the Economic results. This could be also a consequence of the experience generated by the global crisis in the economic world. The author believe that new inter-, trans- and multi-sciences can solve the problem of a better coverage of economic realities, through more adequate and comprehensive methods and models. In addition to this main purpose, the paper could be a good explanation for a better understanding of the recessions [5-7].

***Keywords:** Sociophysics, Quantum economics, Macrorealism, Particle, Multidisciplinary sciences.*

Chapter 4
Author: Gheorghe Săvoiu
DEMOGRAPHYSICS, DEMOGRASTATISTICS AND OTHER NEW INTER-, TRANS-, AND MULTI-SCIENCES OF DEMOGRAPHY

The demographic diversity is covered by traditional approaches with a lot of difficulties or based on the classical and unilateral point of view. This chapter confirms the need for alternative interpretation of the demographical processes through physics and various subsystems that compose the demographic phenomena, such as migration or natural movement of human populations. A rigorous scientific research of human population and of the global demographical system and can be conferred by the vision of integrative statistical physics, whose essential optical systems analysis is based on the premise that the properties do not reduce the amount of individuals as units (atoms, particles, etc.). The keystone of the construction of the systemic vision in Statistical Physics starts using the existing deviations and variations in the area of statistical units. The same physical thought transforms the human populations in the studied

objects and the system in interactions between subsystems using probabilistic or stochastic nature of the behavior units (as major components of the analyzed systems). The new approach of this chapter is based on statistical physics and demography (e.g. Demographysics as a reunion of the both sciences). As migration flows and natural movements represent the subsystems the of the human populations system, so on all of these reunion aspects between the demographical theory and physical models become comparable and sometimes even similar, to those conferred by physics to sociology or economics, which have defined during the last two decades the new sciences called Econophysics and Sociophysics, and more recently Demographysics and Demograstatistics. Nowadays, and especially in the very next future Demographysics and Demo-grastatistics may come to life because of the new instruments and models applied to explain social and demographical phenomena, in spite of classic Demography relying on the duality particle-wave which seems convenient to model relationships among society and its members. Thus, it is a stimulating approach for this new science entitled Demographysics and Demograstatistics, to model social and even everyday life phenomena [8-11].

Keywords: *Statistical Physics, Demography, Demographysics, Demograstatistics, physical models, demographical & demographysical models*

3.B. THE SECOND PART

ECONO-, & SOCIOPHYSICS' APROACHES AND CONTEMPORARY IMPACT, BASED ON THE RIGOUR OF THE PHYSICAL MODELS (ECONO- AND SOCIOPHYSICS APPLIED)

Chapter 5

Author: Mircea Gligor

MAPPING MACROECONOMIC TIME SERIES INTO WEIGHTED NETWORKS

The correlations between GDP/capita growth rates of 27 European countries are scanned in various moving time window sizes. The square averaged correlation coefficients are taken as the link weights for a network having the countries as vertices. The network average degree and the weight set variance are found to be monotonic functions on the time window size. The statistics of the weight distributions as well as the adjacency matrix eigensystem are discussed. A new measure of the so called country overlapping is proposed and applied to the network. The ties and clusters are better emphasized through a threshold analysis. The derived clustering structure is found to confirm intuitive or empirical aspects, like the convergence clubs i.e. have a remarkable consistency with the results reported in the actual economic literature [12]. ***Keywords:*** *Fluctuations, correlations, network, clusters.*

Chapter 6

Authors: Radu Chişleag & Ioana-Roxana Chişleag Losada

SOCIAL COMMITMENTS OF THE SCIENTISTS, PHYSICS AND CORRUPTION

Physics may offer powerful tools to be used by socially committed scientists to model social, political and economic phenomena, among them corruption. The word corruption was used in Physics and Philosophy, in Antiquity, to describe an alteration of the actual motion (behaviour) of a body, with respect to that expected to be, due to the physical law applicable. The alterations of the actual motions of bodies have been explained by physicists by using Physics models. The authors have used Physics models to find characteristics of social corruption, characteristics which are exposed in this chapter. A few simple Classical Physics models are introduced in the paper - the three Newton laws, conservation laws, dimensional homogeneity, and the basics of the processing of data. These models are being used by the authors to explain some classical or contemporary examples of social and economic corruption, and may be used by socially committed scientists to identify and understood corruption, possibly suggesting how to fight and forecast concrete cases of corruption, models being applicable to explain many other everyday life phenomena [13-14].

Keywords: *Corruption, fraud on law, physics models, action and reaction, inertia, proportionality, conservation principles, dimensional calculus, dimensional homogeneity, error estimation, Sociophysics, Socio-optics.*

Chapter 7

Author: Mircea Gligor

STATISTICAL PROPERTIES OF WEIGHTED MACROECONOMIC NETWORKS

The properties of the weighted networks are investigated using some statistical physics tools, taking into account the statistical ensemble of the networks with fixed number of vertices. As application, the correlations between GDP/capita time series are investigated in various time windows, over the time interval 1993-2008. The target group of countries is the 27 EU members in 2008. The mean correlation coefficients are attached to the edges of a fully connected weighted network having the countries as nodes. Particularly, the concept of entropy, based on the probability of one particular realisation from the statistical ensemble, may yield some more information about the structure, stability and evolution of the EU country clusters. [15].

Keywords:*Network, clusters, free energy, entropy.*

Chapter 8
Author: Mircea Gligor
STATISTICAL PROPERTIES OF SMALL WORLD NETWORKS

Some of the most significant points in the study of the „small world" (SW) effect are briefly reviewed in the first section of this chapter, starting from the Milgram's sociological experiment, the paradigm of the „six degrees of separation", and the Watts and Strogatz' model. Based on interviews and questionnaires we found that the pupils network, in a school with about 1,000 pupils is a SW network with a mean degree of separation between 2 and 3. The problem is important taking into account that the spread of news, jokes, fashions, rumour, as well as epidemics, all take place by contact between individuals, far faster over a social network in which the average degree of separation is small than it can over one in which the average degree is e.g. 25. The third section is theoretical. The statistical ensemble of networks with fixed number of vertices was constructed and analyzed. A probability has been assigned to each two-individual connection by random attachment mechanism, and the corresponding partition function was built. The basic thermodynamic quantities, namely entropy, free energy, average energy per link and thermal susceptibility have been defined using the partition function. The variation of the thermodynamic quantities have been investigated during a thinking process of network deconstruction, which consist of removing the vertices one by one, in decreasing and, respectively, increasing order of the overlapping coefficients. Some evidences for critical points have been found, the corresponding phase transitions being generated by removing several special vertices from the system [16].

***Keywords**: Small-world network, minimal path length, clustering coefficient, phase transition*

3.C. THE THIRD PART
THE TIME-SPACE IN ECONO- AND SOCIOPHYSICS AND THE FUTURE OF THE MULTI-, TRANS-, AND INTER-SCIENCES

Chapter 9
Author: Gheorghe Săvoiu
THE CONCEPT OF TIME-SPACE IN THE PHYSICAL THOUGHT AND THE INFLATION-UNEMPLOYMENT CONCEPT, IN ECONO-PHYSICS AND SOCIOPHYSICS

The concept of time in physics has evolved from the statutes of absolute time to that of a space-time object, omnipresent and exclusive, in the generalized theory of relativity. Physical thinking has attracted under its influence imaginary time as well, decomposing it in three senses: the entropic sense, the psychological sense, and the cosmological sense. Physical thinking has personalized itself within a space of the expanding universe, and the analogy with the economic phenomenon, particularly with inflation, is only natural. From the analytical overlapping of the concepts there emerge similarities between the space-time of the theory of relativity, and economic space-time, named here as Inflation-Unemployment concept. Which are the similarities of physical and economic thinking about time and inflation, space and unemployment? An attempt to define what is the meaning of time, time series, indices time series and physical correspondences a brief historical background of a hundred years of inflation in Romania, some significant graphical resemblances, together with the specific method used in physics to analyze economic data and economic processes and finally a short review of major results and new domains in refereed literature are the principal themes or the major content of this paper, which remains nothing else but a modest contribution for starting a debate about the concept of space-time in physics as a remarkable start point inflation-unemployment analysis [17].

***Keywords:** Time, Space-Time Object, Imaginary Time, Entropic Time, Psychological and Cosmological Time, Time Series, Indices of Inflation, Inflation-Unemployment concept, Equilibrium of Development, Non-equilibrium of contraction.*

Chapter 10
Author: Gheorghe Săvoiu
THE FUTURE MULTIVERSE OF INTER-, TRANS-, AND MULTI-SCIENCES OR DISCIPLINES IN ACADEMIC EDUCATION & SCIENTIFIC RESEARCH

The final chapter emphasizes the importance of the creative approach in trying to adapt to a more dynamic and complex reality resulting from the multiple requirements of multi-, trans-, and interdisciplinarity as well as inter-sciences or inter-researches. As multi-, trans- and interdisciplinarity grow more complex, it represents a unique opportunity for new sciences but also for multi-, trans- and interdisciplinary dialogues and discourses, where a lot of pseudo-militaristic and geopolitical metaphors have been used, either to support or to neglect their impact. Scientific knowledge has sometimes been treated like a geographic territory, over which one can fight and others can make peace, but all of them need a modern solutions of surviving and expand knowledge. The more abstract the new sciences appear to be, the best solution to be understood remains not the highly abstract concepts of their specific knowledge, but a common language that can make these sciences and scientific disciplines

look more tangible. Foucault's assertion that "taxonomy must be more than an intersection of words and things", and become actually the "History of Systems of Thought" (Foucault, 1970), and the readiness of its changes should be similar to demographical records, in the sense of almost "instantly" capturing the birth of the new sciences in areas of multi-, trans- and interdisciplinary impact, at the level of the life cycle of modern science. It is also imperative that the road from science to scientific disciplines should be ever shorter, as a major impact in the expansion of the scientific universes and the quality of modern multiverse [18-19].

Keywords: *Science life cycle, discipline life cycle, future of science, scientology.*

Speaking about market and competition inside any publishing universe, the major prospective readers could include undergraduate students, bachelors, MA students, PhD students, professional researchers and academic teachers (physics, economics, sociology, behavioural sciences, law, demography, etc). A secondary market could be also any other association or group of specialists and analysts from the economic (especially banking and financial) and social environment who watch more profoundly the socio economic, behavioural, econophysics and social phenomena.

A comparative list of books or, rather, a small enumeration of some books that this project could try to resemble in the editor's opinion could include the following landmarks (including author, title and publisher):

[20]. Chatterjee, A. Saha Institute of Nuclear Physics, Kolkata, India; B.K. Chakrabarti, Saha Institute of Nuclear Physics, Kolkata, India (Eds.), *Econophysics of Markets and Business Networks*, 2007. XII 266 pages (New Economic Windows) Geb. ISBN 978-88-470-0664-5 as a *book reviewing the modern Econophysics researches in the structure and functioning of the complex financial network systems.*

[21]. Takayasu, H. *Practical Fruits of Econophysics: Proceedings of The Third Nikkei Econophysics Symposium*, Springer, 2006, 390 pages ISBN 4431289143, 9784431289142 *as proceedings of the Third Nikkei Econophysics Symposium, "Business Models in the 21st Century - Risk Management and Expectations for Econophysics," held in Tokyo in November 2004, including cutting-edge researches on the practical application of Econophysics and covering many topics from the predictability of markets, the analysis of rare events, to he mechanism of crashes markets' correlation, wealth distribution, and network structures in economics, etc.*.

[22]. Chakrabarti, B. K., Anirban Chakraborti, A.; Chatterjee, A., *Econophysics and sociophysics: trends and perspectives*, Weinheim: Wiley-VCH, 2006. ISBN-10: 3527406700 ISBN-13: 978-3527406708, 648 pages as a *book intending to provide the reader with updated reviews on such major developments in both Econophysics and Sociophysics, by leading experts in the respective fields and providing a panoramic view of these developments in the last decades.*

[23]. Galam, S. *Sociophysics: a physicist's modeling of psycho-political phenomena*, New York: Springer, 2012 as a book trying to *explain why and how humans behave much like atoms, at least in some aspects of their collective lives, and then proposes how this knowledge can serve as a unique key to a dramatic leap forwards in achieving more social freedom in the real worldand also for a better comprehending of the richness and potential of our social interaction, and so distancing ourselves from inanimate atoms.*

[24]. Arnopoulos, P. *Sociophysics: Cosmos And Chaos In Nature And Culture* Nova Science Pub Inc (March 2005), ISBN-10: 1590339673 ISBN-13: 978-1590339671, 257 pages, *having a holistic scope in making it an appropriate reference work in many courses, such as: Global Ecology; Evolutionary Biology; Macroeconomics; Sociological Theory; Philosophy of Social Science; Theoretical Physics; Thermodynamics; Macrohistory; Behavioural Science; General Systems Theory; and, Inter-, Cros-, Trans- and Multy disciplinary Studies.*

The project means 160 pages ± 20% and it requires maximum 20-30 graphs/charts, 20-30 tables and 4-5 illustrations etc.

4. A FINAL REMARK

Any project is exposed to initial waste, but also to reductionism and final synthesis, and this book cannot be an exception to the rule. The enthusiasm of the author of the article has decreased over time, with the passing of the years and the role of this approach is to identify the existence of any journalistic interest or at least a ray of curiosity...

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AN UNFINISHED PROJECT OF AN INNOVATIVE BOOK ABOUT DEMO(GRA)STATISTICS AND DEMOGRAPHYSICS (STILL AVAILABLE FOR ANY INTERESTED PUBLISHING HOUSE)

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Abstract. *A new book may not appear for reasons independent of the will of the authors... This article describes a project of such a book that has never appeared before and which I discussed with two good friends and co-authors, Mircea Gligor and Constantin Andronache, who unfortunately disappeared shortly after each other. The idea of the book was probably the result of the activity of a demographer and statistician, on the one hand, but also of the desire to dissipate the reservations towards classic demography and especially in relation to the falsifications present in the statistics of classic socialist type demography in particular (Alain Besancon). I have not modified the initial project, part of which exists as ideas in the articles published in the ESMSJ magazine over the years. The project was sent to a prestigious publishing house (ELSEVIER) which had already published Econophysics: Background and Applications in Economics, Finance, and Sociophysics (2012), but it was refused at this stage and then suddenly interrupted by the disappearance of Mircea Gligor and more recently of Constantin Andronache ... Maybe other authors or other publishing houses will find resources to initiate a better project, and in their memory I saw fit to publish it as an independent article. I left almost everything in the present tense in the project, the past and the future being always subjective for any observer, especially when he considers himself independent. If I think about it better, even in the present time, the observer who declares himself independent, but never being so, can influence the development of any experiment or project...*

Keywords: *Interdisciplinary Sciences; Demography; Demo(gra)statistics; Demographysics; Book project.*

1. INTRODUCTION

The project of this demographics book was no longer completed because my good friend Mircea Gligor died during his teaching activity and left a huge open space in the hearts of those who knew him. A few years later, Constantin Andronache also left the collaboration space just as suddenly and with the same astonishing modesty specific to these completely open minds. I decided to publish this project because I hope that in the future someone will try to rethink it by capitalizing on Artificial Intelligence, why not.

2. PROSPECTUS FOR DEMO(GRA)-STATISTICS AND DEMOGRAPHYSICS

Book title: Demo(gra)statistics & Demographysics
Editor: *Gheorghe Săvoiu*

Authors/Contributors: Gheorghe Săvoiu & Mircea Gligor (Andronache Constantin)

Aims and Scope

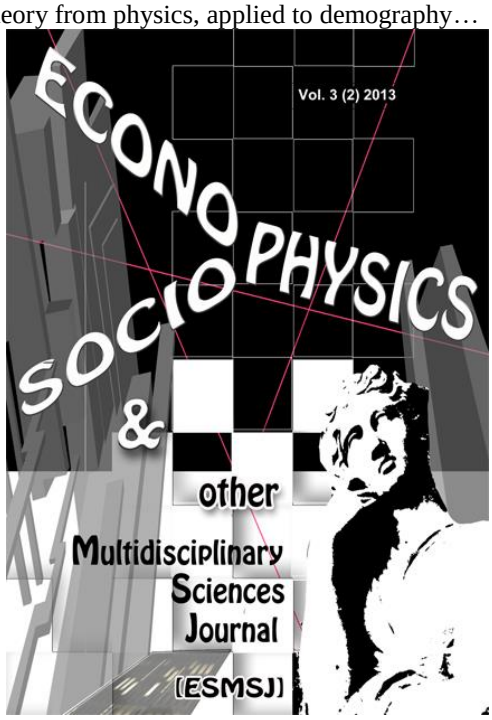
This book represents a totally new approach to the phenomena specific to classic demography [1], but also to interdisciplinary sciences like demo(gra)-statistics and demographysics by means of statistical methods or instruments and physical modelling. The structure of the book is balanced, falling in three parts; the first describes classical demography and the emergence of demo(gra)-statistics and demographysics, the second one to statistical methods and instruments or physical models applied to the study of demographical phenomena, and the last part identifies a set of collateral interdisciplinary approaches that were opened, beyond classical demography, by the creative demo(gra)statistics estimations and demographysics prognoses.

The first part starts with a brief review of the appearance of the alphabet and the first writings about demography, followed by a succinct history of censuses and its importance as the measurement of the major political, military, economic and social factor, as well as the new impact of statistical methods or instruments and physical modelling on censuses. Inside a distinctive chapter, the assault or even onslaught of the twelve classical demographies is described together with the structure and delimitations of classical demography. The theoretical mirrors of the world's populations and their artisans, as well as the historical and quantitative evaluation of the number and structure of the population, as a statistical and economic synthesis of classical demographical evolution, are well delimited and necessary topics.

The second part of the book is defined through its pragmatic character and the innovativeness of the statistical methods and instruments or of the physical modelling, through theories generating new solutions, ready to offer more clearly explanations to complex and various contemporary demographical phenomena, from urban planning, demographical networks, social impact, phase transitions, series of temporal data of demographic character, evolutions of the fractal type of towns and cities, profiled methods, etc. The collateral interdisciplinary approaches open and the demographic prognoses describing a century

polarized through demographic explosion and implosion end the book by a number of remarks.

Therefore, this book, as one written by two (maximum three) members of the group of the international workshop EDEN called Romanian school of Econophysics and Sociophysics, offers a different approach to human population than the classical demographical vision, based on statistical methods and instruments, and also on models and theory from physics, applied to demography…



EDEN was periodically interrupted by ARFYT as a natural need for better scientific knowledge and understanding of the more complex reality of modern research, inter- trans- and multidisciplinary education, classical demography, new economics, and sociological phenomena.

The book also presents interdisciplinary sciences of demo(gra)statistics and demographysics, as new scientific paradigms and new terms, based on original statistical methods, techniques and instruments or innovative models from physics. These narrative and applied texts reveal new solutions for the changing reality in modern demography. Based on the key points and paving the ground for a better knowledge approach book is somehow supported and expressed in examples, case studies and prospective aspects, calculus, measurements, indicators and indices. This new approach will hopefully distinguish this book as an original point of view from any other books and articles dedicated to classical demography.

In order to reach a large audience, and to address key policies in demographical phenomena and issues, as well as highlighting the originality of the new vision, presenting interdisciplinary sciences of demo(gra)statistics and demographysics based on physical models and thinking principles and ideas of this book relates to global evolution of population in the international milieu.

Readers include undergraduate students, bachelors, MA students, PhD students, professional researchers and academic teachers, and also any other specialists inspired by passion for demography, and perhaps for the new inter-disciplinary sciences of demo(gra)statistics and demographysics and analysts from the media following the demographic context, and derived politic, military, economic and social phenomena.

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Web of Science Core Collection metrics

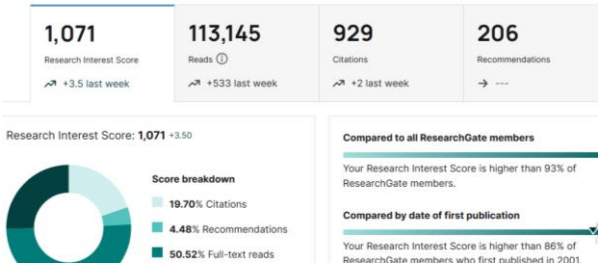
7 H-Index	71 Publications in Web of Science
154 Sum of Times Cited	125 Citing Articles

(Co)Author or editor of more than 40 books: Romanian Statistics Society (RSS) - Science, Research, Practice and Statistical Education (2016), Conceiving, Writing and Publishing A Scientific Paper. An approach in the Context of Economic Research (2016), Statistical Financial Accounting Situations and Derived Statistical Indicator Systems (2013),Economic-financial modelling. Econometric thinking applied in the financial field (2013), Economic - financial modelling. Econometric thinking applied in the financial field (2013), Econophysics: Background and Applications in Economics, Finance, and Sociophysics (2012), Multidisciplinarity and academic education (2011),

Applied statistical thought (2010), Exploratory Domains of Econophysics. News EDEN I&II (2009), Statistics. A scientific way of thinking (2007), The world population between demographic explosion and implosion (2006), Some marketing researches and models, Quantitative methods of market research (2005), The Price Universe and interpreter indices (2001), etc.

(Co)author of 70 papers Core Collection Web of Sciences (WoS), and 250 journal and conference papers. Project manager / member of the project's team in more than 10 projects.

Major domains of interest: Statistics, Econometrics, Econophysics, Sociophysics, Demography, Scientific Research, Logic, Philosophy, Economics, Marketing researches, Ecology, Management's methods, Price universe and interpreter indices, Rural tourism, etc.



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Competing Titles

There is no similar book or similar paper's approach, but there are some important references for this original idea of Demographysics, by definition *unifying* the scientific Physics thought with the demographical laws and theories, and thus, bringing together an increasingly large number of demographic facts and observations, supplemented with the maximum value of physics' knowledge (models and methods which exceed even those specific to logic, mathematics, etc.) [2-4] :

[2] Stewart, John Quincy, 1948. *Demographic gravitation*. Beacon, N.Y.: Beacon House. Sociometry, 11, no. 1-2, pp. 31-58. [(OCoLC)826631559; OCLC Number: 54700889]

This fundamental paper is an attempt to use equations and notions of classical physics - such as gravity - to seek simplified insights and even laws of demographic behaviour for large numbers of human beings. A basic conception within it is that large numbers of people, in a city for example, actually behave as an attractive force for other people to migrate there, hence the notion of demographic gravitation.

[3] Schweitzer, F., Steinbrink, J, 1998. *Estimation of megacity growth: simple rules versus complex phenomena*. Applied geography (Sevenoaks, England) 1998 Jan; 18(1), pp. 69-81

This paper describes the growth of large urban aggregates (megacities) being analogous to the development of self-organized structures known in physics. Using empirical data about changes in the built-up areas of different cities as input, the self-organizing model employed here suggests that megacities evolve towards a hierarchical form of spatial organization, and provides estimates of the size of subclusters that compose the urban aggregate.... The model has been validated by reproducing the evolution of the Berlin area over a period of 35 years (1910-45). Using the same assumptions, the evolution of the built-up area of Daegu (Korea) is simulated up to the year 2010.

[4] Stauffer, D. and Solomon, S. 2009. *Physics and Mathematics Applications in Social Science*. Encyclopedia of Complexity and Systems Science / Ed. by R. A. Meyers, pp. 6804-6810, New York, NY. Springer.

This paper introduces into the world of Social Sciences, concentrating on the applications of physics in this domain, including also computer simulations taken from physics, and applications of these simulations of models which basically existed already in physics before they were applied to social.

****Note: The project of the book is drafted per chapters in proportion of 50%, and the book can be edited in approximately 6 to 9 months.*

PART I
CLASSICAL DEMOGRAPHIES AND THE EMERGENCE OF DEMO(GRA)STATISTICS AND DEMOGRAPHYSICS

Chapter 1. Author: Gheorghe Săvoiu
ALPHABET, WRITINGS ABOUT CENSUSES, POPULATION, AND THE REAL IMPACT OF STATISTICAL METHODS & PHYSICAL MODELS

A first signification of classical demography leads towards a broader concept, that of "writing about human population". A second acceptation is that

of a science, the object of which is human population, as a well delimited system, benefiting from relative autonomy, where the stress is laid on the variables of state and level, on the inputs into, and the outputs from the described system, and especially the structural changes, the dependencies, interdependences, associations and correlations between the characteristic variables of the population, its scientific methods and models being essential. Starting from the fact that demography as writing about population is based on a largely used alphabet, identification of the emergence of demography in parallel with that of writing appears as natural. In general, the European origin of the first alphabet was accepted, and thus the fact was recognized that the first symbolic and literal, but especially accessible, type of writing was the Phoenician one dated 900-800 B.C. The difficult Phoenician alphabet gradually turned into a new one, the Hellenic alphabet, and then the latter generated the Latin one, which lies at the foundation of the first truly rigorous census methodology-wise. Yet today it the physical model that can give demography greater clarity and once it has been integrated, demography becomes demographysics.

Keywords: *demography, alphabet, census, physical model, demographysics.*

Chapter 2. Author: Gheorghe Săvoiu

ASSAULT OF THE TWELVE CLASSICAL DEMOGRAPHIES AND DEMOGRAPHYSICS

The interdisciplinary demographies seem to be nowadays the adequate expression of the integrating approached of the human population, through the reunited sphere of the preoccupations of these numerous sciences, which search to explain in a more and more various and detailed way, our human dynamic, both in its quantitative side, and, especially, in the qualitative one. The exit of the new demographies from the captivity of other scientific disciplines was accomplished through an original process of segmentation comparable to the phenomenon of fission, followed by the free joining of the new demographies to the nucleus of other divided fragments from the classical sciences, free as well, but forced to state a new identity of the object and characteristic methods, in the so complex field of the contemporary science, during this period of globalization. The most adequate solution for the future seems to be demographysics as an expression of unifying the classical and modern laws and statistical methods of demography with physical models.

Keywords: *Interdisciplinary demography, objects & methods, demometria, mathematic demography, potential demography, social & economic demography, biometry, descriptive demography, regional demography, historical demography, demo(gra)statistics & demographysics.*

Chapter 3. Author: Gheorghe Săvoiu

THE THEORETICAL MIRRORS OF THE WORLD'S POPULATIONS AND THEIR ARTISANS

The demographic conceptions or the theories about population constitute themselves in a coherent explanatory system of the human population's evolution by means of dependencies, interdependencies, associations and correlations of the demography with economy, biology, sociological history and other various social sciences, the role of the resources, of the scientific progress and of other cultural factors being very well mentioned in comparison with demographic dynamic. From Thomas Robert Malthus to his contemporary alter-ego, famous authors of the theory of "the demographic explosion," Robert Cook and Paul Ehrlich, from the trend of human ecology of the Chicago School, with its famous representatives Robert E. Park, Roderick McKenzie and Ernest W. Burgess to Philip Longman or S. P. Kapitza, the long road of the demographic theory, mainly of the theories about the human population, remains an extremely exciting and attractive, aggressive and even speculative sometimes, but interrogatively existential, and, often, of an inadequate economic opportunism one.

Keywords*: population and the means of subsistence; Malthusian thinking; demographic, explosion; demographic transition; demographic revolution; stationary population; optimal population; demographic implosion.*

Chapter 4. Author: Gheorghe Săvoiu

NUMBER AND POPULATION STRUCTURE: A STATISTICAL & ECONOMIC SYNTHESIS OF THE EVOLUTION OF MAJOR CLASSICAL DEMOGRAPHIES

The number of the human population had reunited both in its quantitative side, and, especially, in the qualitative one, the most significant aspects of the various and detailed human evolution and dynamic. This demographic and synthetic indicator allowed a detailed and original process of population segmentation in the field of the contemporary analysis. Referring to a new process of demographic evolution and defining the population's decline, demographers like Ehrlich and Longman have used the concept of demographic explosion but with the opposite demographic implosion too. World population through the accomplishment of the United Nations Population Revision or UNO prognosis, seems to be forever somewhere between the limits of explosion and implosion.

Keywords: *Average number of population**;** equilibrium; demographical phenomenon; demographical event and method; cohort; explosion and implosion**;** world migrant stock; registered and estimated number of population.*

PART II
STATISTICAL METHODS AND PHYSICAL MODELS APPLIED TO THE STUDY OF DEMOGRAPHICAL PHENOMENA

Chapter 5. Author: Mircea Gligor
THE METHODOLOGICAL FRAMEWORK: THE SOCIAL TIME SERIES ANALYSIS AND THE CLUSTER VARIATION METHOD

Modelling dependence in the social sciences has to take into account circumstances that differ substantially from those encountered in the natural sciences. First, experimentation is usually not feasible and is replaced by survey research, implying that the explanatory variables cannot be manipulated and fixed by the researcher. Second, the number of possible explanatory variables is often quite large, unlike the small number of carefully chosen treatment variables frequently found in the natural sciences. The demographic time series are simply too short and noisy. Most social data have a quarterly or at most monthly frequency. When such time series have been produced for a very long period, there is usually strong evidence against stationarity. That is why in the first part of the chapter we introduce a new method to study the social time series, namely the Moving Average Minimal Length Path (MAMLP) algorithm that is an improved version of the classical Minimal Spanning Tree (MST) algorithm. This algorithm allows us to search for a cluster-like structures derived both from the hierarchical organization of countries and from their relative movement inside the hierarchy. In the second part of the chapter, the Cluster Variation Method known in statistical mechanics and condensed matter is revived for weighted bipartite networks. The decomposition of a Hamiltonian through a finite number of components, whence serving to define variable clusters, is recalled. As an illustration the network built from data representing correlations between four macro-economic features, i.e. the so called vector components, of several EU countries, as (function) nodes, is discussed. In the last section of this chapter the correlations between major demographic variables of 27 European countries are scanned in various moving time window sizes, taking into account the square averaged correlation coefficients, the network average degree and the weight set variance. The statistics of the weight distributions as well as the adjacency matrix eigensystem are discussed. The second section describes some of the investigated properties of the demographyc weighted networks, using statistical physics tools, taking into account the statistical ensemble of the networks with fixed number of vertices. The concept of entropy based may offer some more information about the structure, stability and evolution of the EU demography and demographyc country clusters.
Keywords: *Fluctuations, correlations, network, clusters, free energy, entropy.*

Chapter 6. Authors: Mircea Gligor & Gheorghe Savoiu
CRITICAL PHENOMENA AND PHASE TRANSITIONS WITHIN THE MODELS OF MIGRATION BASED ON THE THEORY OF SOCIAL IMPACT AND OTHER THEORIES

This chapter details a first section the history of demographical theories about migration (from classical theories of migration to modern theory of networks centred on physical models). Theoretical physics applied in the field of social sciences, generates a new field of investigation, commonly called Sociophysics, as a natural extension of Econophysics (both area being developed mainly in the last decades of the XXth century). Demographysics, as a similar result to the both sciences, applies models and methods of physics to the study of demographical processes and phenomena. Demographysics gradually became a kind of socio-based physics, and has also adapt the methods developed in theoretical biophysics and neural networks, placing them in the broader category of "complex physics phenomena", as almost all demographical processes are indeed. Except for a few notable previous work (H. Haken, 1983, EW Montroll, 1987), social sciences physics was imposed only after 1995, with the publication of a large number of papers dealing with extremely diverse phenomena, requiring a real time for Demo(gra)statistics and Demographysics to be born. These new sciences have developed and applied many methods and models from Statistics Physics into new demographical domains during the first decade and nearly half of the second during the XXIst century and migration is only one of the most adequate such an adaptation and application of physics thinking. We show that some usual methods of the statistical mechanics, namely the renormalization group theory and the noise induced transitions formalism, may be applied in order to study the critical behaviour of the demographic indices. As application, we consider the live births per 1000 population. The drastic decrease of this index on certain periods takes the specific features of the phase transitions as it follows approximately a power law and, as well, its variation leads to the complete change of the population age structure. The values of the critical exponents that are obtained by fitting the experimental data referring to some East European countries are in agreement with the value resulting from the theoretical approach, thus showing the universality of the power law behaviour in the vicinity of the critical point. In order to describe the nonlinear evolution of the index, a feedback mechanism is introduced, improving in this way the

one-dimensional variant of the model. We study further the influence of the noise on a control parameter and the conditions in which noise induced transitions arise.

Keywords: *Migration, physical model and method, critical phenomenon, phase transition, theoretical biophysics and neural networks, theory of social impact.*

Chapter 7. Author: Mircea Gligor

PHISICS OF URBANISM: NONLINEAR MODELS FOR THE FRACTAL EVOLUTION OF CITIES AND TOWNS

Some of the main ideas of the fractal city theory are briefly reviewed, and their applicability is tested for the medium and small-size Romanian urban settlements. In some previous works (Gligor, M. and Gligor, L. 2008) have considered the fractal distribution of cities in Romania by population and area of the urban perimeter. The dataset was taken according to the 2002 census, referring to 265 urban settlements. Subsequently, there were officially declared an additional 55 towns (Wikipedia.org). In Romania, to the end of the year 2011, there were 320 towns. In the present chapter, the author demonstrates that using the updated dataset, the basic features of distributions remain essentially the same. Regarding to the urban area development, the diffusion-limited aggregation with dendritic-like growth (modelling The Central Place Theory of Christaller and Beckman) was proved to be in disagreement with the urban area development. Instead, the diffusion-limited aggregation with correlated percolation and self-organized criticality mechanisms are found to fit well the urban perimeter growth. Finally, the streets of a small Romanian town (Roman) were found to display the statistical structure of a scale-free network. The last model allows us to simulate complex phenomena like epidemic/rumour propagation and to find the most efficient lines of the urban development. In the second part of the chapter, the Central Places Theory, the diffusion-limited aggregation and the self-organized criticality mechanisms are investigated by means of some numerical simulations and the last two are found to fit better the urban perimeter growth. [5]

Keywords: Zipf law, master equation, diffusion-limited aggregation, self-organization.nonlinear model, cities and towns evolution, fractals, demographical area, rural and urban development.

Part III

OPEN COLLATERAL APPROACHES AND DEMOGRAPHIC, STATISTICAL AND DEMOGRAPHYSICAL PROSPECTIVE

Chapter 8. Savoiu Gheorghe

A DEMOGRAPHIC, ECONOMIC AND STATISTICAL APPROACH TO RELIGION AND WELFARE

This chapter was inspired by the Emil Durkheim's *classical definition of religion as a "unified system of beliefs and practices relative to sacred things, that is to say, things set apart and forbidden-beliefs and practices which unite into one single moral community...". Another starting point is Irving Hexham opinion that "today, there is an overemphasis on certain narrowly defined academic traditions in Religious Studies to the neglect of studies dealing with religion as it actually occurs in the world". The classification of major religions is fairly recent. During the 1800s, Islam, Hinduism, Buddhism joined Judaism and Christianity on the list. Eventually, five smaller religions were officially recognized: Confucianism, Daoism, Jainism, Shinto and Zoroastrianism. Traditions and religions are connected with demography. A lot of original concepts could be generated from these sciences, demography and religion history ... The first section of the paper is the result of a dialogue converging towards multi-, trans- and interdisciplinarity, whose starting points are science and religion, scientific and religious inquiry. This section underlines the existence of a deep conflict between modern science and religion in the 21st century, while the second section emphasizes the historical complementarity holding between the two forms of knowledge, the scientific and the religious one. An interesting example of science-religion complementarity, or a manifestation of interference of religion with economics, ecology and sociology in the newly appeared human ecology, is the content of the fourth section. In the fifth section a number of general criteria are also identified for grouping the world's populations, i.e. some synthetic demographic factors are detailed, as well, such as life expectancy and demographic aging. The contribution capitalizes on the data in the annual report of the CIA, available on the Internet, which includes the key indicators on world population, offered to the public by the U.S. institution, detailed and complete for a number of more than 200 countries in the world, where religious faith is present mainly as a firm option of the inhabitants; demographic evolution and economic growth are radically different, and so per capita GDP becomes a polarization axis. Also, the category of those having no religious creed, and that of the atheists are equally important contemporary landmarks in the initial segmentation of the population. Starting from the high degree of determination of religion as a factor of wealth, potential statistical associations area quantified. Some conclusions naturally arise from the general approach of the statistical investigation. A final remark describes the coexistence of new sciences (demograstatistics &*

demographysics) with religion in the contemporary world, appealing to an approach at once scientific and religious.

Keywords: *major world religions; Islam; Hinduism; Buddhism; Judaism; Christianity; religious adherents*; *holy books; religious community and group; nonreligious; agnostic; atheist population. religious demography, religion-calendar connections, religion-welfare associations, demography and demographic indicators, Yule association coefficient.*

Chapter 9. Mircea Gligor – Gheorghe Savoiu

PROSPECTIVE EVALUATIONS OR PROGNOSIS AND THE METHOD OF PROFILING IN CLASSICAL DEMOGRAPHIES AND DEMOGRAPHYSICS

Planning or forecast of the demographic type represents the first subsection of the chapter, both being, in the classical vision, fugitive glances simultaneously cast into the more or less proximal (or distant) future, in accordance with past and present developments in the human populations, in the statistical and mathematical form of extrapolations, whose quality crucially depends on the quality of the processed statistical series, and also the design or forecast model; the estimates are based on breaking up the phenomena of the demographic type, the use of distinctive hypotheses in the prospective processes thus decomposed, turning to account the methods and validation of models. The quality of the projections and forecasts essentially depends on the quality of the demographic or statistical data series processed and the assumptions made, but it seems that the method, and especially the model, become strengths instead of hotspots. With the support of the physical model provided, the demographic prognosis turns into an increasingly accurate way of assessing, securing classical demography a few new benchmarks within demographysics. The second section of this chapter describes the practical use of the sociological and statistical method of profiling in various disciplines, underlining the importance of this new method concept as applied to Demographysics' approach. The method is described briefly in the introduction and applied in the third section, after the second section has detailed the multidisciplinary innovative management process. The practical results of applying the method in innovative educational systems are further detailed, based on both the specifically multidisciplinary nature of this type of processes, and the profile method applied. A final remark ends the paper in a structuralist, schematic and optimistic manner.

Keywords: *demographic prognosis, prospective demographysics, physical model, prognosis horizon, prospective alternatives, sociological and statistical profile, the profile method, innovative educational process, management in innovative educational processes, profiled skills.*

Chapter 10 Savoiu Gheorghe

A CENTURY OF POLARIZING DEMOGRAPHICAL EVOLUTIONS. THE WORLD'S POPULATION BETWEEN DEMOGRAPHIC EXPLOSION & IMPLOSION

In the 21st century the option of "to be religious or not to be at all" has already been exceeded by the importance of the problem of limited resources of existing industrial technologies, the problem of environmental pollution and the problem of the serious economic disparities and demographic developments of the continents. At the beginning of the new century, the world's population manifests more and more clearly a sharp demographic oscillation. For the next fifty years the trends of the demographic projections of many economically developed countries are descending, meaning that these countries, and to the limit even the entire European continent, will severely reduce their populations while in almost all the developing countries or economically underdeveloped nations population will increase at an accelerated rate. This chapter oscillates between the demographic explosion generated by certain religions, and the well-being levels and implosion of others, everything being physically modelled on a model existing in the pragmatic and experimental thinking of physics. [6-8]

Keywords: *explosion & implosion of classical demography, explosion & implosion in demo(gra)statistics, explosion & implosion in demographysics, physical model.*

IN ABSENCE OF SOME FINAL REMARKS OR WAITING FOR SOME CONCLUSIONS

A synthetic summary of the study object pertaining to classical demography, of the variables specific to the new contrasting and polarizing evolutions, new developments, of the methods and models of physics, lead to a final outline of this new science about to be universally recognized, which can be defined first as demo(gra)statistics, and finally, why not, demographysics [9-10].

Keywords: *demography, classical demography, demo(gra)statistics, demographysics, multi-scientitific future of demographysics*

3. SOME FINAL REMARKS

Statisticians, mathematicians, physicists and demographers have capitalized on methodological and instrumental statistical thinking as well as the theory of statistical physics, physics and statistical-mathematical modeling in new interdisciplines called demo(gra)statistics and demographiysics

succeding to identify as many of the decisive exogenous factors of human population development as possible.

The most interesting approaches in the new and creative interdisciplines analyze statistical-mathematical and physical-demographic, even spirituality and information, culture in the broadest sense of the word and cultural behavior derived in the distinct denomen of demographic type, practically representing the maximum shaping determination, trying to annul the classic Malthusianism, after which demographers who identified the food problem as the driving force of mankind were oriented for a long time [11-13]. The demographic explosion has become a temporary phenomenon, being influenced, essentially and paradoxically, precisely by the level of culture and the ability to receive information. The inaccuracy of the long-term and very long-term mathematical models distinguishes many terrifying demographic projections in stark contrast. One prediction is much older and belongs to François Héran, the director of the French National Institute of Demographic Studies (INED) focused on a diminished upward trend or an accentuated downward trend, the first describing a positive rhythm of the demographic surplus, but decreasing, which will lead, at the level of the year 2300, to a still explosive world population of about 36.4 billion inhabitants, as well as the second with a pessimistic level, almost stationary around the year 2 075, which would thus correspond to a historical threshold of 9.2 billion inhabitants, a projection probably characterized by incipient diminishing tendencies after the year 2100 and severely installed after the year 2300, when a population on Earth is estimated to be below 2.3 billion inhabitants. The hope in the new interdisciplinary demo(gra)statistics and demographysics sciences, focused on their much more rigorous and realistic modeling capacity, transforms the unpredictable long-term and very long-term predictions into direct challenges addressed to themselves as the last alternative of inter- and transdisciplinary demography. and through the administered projection hypotheses, one still sees the hope of solving the difficult predictive task with acceptably small errors, thus rehabilitating, reviving and returning human civilization to nature, to spirituality, to culture. The interdisciplines of demo(gra)statistics and demographysics integrate the technological aspects, on a secondary level, where they belong and thus return to simplicity, to rationality, to the classical demographic and economic, political and social balance, on the path of the statistical method and the physical model.

Any book can be born or not, it can be published or not, it can be read or not, etc. This project about demo(gra)statistics and demographysics recalls in the general memory a demographic phenomenon of the newborn who dies in the first month of life, known as the neonatal phenomenon [6] ...

A simple or complex classical quality-quantity model can not explain entire variations in mortality rate, birth rate, fertility rate, neonatality rate, stillbirth rate, life expectancy, etc across time for human populations. Only trans-, multi- but especially interdisciplinarity sciences can help to have a more accurate approach able to assure a major improvement of the demographical estimations or prognosis (from HI or human intelligence to AI or artificial intelligence, from methods to models, from techniques to instruments etc.) [11-13]. Nothing is totally random but only relatively associated, more or less intense, both in statistics and physics, statistical physics and quantum physics, econophysics amd sociophysics, demo(gra)statistics and demographysics...

But as you can never say “never”, it is likely that even this book will appear either with a single author or with other willing collaborators, together with another interested publishing house. The possible is always the opposite of the seemingly “impossible” of reality, like in any paradox's essence...

From this point of view, the author of the article was and is still open to all kinds of collaborations for the revitalization of this book, especially in memory of his two missing friends.

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EPILOGUE OF A COMPLEX JOURNAL PROJECT, BASED ON INTER-, CROSS-, TRANS-, AND MULTIDISCIPLINARY RESEARCH AND ACADEMIC EDUCATION

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Abstract. *Any research and scientific journal has its own life and as it appears it must naturally disappear at some point, if there are no more researchers or professors as editors, interested in keeping it alive or giving it the status of being publishable. The magazine about which this brief article deals, suggestively titled "Epilogue of a Complex Journal Project, based on Inter-, Cross-, Trans-, and Multidisciplinary Research and Academic Education" appeared in 2008-2009. From its first two issues (now deleted from the ESMSJ link), a book was written that was successful in the market of academic publications and scientific research in 2012. The ESMSJ magazine became a permanent online magazine with 2, respectively 3 appearances per year, starting with 2011. On its website I wrote that Econophysics, Sociophysics & other Multidisciplinary Sciences Journal (ESMSJ) provides a resource of the most important developments in the rapidly evolving area of Econophysics, Sociophysics & other new multi-disciplinary sciences. The journal contains articles from Physics, Econophysics, Sociophysics, Demographysics, Socioeconomics, Quantum Economics, Econooperations Research, or many other transdisciplinary, multi-disciplinary and modern sciences related to fundamental methods and concepts. This article identifies a final moment in ESMSJ magazine and some conclusions of the editor-in-chief with the sadness but also the specific resentment of the age of a pensioner passionate about education and research in equal measure.*

Keywords: *Inter-, Cross-, Trans-, and Multidisciplinary Sciences; Econophysics, Sociophysics & Other Multidisciplinary Sciences Journal (ESMSJ), Physics, Econophysics, Sociophysics, Demographysics, Socioeconomics, Quantum Economics, Econooperations Research; Journal project, Epilogue*

1. INTRODUCTION

The idea of this magazine appeared in 2008, and its first two issues, which are no more published on the current website of the ESMSJ, ultimately constituted a successful book for our small publication. The book appeared in 2012, at the Elsevier publishing house under the title Econophysics. Background and Applications in Economics, Finance, and Sociophysics. London: Elsevier Academic Press (AP), 1st Edition-October 23, 2012 [1]. I have created ESMSJ in the online version since 2010 and its first issue was published only in 2011. Initially, ESMSJ had 2 annual issues (based on papers selected from EDEN workshop), and then with an additional or special one (ARFYT). In order to check its quality before publication, I held a series of EDEN workshops and later ARFYT workshops each year. ESMSJ remains my soul magazine or the journal of my heart. I created an opening article and an additional one, the last together with an enlarged team in almost every issue. Initially, the magazine was open to interdisciplinarity and multidisciplinarity in order to later include cross-disciplinarity and trans-disciplinarity, and finally even the holistic approach. In all the team articles in which I appear as the first author, I wanted and succeeded in completing more than 70-90% of the research and writing activities. In the rest of the articles, I was part of the inter-, cross-, trans-, multidisciplinary team and contributed with my limited expertise as a statistician, econometrician, economist, and demographer. Everything was done out of passion and sometimes this can be felt through the extensive number of friends, acquired, who are initially found as authors of published articles and finally as members of the scientific board (Ion Iorga Siman, Radu Chișleag, Aretina David Pearson, Sant Sharan Mishra, Hans Schjær-Jacobsen, Mladen Čudanov, Libb Thims, Ondrej Jaško, Ram Poudel, Shinichi Tokuno, Shunji Mitsuyoshi, Ung-il Chung/Yuichi Tei, Wolfgang Ecker-Lala, Doru Pogoreanu etc.).

Great support for their special help to the three young researchers and proffesors who really helped me without interruption and always with passion: my exceptional co-author Mladen Cudanov [now a mature researcher and university professor at FON, Belgrade], Marian Țaicu (the editor of the final text accepted in the pdf version), Denis Negrea (the one who took care of the online upload of the magazine, the electronic archive etc.).

Thank you from my heart, my dear friends!

Unfortunately, after I retired from academic education and academic scientific research almost three years ago, it was more and more difficult just for the four of us and no more help from the others, to fight hard to continue publishing ESMSJ. I regret that after 26 issues of the magazine appeared in the last 13 years, I have not identified a viable solution or I have not been able to find someone who wants to continue the tradition of this magazine and take over in a real way the job of editor-in-chief.

This last issue was written and signed entirely by me, having the clear role of marking the end of the magazine's editorial activity according to the title of its last article (ESMSJ vol.12(3) as a necessary epilogue…)

2. SOME FINAL REMARKS

The study of such a journal's existence provides a number of scopes to be enquired upon in the future of any scientific and research magazine. These are the following major and final major remarks about ESMSJ:

1. This journal's beggining was inter-disciplinarity in fact, based on the intersection between economics and physics and therefore further issues became cross-, trans- and especially multidisciplinary not only as contents but also as team research published in its pages.

2. The journal's peer review was based on the two workshops each year (EDEN and ARFYT), and the articles are the direct results of the initial papers and research but also through the dialogues and conclusions after the meetings, improving the quality of the publishing activity in the final articles.

3. The published ESMSJ can be considered not only a result of inter-, cross-, trans- and multidisciplinary research (EDEN) or research workshops (ARFYT) but especially the final conclusions and discussions generated in a multi-disciplinary extended family of scientists as friends. Thus, based on our precious scientific friendships, a new model or a future relevant solution was created among the models of researches in modern universities in Europe and many other geographic locations.

4. Based on the increasing role of inter-, cross-, trans- and multidisciplinary research (EDEN) or research workshops (ARFYT) or on the scientific research in academic education, ESMSJ's role can be incorporated into the provided model for future scientific journals or complex magazines.

5. All scientific papers from ESMSJ remain available for any interested publishing house during my last years of retirement from Academic education. If there are also interested scientists together with publishing houses for any articles in ESMSJ please write a message and finally, just send it to my e-mail gsavoiu@yahoo.com)

Some final findings regarding the attempts at foresight or evolutionary prediction can be extracted from the life or existence in time of an inter-, cross-, multi-, and transdisciplinary journal such as ESMSJ [2-3]. I would call these conclusions principles of foresight in the expected evolution of independent scientific journals or stores, with an emphasis on inter-, cross-, multi-, and trans-disciplinary ones.

The first and the most important principle is that of the futility of temporal, co-authorship (both in number and research fields), thematic, methodological, structural and content limitations, etc. which apparently impose themselves in the investigation and education mainly focused on unidisciplinarity. This principle of non-limitation could be formulated in detail as follows:

In any scenario, forecast estimation related to the life and existence of any scientific and research magazine published from passion and nothing else:

L1: The confidence level (1-alpha) decreases with:
a) number of variables [authors, domains, disciplines, sciences, inter-, cross-, multi- and transdisciplinary processes];
b) inference of estimators [number of authors, domains, disciplines, sciences, inter-, cross-, multi- and transdisciplinary processes];
c) the extension of the parameter and its statistical complexity [mean, dispersion, coefficient of homogeneity, test specificity etc.].

Derivatively, the significance threshold also increases accordingly.

L2: In any scenario, the confidence level can become optimal only in relation to the identification of a practical optimal - Paretian solution [eg. 20/80] of the minimum number of variables that ensure a maximum precision of statistically and mathematically acceptable inference.

L3: In any scenario, there is a limit to the survival of hypotheses (in an inter-, cross-, multi- and transdisciplinary approach) of the disappearance of the process or phenomenon in a universal biophysical and statistical-mathematical sense.

In the scientific universe, like the biological, natural or physical, hypothetical scenarios are born and die successively at the contact between past time and future time in a continuous and infinite present.

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