

Modern Aspects of Science Development: Synergetics and Globalization

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Abstract: In this study, the researcher discusses and analyzes the modern aspects of science and scientific knowledge development in the spectrum of synergy and globalization. The researcher rightly points out that modern scientific knowledge in general lost classic harmony, the focus from empiricism to theory and empiricism and is chaotic and “anarchic” in many fields, destroys the old strict boundaries between science and myth, science and religion, science and art and other forms of social consciousness. In order to disclose these processes the methodology of synergy is used which is applied almost equally well for the study and the knowledge of chaos and the absurd stages of a man’s development. The use of synergistic approaches and models means to understand better the internal mechanisms of evolution and self-organization of complex phenomena of nature and society.

Key words: Synergy, globalization, science, philosophy, bifurcation, postmodernism

INTRODUCTION

The conditions of formation of modern society increase the role and the importance of science as a phenomenon of human culture steadily. At that the central problem of science and the scientific community in our time is the following one: on the one hand, a scientist is an extremely free person, expanding the boundaries of the cognized world. On the other hand, he is the servant of a “social machine” of science in a certain sense an employee of the factory “for the production of knowledge”. The contradictory nature of a personal and a professional situation of a scientist in the world nowadays is the starting point of an attempts to present his vision of social nature and the organizational perspectives of an individual scientist activity and the scientific community as a whole.

It is obvious that any scientist does not work in a vacuum or on a desert land but together with other scientists, using the material, information, political or cultural resources of various state and social structures. On the other hand, the system of socio-political and cultural factors of social life, its development trends problematize the activity of a single researcher largely, introduce certain “distortions” in the implementation of methodological research strategies.

Let’s start with the fact that the analysis of scientific activity phenomenon in three main aspects or three problematic sections became a common one. Firstly, science as a specific type of activity, implemented in accordance with established rules, regulations and procedures. Secondly, science as a part and/or a form of culture, a culture-specific element of a certain tradition or developing the very cultural tradition. And thirdly, the consideration of science as a particular social institution or institutions of a system, various types of social communities, directly interacting with the structures of society as such are possible and necessary. The analysis of science social nature takes us immediately to the problem of relations between a scholar and authority, the development of management systems in research activities, the design of “social order” on scientific work results.

Scientific knowledge and synergy: Scientific knowledge of the world provided a great opportunity to a person for the transformation of nature in his own purposes for a broad use of its powerful forces in the interests of human society for the progressive development.

Science studies not only the secrets of the universe but also foresees the future, predicts the phenomena of nature and social life. Scientific prediction is based on the

knowledge of material world development laws. Consciousness does not reflect reality passively: it analyzes an objective world and catches regularities by random facts and phenomena. All the phenomena of nature and society have their natural causes, subject to certain laws. The world is a single, indivisible whole. The phenomena surrounding us are related inextricably, one of them are provoked by others and inspire new phenomena in its turn. "There is a tendency in philosophical, historical and scientific literature to associate the occurrence in sciences about processuality ideas of complex system objects, cyclic and probabilistic causalities, irreducibility of a whole to a simple sum of its components, mainly with the advent of Charles Darwin evolutionary theory, genetics and the representations about supraorganism living systems (population, biogeocoenosis, biosphere)" (Stepin *et al.*, 2015). Studying their origin and development, their mutual relations we find out the nature and the causes of happening we establish what determines this or that phenomenon and its causes. At the same time, we study the way and the sequence various phenomena follow each other, the periods and the conditions of their repetition.

Modern science came to the recognition of the fact that all the natural and social objects considered in view of their historical development belong to the type of complex self-developing systems. Sophisticated self-developing systems are characterized by openness, matter, energy and information exchange with environment. Specific information structures recording important features of its interaction with environment are developed in such systems. These structures appear in the program function of system behavior.

Society as a self-developing system is studied by social synergy. System-synergetic methodology opens new conceptual possibilities in particular for the study of globalization processes. Synergetics is a scientific trend, studying the relationship between the elements of a structure (subsystems) which are formed in open systems (biological, physical, chemical and others) by the intense (streaming) matter and energy exchange with the environment in non-equilibrium conditions. There is a consistent behavior of subsystems in such systems, thereby increasing the degree of their ordering that is entropy decreases (the so-called chaos). "The doctrine of self-organization can reveal the mechanisms of evolution, derived from simple systems of inanimate nature to complex forms of evolution in biological, socio-economic and cultural-historical systems" (Radjabov and Guseynhanov, 2006). Synergy does not replace but rather confirms the fundamental law of dialectics the law of unity

and struggle of opposites (not only in the opposition but also in conjunction). At that the opposites interact both as chaos and order, darkness and light, feelings and thoughts. The development of "order out of chaos" is accompanied by a constant non-linear movement of a lower order reality through the state of new changing chaos to a higher order. This is due to the laws of dialectics complement each other. "A synergetic approach provides a focus shift from the knowledge of particular laws on the knowledge of general laws" (Plebanek, 2015).

From the viewpoint of a synergistic approach a community transformational development is the process of social self-organization which is implemented in the form of interaction between social order and social chaos. Complex nonlinear systems have the property of synergetic co-evolution of several power vectors in one or in several attractors (for complex systems). "Thus, the belief was developed slowly but steadily in various fields of science that there is a common conceptual core that serves as their common basis and makes the paradigm of self-organization process study" (Radjabov, 2016). Synergy is intended as a modern worldview scientific approach, a trend and a new scientific discipline, explaining complex, nonequilibrium and self-organizing large systems in different spheres of reality.

Synergetics as science reflects the evolution of the development and changes concerning traditional "Russian cosmism" on the scale of the universe and in all forms of life on earth, including the civilizations and societies. "A synergistic approach started to claim the role of a general scientific research paradigm which received various names in national scientific traditions (heavily dependent on scientific scope of application) and which became the general methodological basis of modern social science".

The science of complex nonlinear system self organization in different countries is called in different ways: in Germany and Russia, it is called synergy in French-speaking countries France and Belgium it is called the theory of dissipative structures in the US it is called the theory of dynamical chaos. Although, the term "synergy" is popular in domestic scientific literature, the meaning of this term is provided well by the phrase "universal evolutionism" (Plebanek, 2015; Kizima, 2015).

It should be noted that there is a sufficiently critical attitude towards synergetic theory. Modern scientific knowledge lost classical methodological harmony, the focus from empiricism to theory and in many of its areas it destroys former strict boundaries between science and myth, science and religion, science and art and so on in a chaotic, anarchic way. The borrowing between humanities and natural sciences became more frequent and

synergetic methodology is applied almost equally well to study cosmic chaos and absurd stages of human development. "In other words, there were and there are various practices of cognitive science with its scenarios, situational models and frames; finally, there is a reflection of cognitive phenomena in the context of synergy".

The difference between natural scientific and social approach lies mainly in the fact that if the laws of nature are manifested in so-called dynamic enough observed, unambiguous connections and relations, social relations are of probabilistic, ambiguous, sometimes veiled character. Natural laws are natural-they are the manifestations of natural, absolutely objective forces, abstracted from national or class interests of people and the laws of society are implemented as the activity of people interested in the pursue of their goals.

The peculiarity of modern scientific knowledge is in social and cultural factor increase. The role of social and cultural factors in the process of theory change consists in the fact that they are involved in the creation of the material to combine different paradigms. The systematic method of synthesis is most important for us. On the basis of this method an objective enough and especially prognostic study of natural and social phenomena is possible.

MATERIALS AND METHODS

Synergy and globalization objective process of modern scientific knowledge: The end of the 20th century was marked by the clash between two theories of social development formation and civilization theory. And if formational theory is not able to explain the diversity, unpredictability and variability of social phenomena due to the limited scope of the class approach, the theory of civilization is too vague and subjective. The collision of two existing theoretical paradigms should lead eventually to the emergence of a new one, based on common values. Thus no matter how dubious are the early theoretical schemes, the first sketches of new theories, their further development clearly demonstrate their fruitfulness and superior nature as compared to the old ones. A new theory is better than the old one in the first place because it combines many advantages including the value aspect. The worldview of the 20th century is the energetic outlook. The ancient sages stated the identity of micro-and macrocosm laws. The law of analogies is expressed in the teachings of all world religions. In Christianity it is expressed by the formula "as above so as". If we apply this formula to the evolutionary development it turns out that the evolution of a mankind is impossible without the evolution of an individual. And

the cognition of the evolutionary development of a man is impossible without the study of internal energy capacities of a man. In other words the same idea expresses the eastern wisdom underlying all spiritual systems of mankind, aimed at the study of a man energy capacity: "know thyself and you will know the whole world".

Synergetics synthesizes all human types of energy: sensual, intellectual, psychological, informational as well as all other possible types of natural energy including cosmic one. At that it seems like it directs them to a common natural course. Thus, some scientists perceive synergy as a future paradigm of not only Russia but of the whole noosphere. They believe that synergy ideas can help to return to the synthesis of general principles which will bring science and religion together through the coupling of materialism and idealism, the "rationalism" of the West with the "irrationality" of the East. It seems that the more complex a particular fragment of a single system, the more it is unstable. "As modern cosmology is a motley spectacle requiring ordering. It creates more problems and questions than solutions and answers. The theoretical thought is deadlocked. None of the theories has a convincing experimental confirmation and even potentially valuable ideas are veiled by unproductive conceptual background and do not have the conditions for development". Kizima, 2015 super system, i.e., the universe is particularly striking.

The insignificant changes in fundamental constants would make impossible the existence of any stable states. As is known, this fact led to the emergence of the anthropic principle and its various interpretations. But if the increase in complexity of matter organization increases its structural instability then maybe there should be some special trends of the world synergetic process compensating this natural phenomenon? Perhaps, this "synergistic chaos" by which the world process of self-organization is represented has a certain tendency of a kind of autopilot development which protects supersystem and its fragments from a spontaneous destruction. In our opinion, the most correct point of view is the point according to which the essence of synergy is in universal and interdisciplinary transfer of its models. It provides only a general framework of a study, a mental scheme or a heuristic approach to a specific scientific research. Specific applications of synergetic models to complex human and social systems require further detailed research. Such research can be carried out successfully only with a deep knowledge of a relevant scientific discipline or at a close collaboration with the experts in this disciplinary area.

Synergy does not invent speculative general evolutionary laws, it reflects them, showing the boundary conditions of their action. It explores the specific self-organization processes such as laser light, the structure in plasma or convection cells in a fluid and develops a model which allows to describe these processes mathematically. This model is a deeply meaningful and successfully functioning in many other areas of scientific research. This is the way from the bottom up, i.e., the method of system synthesis which allows to move from thorough research to the theoretical and then even to philosophical generalizations.

Synergetic models do not contain any regulations and any compulsion towards the nature to behave that way and not otherwise. The use of synergistic models means to understand better the internal mechanisms of evolution and self-organization of complexity in nature.

We always observe the direct dependence of scientific activity organizational forms from the basic tendencies of social and cultural environment development. There are two such trends in our opinion. Let us examine them in detail. The first one is the process of social life “globalization” in general civilization scale. Almost everyone understands what is contemporary globalization but only a few can describe clearly its key features. Globalization in our opinion is not the process of rules and regulations unification concerning economic activities. Globalization is characterized by three main features: The establishment of common principles and organization standards, regardless of a particular subject area on which the activity is directed; the unification of rules and communication norms between the activity subjects including the creation of a unified information environment developed by Internet technologies (and this is not the internet blame exclusively); the development of a unified system of values, used by a man who tries to determine the validity of his action. The globalization process encompasses both the whole groups and regions and individual countries through the growth of internationalized production of goods and services, the dynamics of direct foreign investments and international capital, the dynamics of international trade by goods and services and its growth rate as compared to a gross domestic product, the dynamics of international bank operations, joint research projects, academic institutions, etc. (Radjabova, 2016).

The trends of globalization are of a supranational character, aimed at the erasure of national borders, the undermining of a national-state sovereignty. “With the globalization terms the processes of civilizational upgrades are carried out simultaneously in the scale of all

mankind. They are deeply contradictory and testify about human civilization crisis”. Lapin (2015) on the one hand, globalization is the global integration of efforts in a wide range of relations (scientific, political, informational, religious, etc). On the other hand, globalism is determined by a rapid surge of deterministic civilizational changes as well as by demographic, economic, international-terrorist and other issues.

The impact of globalization processes on socio-political systems is undeniable. We can say that the social and political transformations are initiated by a globalization factor. According to most scholars, the global bifurcations are an objective perspective of modern civilization. Bifurcation is the gaining of a new quality a dynamic system movement with a small change of its parameters. The basics of bifurcation theory were laid by Poincare and A.M. Lyapunov during the early 20th century then this theory was developed by I.R. Prigogine and his followers. The deep meaning of a new wave of bifurcations which began since the end of the 20th century is the transformation of the industrial society and its inherent patterns in the post-industrial one in the development of an integral socio-cultural system, based on the interaction of Western and Eastern civilization achievements.

The globalization process can be carried out in two forms: extensively and intensively. An extensive globalization assumes its expansion horizontally while the social value is embedded in an increasingly wide range of people, countries and nations. An intensive globalization means a profound assimilation of social experience by various subjects.

Many discoveries of modern science have the origins in the cosmogony of the ancient Taoist tradition. According to the ancient Chinese thinkers, the world was a chaos initially consisting of minute particles “chi” which existed in the form of a formless mist and then began the process of division “chi”: light, bright particles went up and solid particles fell down. The sky was formed from light particles, known as “yang” and the land was formed from heavy particles called “yin”. And a man appeared only after the development of heaven and earth. Everything that surrounds us, all objects and phenomena are the result of a light origin “yang” and a dark origin “yin” interaction. This interaction generates movement and rest, light and darkness, heat and cold, good and evil. And one is impossible without the other, one becomes another and relatively speaking, may change its sign depending on time and situation. The ancient Chinese Monad is the symbol of “yang” and “yin” forces. The movement of forces is unlimited: they are swapped penetrating into each other and create an endless “cycle

of things". The diversity of nature, its life is the struggle between "yang" and "yin". Taoism has an integral world outlook which is based on the pervasive unity. In the philosophy of taoism we also find a brilliant development of a universal distinction and unity idea which allows an infinite number of differences. This thought has no oppositions between an ideal and a material, a spiritual and a physical, mind and feelings, empirical and rational, subjective and objective-all these positions which in the end, reduce reality to "principles".

The idea of the trinity of opposites in nature and life, related to the "great limit" has the ancient philosophy of India and the teaching of Christianity and Gandhi's teaching of non-violence which was born under the influence of Leo Tolstoy as he admitted himself. It was also reflected in V.I. Vernadsky's theory of noosphere, whose ideas were shared by French philosopher Edward Leroy and his compatriot, theologian and paleontologist Teilhard de Chardin who has worked in China for many years. So, kindred ideas go from one nation to another, from one teaching to another, migrate from India to China, from Byzantium to Russia from Palestine to the West and then back to the East-to India, China and to the Muslim world.

RESULTS AND DISCUSSION

The processes of globalization have contradictory effects on the socio-cultural dynamics of local civilizations, promoting both integration and disintegration aspects of this impact. "Now this behavior returns as a boomerang to the radical layers of developed country population. In the context of globalization an inadequate perception of other civilizations an uncivilized attitude towards their population as "strangers" was fraught with negative consequences for the population of the Western civilization, primarily its "European subcivilization" (Lapin, 2015). They appear in different proportions and with various degrees of intensity for different elements of the socio-cultural sphere. On the one hand, a global socio-cultural space is developed, increasing the interdependence of countries and civilizations in this area, their interpenetration and interweaving, especially with regard to the process of migration strengthening. On the other hand, the process of civilizational identity, the understanding of culture identity and the confrontation of religions is being developed. Also, it should be noted that two basic trends of socio-cultural environment development globalization and postmodernism-confront each other. Globalization is aimed at the development of a uniform and a compulsory order and postmodernism opposes any

unification in the use of truth and order categories. There is nothing strange in this "dialectics of epochs". The fact is that globalization organizes the activity of communities and postmodernism is the form and the style of modern thinking. At that postmodernism is expressed as a quite natural means and result of globalization effects compensation in the minds of intellectuals. Thinking people can not come to terms with the triumph of uniformity dictated by globalization with the "kingdom of universality". They'd like to preserve the freedom of thought at least to reduce the opportunity of their own ideas development and the ways of operation with information. The more a separate entity has to obey common rules and technologies of activity organization, the more is his desire for the freedom of thought. If you focus on a particular species of intellectuals-a modern scientist, the whole depth of a problem situation is revealed in which he resides, strangled from both sides by the millstones of globalization as a key form of organization and postmodernism as a key form of organization of thinking. Again as in the era of modern times, a scientist aims to answer the fundamental question about the reliability criteria of his knowledge. But now his specific scientific activity is inseparably linked with the activity structures of the whole social life. The social being, the various systems of social practices include, "privatize" science, give it the necessary basis and an appropriate place in a social space but at the same time they claim to control the shapes and the content of research activity.

Ultimately, the science itself and its main subject-a scientist-are the elements and the parts of a global "social machine". They have a guaranteed certain place, a certain proportion of the resources and opportunities as the cogs of this machine but only as long as the scientific activity does not begin to go beyond the established social machine boundaries to break the "rules of a game". The development of the global "social machines" is a natural and an inevitable result of two trends interaction in the development of socio-cultural environment which was discussed earlier-globalization and postmodernism. A global social mechanism that absorbs an individual is born at their intersections. Theorists of postmodernism have been arguing about an "anthropological disaster" for a long time about the disappearance of a human nature and the concept of a "man". An activity subject finds it increasingly difficult to maintain his own "I", his "human" nature. And the more active a person is included in the social systems, the faster the process of deformation and the break of his subjectivity takes place. The widening of communication space boundaries and of a continuous complication of communication system make it impossible

to keep the meaning and the purpose of communicative actions within the consciousness of an individual. All this fully applies to the man of science. Scientists can not dissociate from subjectivity destruction processes by an insuperable barrier, consisting of a set of classical principles from scientific methodology. However, the paradox lies in the fact that this circumstance does not preclude the machine on the “production of scientific knowledge” from its effectiveness.

Summary: If earlier the reliable recipes of methodological scientific activity organization as such were received, nowadays these recipes and rules are not enough. It should be emphasized that the traditional methodology of science did not lose its significance and even strengthened its own influence in the process of globalization. Globalization is an objective process of global development, a form of a man’s life internationalization which brings together the main characteristics of local communities.

It seems that in this situation the prospects for the development of scientific activity are entirely related to the development and the implementation of new strategies and forms of researcher activity organization. These strategies should provide new tools for scientists to work with various types of resources, new possibilities of such activity system development in which a subject of science would be able to preserve himself his position in respect to basic socio-cultural processes and structures. In modern science, the theory of self-organization (synergy) has become the study paradigm for a broad class of systems and occurring evolution processes. Usually, the paradigm in science is a fundamental theory which is used to explain a wide range of phenomena related to a respective field of study.

The development of new systems of scientific activity organization is undoubtedly the most complex and a multi-faceted problem. We must not forget about the epistemological foundations of any particular

organization scheme during this issue solution. In this regard, the classical categories, themes and issues of epistemology require further development.

CONCLUSION

Thus, synergetics provides a certain approach or indicates a certain line of research, gives a particular research setting an outlook to scientists; the origins of globalization as a planetary phenomenon inherent in all megasystem shall be sought in the general cultural and spiritual traditions undoubtedly. It is quite applicable to use modern scientific methods, including the synergistic one for the study of the phenomenon.

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