



UDC 165

SELF-ORGANIZATION AS AN AUTOPOIETIC SYSTEM

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Abstract. The concept of self-organization emerged as an interdisciplinary approach, based on the fact that everything in the world is related to ideas, interconnected, interdependent. The basis of the synergetic approach is the system approach. The object of studying synergetics is the mechanism of the transition of chaos into order, the process of self-organization, which causes the emergence of a new one. Stability and instability, order and chaos are components that form the basis of the synergetic picture of the world. This article analyses the problems of self-organization in the autopoiesis system. Presently this concept is a new system-theoretical concept of self-reproducing systems. Self-reproducing systems, consisting of components and relationships, are capable of reproducing both components and connections between them, with the help of their own actions, i.e. These actions apply only to the system itself but not to the outside world.

Keywords: autopoiesis; autopoiesis system; dissipative system; approach; disciplinary approach; system approach; cognition; self-organization; synergetic; synergetic approach; complex systems; structure.

The concept of self-organization emerged as an interdisciplinary approach, which is based on the fact that everything in the world is related to ideas, interconnected, interdependent. Today, the problem of the self-organization of living systems is seen as an autopoietic system. It can be said that 'organisms, unlike machines, are self-reproducing, self-organizing entities' [1]. Ideas on the relationship, interdependence can be found in these concepts, but conservatism prevails. Another approach is a dissipative system, it is not conservative (energy is not preserved in it), but is open. Usually it 'contains an external control parame-

ter that can be changed and traced to the transition to chaos' [5, p. 84].

What is self-organization, which system can be called self-organizing? According to G. Haken, the self-organizing system 'if it without any specific external influence acquires some kind of spatial, temporal or functional structure' [8, p. 28]. Here we can say that in self-organizing systems without a specific impact, internal opportunities are used. As a result of the action, which arise more complex and more perfect structures.

Recent time in modern science is explored the theory of autopoiesis as a problem of self-organization. The theory of autopoie-



sis is developed by Chilean scientists F. Varela and H. Maturana, and the theory of autopoiesis becomes one of the pillars of self-organization. It is created on the basis of the material of biology and is distributed in various fields of knowledge, therefore there are many definitions of autopoietic systems. Conditionally defined, autonomous, closed systems, capable of self-development in interaction with the environment, are autopoietic. The given system is 'in the process of constantly constructing itself, its structure, maintaining its autonomy' [11, p. 212].

The term autopoiesis (from Greek *αυτος* – self, *ποιησις* – I create, produce, create) literally means self-construction, self-production or self-reconstruction through myself, and autopoiesis as self-construction. Authors of the concept extend the principle of 'autopoiesis' to behavioral, social structures, and also to the process of cognition as such.

Autopoietic systems, according to H. Maturana and F. Varela, 'is systems existing due to constant self-reproduction. A vivid example of such systems is living organisms' [7, p. 40]. The fact that we living entities are structurally deterministic systems means that nothing external to us can essentially determine what is happening in ourselves. This is explained to us by H. Maturana, 'everything that happens in us and with them occurs as a stream of structural changes that is determined in us moment by moment through internal structural dynamics ... The autopoietic system lives as a closed structurally determined system in the closed dynamics of structural changes' [12, p. 93]. Here we can say that 'living beings live separately, they live as structurally deterministic systems' [4, p. 10].

According to H. Maturana and F. Varela, 'living beings are characterized by the fact that they constantly reproduce themselves, it is precisely this process of self-reproduction that we point out when we call the organiza-

tion distinguishing living beings an autopoietic organization' [7, p. 12]. Autopoiesis is inherent in all living systems, regardless of their classes, components. In the opinion of H. Maturana, 'the living system has a circular organization, it is the unity of interactions, and it is this circularity that the living system must preserve in order to remain a living system by its perfect identity in various interactions, and its identity remains only as long as the fundamental circularity, which determines the living system as a unity of interactions, remains unbroken' [6, p. 24]. Due to the closedness of the causal round process, the living system allows changes to maintain circularity, but the circularity itself remains. Circularity is one of the main characteristics in the theory of autopoiesis.

In the theory of autopoiesis, it is argued that cognition is a natural process for systems that meet the following requirements: a system is a network in which all elements affect one another; the boundary of this network is also its element. The system is operationally closed and autonomous. The presence of these properties suggests that the system is autopoietic. According to autopoiesis, the process of cognition is a cognitive process.

H. Maturana and F. Varela distinguish between organizations and the structure, the structure is not considered as a kind of organization. 'Organization means the relationship that must exist so that it can be attributed to a particular class' [7, p. 12]. Organization is a specific configuration of the relationship between the elements of unity and the environment. The same organization can be inherent in different representatives of the same class of objects. It does not depend on the properties of the components of its components, they can be different. The main relationship between the components must be in the form of a closed causal circular process, i.e. they represent negative feed-



back, which serves to preserve the constancy of the system.

The concept of H. Maturana and F. Varela is a new system-theoretical concept of self-reproducing systems. Self-reproducing systems, consisting of components and relationships, are capable of reproducing both components and connections between them, with the help of their own actions, i.e. these actions apply only to the system itself, but not to the outside world. The system constantly produces, reproduces, creates itself.

In the autopoietic system, reproduction and creation of new ones are carried out by the components of the system itself. Therefore, organizational closeness means that the living system is self-organizing, since its order and behavior are conditioned by the system itself. But at the same time the system interacts with the environment, there is a continuous exchange of energy and matter. Interaction with the environment does not determine the organization, it remains self-organizing. But constant interaction with the environment creates the conditions for the formation of new structures. 'The creation of novelty leading to development and evolution is a deep internal aspect of autopoiesis. H. Maturana and F. Varela see in the difference between the relationships of static relationships and the relationship of processes the key difference between physical and biological components' [1].

In the autopoietic system, a structural change is constantly taking place, but at the same time the organization is preserved, i.e. components continuously or periodically disintegrate and arise, are destroyed and created. Another type of change leads to the formation of new structures - new links in the autopoiesis system. 'The change of the second type is evolutionary, not cyclic; they are also committed continuously, either as consequences of the influence of the environ-

ment, or as a result of the internal dynamics of the system' [1, p. 213]. A complex system of interactions, systems based on cyclic changes, retains its identity. And changes are associated with a change in the structure for adaptation and the conditions of the external environment, while maintaining its organization. In this process, there is an indissoluble connection between the unity of variability and organization, differences and similarities. According to this concept, structural changes play an important role, both in preserving the identity, and in the adaptation process of the organization. Structural changes, when exposed externally, are transformed. The structure in this concept means 'those components and relationships that really constitute a concrete unity' [7, p. 13].

In the concept of H. Maturana and F. Varela, the structure determines the functioning of the system 'changes that occur from the interaction of a living being and its environment, although caused by a disturbing agent, are nevertheless determined by the structure of the most perturbed system' [7, p. 27]. Changes occurring in living systems are determined by their structure and organization. 'The concept of structural determinism, introduced by H. Maturana for understanding biological systems, was subsequently applied in therapy, psychotherapy and even in the study of social systems' [2, p. 28].

Summarizing the idea of autopoiesis, one can come to the conclusion that changes occurring in an autopoietic system are an expression of the properties of the system itself, which reacts to the external by acting immanently in its inherent way. According to the concept of H. Maturana and F. Varela, two independent structures come into interaction: a living being and an environment. 'In its expanded form, it provides a convincing picture of the relationship between systemic unity and the environment, which



characterizes not only the process of cognition in living systems, but also other processes, including functioning over the organism systems' [10, p. 170].

Autopoiesis is not only the maintenance, preservation, the ability to regenerate structures, but also a way of its development, self-renewal. Speaking about knowledge in the aspect of autopoiesis, it can be said that it is aimed at finding what is missing. He defined the essence of cognition, 'cognition is an action aimed at finding what is missing, and replenishing the missing from the point of view of the cognitive agent' [7, p. 6].

In the framework of the concept of autopoiesis of systems, according to N. Luhmann, the society considered in the flow of time is 'unable to anticipate or plan its future, but in its morphogenesis, in its radical structural changes, it is correlated with evolution' [3, p. 113]. The uncertainty of the future of autopoiesis is also an important part of post-social research, which in some of its parts is not focused on finding the probabilities of the future, but on analyzing the social risks that arise when the objective cultures benefit, and the object relations thus presented compete with human relations.

All autopoietic systems are self-regulating. According to Heinz von Foerster they are continuously occupied with the calculation of regularities [13]. H. Maturana distinguishes between the simple organization of the auto-poetic process and its structure, which gives it a special type, along with which other types can also exist [12].

H. Maturana defines life as an autopoietic organization in molecular space (and, therefore, through the combination of two more complex concepts themselves, and they are not specifically defined biologically) [12]. This has significant consequences. On the one hand, the question of the existence of other auto-ethical systems (in other spaces) remains open. On the other hand, what acts as a criterial sign of life grasps so narrowly

and so unambiguously that many 'obvious' circumstances connected with this sign can be treated only as distinctions made by an observer if he observes living systems.

So, the epistemological approach determines the cognition of complex phenomena, since the identification of new sides requires new approaches, new methodological guidelines that should adequately reflect the phenomena studied. In addition, the process of formation of new structures in open systems is subject to general laws. From the point of view of synergetics, creative opportunities appear in a new form. 'As a result of this or that fluctuation (illumination or flash), a new order parameter (a new idea) arises, thanks to which we are able to find the relationship between the individual parts and order them by subordinating ourselves. However, all this is due to self-organization – the self-organization of our thoughts in this case' [9, p. 232]. As conclusion we consider that autopoiesis means a system that reproduces all its elementary parts with the help of an active network of the same elements and, therefore, is delimited from the external environment [12]. This can occur in the form of life, in the form of consciousness or, in the case of a social system, in the form of communication. It is autopoiesis that we consider the way of reproducing the system through itself.

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