Chaos theory – a new paradigm of activity international monetary and financial system

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The concept of system comes from the Greek word "systema" which translated means "whole". Therefore, it is understood by the concept of a whole system. Everyone around us - and atoms, molecules and living organisms, the universe and society - consists of systems. Hence, research systems, together, represent and research the mysterious nature of the world, determine the nature and development of human society. Science synthesized century, after long and contradictory searches scientific category system. It has enabled both theory and practice to overcome the simplistic understanding of reality and put the man to reassess how the organization and exercise of its social, economic, political, etc.. Theory, which deals with the study of interrelations of the existence, disclosure of specific types of relations phenomena, deciphering functions, the dysfunction, the finalities processes called systems theory.

According to the above theory, the system is all interrelated elements. In fact, components are called its elements until they report to the system. The interconnection elements determine the integrity of the system. And if one element of the system loses contact with the system, then it turns into a new system. Like the other side of the system, which turns into another new system. So, all systems have their its entirety. Analog and all social systems are composed of elements. In the contemporary philosophical literature, systems are classified into several groups, namely:

• abiotic systems. This group covers a multitude of cosmic formations;

• biological systems. Living systems actually are a special case of systems nevi and are divided into many groups, depending on the purposes of research. Among these systems is highlighted and cyber systems. Social systems are, first, living systems and secondly, cyber systems. At the same time, these systems are distinguished by their exceptional features.

Determination and classification systems, assessment of the nature is possible only by the existence of a specific measurement tool (evaluation). Such a tool in our situation can be space and time. Systems research as a basis to take the internal space of the system and his own time. These

two parameters of the real world is evident as more general. On the one hand, they include all forms and systems in any combination, and on the other hand, they reflect the great diversity of systems and the slightest difference to them. Social systems, and other systems known in nature are measured by these parameters.

As for, the management of complex systems, the classical approach is based on the concept, that the result of external action is a consequence management unequivocal, linear and predictable "forces" applied, which corresponds to the following schedule: Action managed - the desired result. According to I. Newton (1643-1727), all physical actions are determined by both forces and their causes. The purpose of the research nature ("Philosophia Naturalis") is to determine these forces through mathematical laws ("Principia Mathematica") and continue to explain and determine all physical events observed in the past and future. With 100 years later this idea becomes the Frenchman Pierre Simon de Laplace (1747-1827) the belief in the possibility of calculating all of nature in ideal conditions, where all the action laws and initial conditions are known force (Laplace demon "). This assumption is true for linear dynamic systems, for example if a harmonic oscillator. The slightest shift of weight attached to a spring causes significant oscillations, while a significant shift will bring some significant swings. Cause and effect in this situation are similar. Mathematical analysis of this case will lead to a linear equation, which can be solved quite easily. In a more than sophisticated output deterministic dynamical systems can, in principle, exactly forecast and assuming that the real system model is correct, prediction errors have the same order of magnitude as the errors of observation and measurement of variables . Conversely, non-linear equations do not always allow a resolution as may be accurate, even if computers are used best. Thus, it can serve as an example of bodies in celestial mechanics problems, where the question of determining the gravitational influence of a body over another, if more than two celestial bodies (the so-called problem of three bodies). For the first time in the 1892 H. Poincare shows that when nonlinear problem some bodies may appear chaotic orbits, unstable, which largely depend on the initial indicators and can not be calculated in advance. Finally A. Kolmogorov (1954), V. Arnold (1963) and J. Mozer (1962) demonstrates the known theorem: trajectories in phase space of classical mechanics are not all regular or irregular all, but depend largely on initial conditions chosen. Significant deviations in initial data lead to the development of quite different trajectories ("butterfly effect"). It is therefore impossible to calculate in advance future directions of development in a chaotic system, although mathematically they can be fully determined.

Hence we conclude that the level of complex systems - biological, cyber, social - there is no total identity qualitative and quantitative equality between cause and effect here intervening processing element to produce quality and the new.

Another characteristic of living systems and human is a self-organization. Even the reverse connection is presented as a relatively simple form of self-organization that allows different types of systems to control activity. Cyber systems creates inside the homeostatic maintenance facilities, and resources as possible for their own development. It can be said that self-organizing system uses the order and disorder in service organization, structure and restructure the arsenal. Another parent of a market economy Adam Smith (1723-1790) in his research was apparent from the concept complex economic system where supply and demand of goods between producers and consumers determines the economic dynamics. To describe the dynamic Smith analyzed the price "natural" form of the cost of producing goods. When the market price exceeds the natural increase and lead to widening income generation and in a way to lower prices. Inverse relationship takes place when the market price is lower than natural. Thus, by means of the interdependence between risk the possibility of increasing profits and losses, the system of market economy status is self-organization and tends to balance supply and demand absolute. In this way, Adam Smith proposed a conservative self-organization, where the economic balance is done through an invisible hand ("invisible hand") and therefore lead to a social order of society ("public wealth"). But in reality, the behavior of economic systems self-organization does not allow comparison with the variety of crystals and strong bodies near a thermal balance. As an open system, which is in a constant process of exchange of substance, energy and information, the system of market economy can not aim at an equilibrium price "natural". After the analogy with biological ecosystems, the market economy undergoes constant changes and react most sensitive to small changes.

Term fluctuations of propensity to consumption, the inelastic response behavior of producers and speculation on markets for raw materials as examples of reactions can be sensitive to the economic system. The fact that fluctuations on the one hand may contribute to large leaps in economic development (eg, the role of technical innovations such as weaving machines and steam car in the industrial revolution), and secondly to cause chaotic behavior and uncontrolled (stock-krah , mass pauperism and unemployment), we demonstrated the historical experience of hundreds of years after Adam Smith.

Self-organization of the market economy was precisely determined by Karl Marx. His analysis reveals the critical transition phase, in which the development of economic systems saturated in crisis and change social structures. In terms of complex dynamic systems Marxist analysis of the transition phase is realistic. Marx observed that self-organization of economic systems does not automatically lead to societal welfare. Mistake many of his successors was that they tried to substitute self-organization of the distribution market with centralized administration. Thus, Marx on the one hand, recognizes the nonlinear dynamics of economic systems, and on the other hand tends to replace the linear dynamics, which corresponded to the spirit "Laplace demon". For this he acknowledges the existence of a new man who is not interested in personal benefit, but recognizes primarily the interests of society and act in accordance with them. But this assumption about human nature is unrealistic. Like Adam Smith and other classics of political economy emerge from the idealistic assumptions about the man. "Homo economicus" which is armed with comprehensive information about the environment just tends to maximize its benefit is nothing but a fiction of the dynamic linear mathematical balance.

In terms of history of science is remarkable that the "butterfly effect" in economics is that already in 1890 the English economist A. Marshall, about the same time the linear character of H. Poincare set celestial mechanics. Marshall said that one company, which accidentally reached an early high level of commodity production can overcome its competitors, whether the increased production and freight costs will decrease production. From this follows the following conclusion: it is important for finding policy parameters that could have played a dominant role in dynamic systems. In fact it is considering the need to prevent the development of economic systems as for early disease forecasting body or time. In both cases we meet with nonlinear dynamics of complex systems. Based on symptoms and meteorological data can be through various mathematical methods (analysis of numerical strings, determining the attractor in phase space, Lyapunov exponent) to determine the future trend of development. The research of economic and social systems operate with multidimensional systems, which include several components. On the mathematical social sciences are more complicated than the natural sciences, because the models used are more difficult. But the collection of qualitative models using nonlinear dynamics is very precious and we ensure against unexpected events.

Elements using nonlinear dynamics models can then be seen in the dynamics of A. Schumpeter, the dynamics of Keynes, Tobin's money in about the neoclassical model and the model

" Self-organized " Zang's (1990, 1991), in theory informational value of Valituh (2001). But even these models have contributed to an elucidation to describe temporal relationship processes and behavior changes extra dynamic go from order to chaos.

Part qualitative substantiation of new statistical formulations of "as three of the laws of chaos" they find in basic research, dedicated to dynamic chaos, the following scholars: A. Kolmogorov, V. Arnold, J. Mozer, I. Prigogine, H. Haken M. Feigenbaum.

A great contribution in development of complex dynamic systems theory was brought by Romanian scholars, in particular, by Nicholas Georgescu-Roegen in his work, among which we highlight the following work: Entropy and economic processes and energy, natural resources and economic theory Paul Bran and its activities throughout the researcher and especially his monographs: Economic value and the current monetary mechanism.

Economic systems research brings us closer to a deeper understanding of contemporary bases functioning market economy, the scientific and technical progress inevitably triggering new technologies "high", branches of information and "new" financial market quality.

Category of generalized systemic financial activity shown as the international monetary system international monetary financial possibilities of regulating their activities secure system, but can influence the world economy or even human society.

Knowledge of content aspect of the international monetary and financial system must proceed logically from systems theory and its concepts for the category of system. Systemic approach will enable a quantitative and qualitative analysis of the development and operation of the international monetary and financial system, proceeding from nature and its specificity, we inclined to use the concept of synergy and chaos theory in research.
Synergy is often called "the science of complex, self-organization and universal laws teaching of evolution of complex dynamic systems. One of the founders of Synergy, the German physicist H. Haken caused not only a science of self-organization, but as the theory of "joint action of several subsystems, the result that at the macroscopic level is a new structure.

This theory he proposed to be studied in a new discipline called it synergy from the Greek word "synergeia" which translated means "common coordinated action. In the early 80 century science of self-organization in Germany was called Synergy (H. Haken), the French-speaking countries-theory of dissipative structures (I. Prigogine) and the U.S. - the dynamic chaos theory (M.

Feigenbaum. In literature These "branches" of the science of self-organization is also called "complexity " science (the science component).

In contemporary scientific literature, often evolution paradigm - is launched on the first plane synergistic science. In line with this paradigm, development is understood as successively long periods, corresponding to a stable state of the system, which are interrupted by short chaotic behavior (bifurcations), then going switch to another stable state (" attractor "), the choice that is determined usually by fluctuations of the bifurcation point.

Already 25 years ago, one of the best known researchers in the field of synergy, I. Danilov has characterized the current research related to nonlinear dynamic systems as: "Among the multitude of scientific evidence that had brought our century scientific progress" non-linear century is one of the least sonorous, but more significant and deserved. World nonlinear functions, nonlinear phenomena as the world dread, captivating and irresistibly tempts the inexhaustible diversity. There is no room for a decent standard, here governing the variability and anger forms " Systems that are the subject of synergy can be quite varied in nature and studied by different sciences, like physics, chemistry, biology, mathematics, economics, sociology, etc. In this context, the arguments are of interest to researchers K. Mathews, M. White, R. Long in the application of synergy in the social sciences. Recognizing the usefulness of traditional methods - linear methods - in the social sciences they noted that it is observed that no obvious why human behavior should be more linear than the behavior of other living systems and non-viable.

Meanwhile, polemizing with skeptics who consider "complexity science" science circumstantial, a current vogue "bandwagon science, distinguished several arguments in defense of the thesis about the use of chaos theory research perspective of social processes, namely:

- Increasing the pace of economic change processes. Often these changes are unforeseeable and may lead to unexpected results, dynamic social systems contain all greater share of uncertainty, including periods of chaotic behavior and fractal characteristics show characteristic variations (eg typical dynamics of financial markets);
- The similarity of the most important aspects of development of economic systems, according to a number of researchers with natural systems: nonlinear dynamic link between a set of components, complex interdependence between components, the

possibility of dynamic development in compound forms, including chaotic regimes and self-organization;

- Similarity of mathematical models that give rise to chaotic behavior in physical and biological research with some developed in the social processes;
- Disappointment of the results of empirical research based on standard statistical methods (usually linear) because of failure of key variables in the research program;
- Widespread concept of synergy as an interdisciplinary paradigm in recent decades raises the question not only the development of apparatus to study the social disciplines, but also the use of a universal mathematical models developed in the theory of nonlinear dynamical systems and chaos theory, closely related to the concept of synergy.
- Synergy is clear from the fact that the steady state and linear nature of development processes in any event are not dominant in practice and main to be worth the attention of researchers is the unpredictability of the reaction systems studied their development during unstable, the point of bifurcation, that small random fluctuations can strongly influence the trajectory of the process (while in conditions "balance" usually Studied traditional, small fluctuations least influence the development process). The emergence of "chaos" near the fork does not mean that the order disappears, but the dynamic process that is unpredictable from the inside (not from external causes). In this respect, the basic question is how to influence random events which can not be anticipated, investigated the evolution process. For this question are related, and new research approaches to develop alternatives to the international monetary and financial system, emerging at points of bifurcation.

International monetary and financial system and its specific nature and is undoubtedly a complex nonlinear system. These characteristics are attributed to a number of peculiarities. First, the international monetary and financial system must be assigned to the class of nonlinear systems because these systems are those in which at least in a statistical characteristic constituent violated linear or other violations of the dynamics taking place links linear equation. No-nlinear systems can qualitatively alter his behavior to change the quantitative influence. And the financial system and international monetary developments shows it.

Secondly, during development of the financial system and international monetary crises can regularly see what they characterized. Thus, chaos is evident objective in the international monetary and financial system. The second postulate of synergistic approach demonstrates how and why

chaos can manifest as the creative basis for constructive mechanism of evolution, as the chaos under the influence of inner powers to develop a new organization. Chaotic state is characterized by uncertainty, probability and chance, which fall within the concept of cybernetics and entropy (if the information system is the measure entropy is a measure of organization and system disruption that is, entropy is a measure of insufficient information in the system).

Through the chaos is a link between different levels of organization. At times - times of instability - small fluctuations can branch out in macrostructure.
As for the concept of entropy was first introduced in 1865 by Clausius in explaining the dynamics of thermal processes, closed a decade later by Boltzmann in a concise mathematical formula, what takes place epitaph on the tombstone of the central cemetery of Vena .

In 1948 Shannon entropy as a measure redefining general uncertainty in his mathematical theory of communication, entropy is the law we are condemned to us fight, despite the fact that due to the three brilliant mind, today we know: it is inexorable victory.

Parable of Sisyphus is literally written the story of that concept. Remember it only when a huge sea wave destroyed lives of some hundreds of thousands of people, an earthquake of 7.6 on the Richter scale is a day about as many victims as a local war under the open sky and dropped 2 million people, when as a city was in ruins when Kobe is sent in minutes, when a volcano throws ashes in heaven sufficient to cover the Australian sun for several days.
Later, after developing the concept of systems "dissipative" entropy was associated with dissipative processes. Internal production of entropy of unit volume in a unit time function is called dissipative open systems and dissipative systems in which the function is different from zero are called dissipative systems. Therefore to describe the processes of economic systems need to operate with the concept of economic entropy, the thermodynamic entropy by analogy reflects the system state function entropy change is independent of the form process, but is determined only by the initial and final state of the process.

Economic entropy is a complex process of continuous and irremediable breakdown of the potential of existing resources, and creating a disruption. The content within a theory Termo - economic. Entropy is a degradation process that occurs over time, with a higher speed or lower, making visible reduction in resources.

While the process of entropy in nature occurs by itself, the economic process is directly dependent on human activity that entails the consumption of goods entropy, degradation, the production of waste and the failures that occur in this process.

In this way, the international monetary and financial system is a dissipative system and the concept of dissipative related to the concept of open system.

Thirdly, analysis and synthesis of the international monetary and financial system as given in economics is necessary to achieve or functionally, or in terms of time. The first strand emphasizes one or several functional variables, the other is fixed and is studying group behavior showed. The second compares the time to time some features are descriptive and conclusions on trends.

Compared with the approach "pure" functional structural-functional approach gives the possibility to integrate a variety of internal and external factors to the system studied. This approach would be better to use logical analysis and synthesis of the international monetary and financial system. So far the natural sciences are known many examples of forming ordered structures, arising from unbalanced processes. Ordering can also be carried out both in time and space. These structures, called dissipative structures (from the Latin "Dissipatio" - dispersion, scattering) occurring in dissipative systems during unbalanced processes (irreversible). From this point of view of international financial and monetary system is a system that is an open dissipative. Dissipative structures are necessary for the emergence of compliance with certain conditions. Dissipative structures can be created only in open systems because in these systems is possible influx of "energy", which offset losses and ensure the existence of ordered states. Because of it, both the entropy production, the flow is "negative entropy" within the system. Dissipative structures occur in macroscopic systems, ie systems consisting of several elements. Orderly movement in such systems is represented in the form of a cooperative nature, because it is involved in a large number of objects.

At the same time dissipative structures appear only in systems that can be described by linear equations. Non-linearity is an important feature common processes that happen far from steady state. Self-organization is not tied to a certain class of objects and processes. It exists only for certain external and internal conditions of the system and environment. Some bands are stable dissipative structures (stationary).

While their stability is determined by the stability of energy sources and the time of their occurrence.

If after Self-organization appear more dissipative structures ultimately will survive that system, which will produce entropy at a rate higher. Thus knowing the international monetary and financial system entropy can determine its speed change, allowing to assess the vitality of a higher probability of appearance of a new system composed self-organized, that the international monetary and financial system.

Fourth, the emergence of new ordered structures usually occurs after the bifurcation scenario. When the crisis in international financial and monetary system is the point of bifurcation, the future's development can take place under one or another scenario, because the synergy that complex systems are usually several alternative ways of development.
In this context we need to stress that although evolve (for development) are more, choose a point of bifurcation scenario, ie a certain level of development, is characterized by a relative Predetermination development processes. The current state of international monetary and financial system is determined not only by past and history, but also the future in accordance with the new order of self-organization.

Fifth, the system must be unbalanced, the possible emergence of heterogeneous phenomena, which can be observed throughout the financial system and international monetary developments. Economic systems research brings us closer to a deeper understanding of contemporary bases functioning market economy, the scientific and technical progress inevitably triggering new technologies "high", branches of information and "new" financial market quality.
International monetary and financial system can be viewed from two perspectives, namely:

• international monetary financial system can be defined generically as all the rules and techniques, agreed and accepted on the basis of institutional rules designed to coordinate and organize the behavior of member countries in international financial and monetary flows generated by the conduct of trade or non - international.

• international monetary financial system include all the markets, institutions, methods, media, technology, financial flows designed to provide movement in time and space of capital resources from those who have (creditors or international investors) to those who need them (debtors or beneficiaries of funding).

As part of the world economy the international monetary and financial system reflects any changes in its system and also contribute directly to international economic activity.

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