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SYNERGETICS AND SELF-ORGANIZATION IN PUBLIC ADMINISTRATION

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СИНЕРГЕТИКА І САМООРГАНІЗАЦІЯ В ДЕРЖАВНОМУУПРАВЛІННІ

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СИНЕРГЕТИКА И САМООРГАНИЗАЦИЯ В ГОСУДАРСТВЕННОМУПРАВЛЕНИИ

The article studies the operation and development of public administration from the standpoint of self-organization and usage of synergistic approach to the system of public authorities. The paper examines the concept of self-organization that occurs in spontaneous emergence of spatial or temporal coherence with a consistent flow of several random processes associated with the processes by which new structures are created and there is the interaction of chance and necessity. The use of resonant excitation methods that will carry out in the future, with regard to their own forms of organization of environment appropriate to its nature is suggested.

Keywords: *attractors, positive feedback, nonlinearity, fluctuations, bifurcation, information technology, structure-attractors, resonant excitation methods.*

В статті проведено дослідження функціонування та розвитку систем державного управління з позицій самоорганізації і використання синергетичного підходу в системі державної влади. Проведено аналіз поняття самоорганізації яка має місце при спонтанному виникненні просторової або часової когерентності, тобто при узгодженому протіканні в часі декількох випадкових процесів, яка пов'язана з процесами, завдяки яким виникають нові структури і відбувається в результаті взаємодії випадковості і необхідності. Запропоновано використання методів резонансного збудження, які дозволять здійснювати вихід на майбутнє, якому віддається перевага, з врахуванням власних форм організації середовища, що відповідають його природі.

Ключові слова: *аттрактор, позитивний зворотний зв'язок, нелінійність, флуктуації, біфуркації, інформаційні технології, структури-атрактори, резонансні методи збудження.*

В статье проведено исследование функционирования и развития систем государственного управления с позиций самоорганизации и использования синергетического подхода в системе государственной власти. Проведен анализ понятия самоорганизации имеющей место при спонтанном возникновении пространственной или временной когерентности, то есть при согласованном протекании во времени нескольких случайных процессов, которая связана с процессами, благодаря которым возникают новые структуры и происходит в результате взаимодействия случайности и необходимости. Предложено использование методов резонансного возбуждения, которые позволят осуществлять выход на будущее, которому отдается предпочтение, с учетом собственных форм организации среды, соответствующих ее природе.

Ключевые слова: *аттрактор, положительная обратная связь, нелинейность, флуктуации, бифуркации, информационные технологии, структуры-аттракторы, резонансные методы возбуждения.*

Problem statement. Improving of governance is associated with the use of modern scientific approaches that can improve the functioning and development of the government. One such scientific fields capable of solving complex problems in the area of governance is synergetics, the science that deals with the study of self-organization in systems of different nature. Self-organization of systems is studied during the processes of their creation, functioning and development;such phenomena are investigated as the transition from disorder to order. The subject of the synergetics is concerned with mechanisms of self-organization, so it is also called the theory of self-organization. Self-organization is associated with the establishment of the order installation procedure by cooperative actions and communications components, according to previous history of the system. Self-organization leads to changes in spatial, temporal and functional structure of the system. It is also associated with the processes by which new structures arise as a result of the interaction of chance and necessity, with the transition from an unstable state to the stable state.

Analysis of recent research and publications. The investigate of using synergetics in governance were performed in researches such scientists asDobronravov I.S. Bilous V.S. Derbentsev V.D. Ilchenko B.V., Nicolis, G. Haken G., Knyazev E.N., Kurdyumov S.P., G.G. Malinetskii G.G., Milovanov V.P., Bevzenko L.D. Bogutsky Y.P. However, despite the significant achievements of these authors remain poorly studied issues related to the use of synergetics in governance.

Allocation of the unsolved earlier parts of the overall problem. The researches of different approaches to development of government administration and local government shows that the problem of implementing effective scientific approaches to the governance is investigated not enough. Therefore the problem of implementation synergetic approach in state and local authorities is particularly relevant.

The objectives of the article. The aim of this work is to study the functioning and development of public administration and local government with using synergistic approach.The object of the study is the formation and operation system of government and local government in modern conditions based on the use of a synergistic approach to governance.The subject of research is theoretical concepts and practical approaches to the introduction of synergetic approach to the system of public administration and local government.

The main results of the study. The term "Synergy" is derived from the Greek "synerhos" - co-operating. The term was first used to refer to H. Haken new scientific direction. For this area is characterized by research joint action of various systems, leading to the emergence of new structures for the effective functioning [10].Using synergetics for researching systems of different nature requires cooperation of different scientific fields. H. Haken laid in the definition of synergetics the concept of "synergy" effect sometimes called "2 + 2 = 5" when the results of joint activities far superior individual achievement.Synergism is also determined as a measure of joint effects that appear in the interaction of the components of the system, leading to the formation of an appropriate structure and operations [9]. Also the synergy task is to ascertain the laws for establish organizations and the emergence of order.The emphasis is on the principles of building system, its occurrence, development and complexity. Self-organization is associated with the development in the direction of fewer complexes to more complex objects and more orderly forms of organization. Self-organization occurs in complex dynamic systems. In addition, in the heading of the science lies the idea of interdisciplinarity.

Synergetics considered interdisciplinary research areas, engaged in research of self-organization in systems of different nature. I.Dobronravova in in article"Synergetics: the formation of non-linear thinking" [2] considers synergetics as scientific field that studies the essence of a variety of phenomena, considered as the transition from disorder to order. E.Knyazev and S.Kurdyumov in the article"law of evolution and self-organization of complex systems" give the definition of synergetics as a heuristic method for investigation open self-organizing systems are prone to the cooperative effect which is accompanied by the formation of spatial, temporal or functional structures, or briefly, self-organizing processes of different nature. Definition involves the use of specific methods of research the open systems [4].

J. Nicolis in "The dynamics of hierarchical systems: evolutionary idea" connects self-organization with spontaneous emergence of spatial or temporal coherence that is consistent with the occurrence in time of several random processes. The phenomenon of self-organization leads to the fact that for characterizing the object, which is described by a large number of variables is sufficient only a few variables, so-called order parameters [12]. These options are "subordinate" other variables, determining their value. Haken defines self-organization as an installation of order, which is due to cooperative action links its components, according to its past history and leads to changes in spatial, temporal or functional structure [10]. Prerequisites of self-organization are the openness of the system and its disequilibrium. Self-organization is associated with the processes by which new structures arise and is the result of the interaction of chance and necessity. Self-organization always associated with the transition from instability to stability.

Nowadays, many research efforts aimed at studying changing developing world which is in an unstable state. It is believed that without instability is no development. Thus using nonlinear positive

feedback, which is an essential element in the models autocatalytic processes of different nature. These models suggest the presence of a nonlinear positive feedback at each point of the medium, in other words, the bulk nonlinear positive feedback.Autocatalytic processes are investigated in biological, economic and sociological systems. A classic example for economics is the rapid growth of capital. In terms of non-linear environment the conditions in its various different locations are different and processes in them are also different. However, there is a self-influence at each point of the environment and the local change of the environment affecting the operation of non-linear sources in this place. Thus, nonlinear positive feedback ensures accelerated growth throughout the environment. This is a positive feedback is a source of rapid development [7].

With the synergetics associated new principles of public administration. Inefficient management of social system, in terms of synergy entails that the system is imposing unnatural forms of organization. Such management makes negative results or losses, leading to the crisis, if not taken into account nonlinear inverse action of complex systems.There is a synergetic idea of the right ways of development of any non-linear environments: development path is not predetermined, so is the ability to select the optimal path; the number of paths is not infinite, so there are limits; You can find the best deployment scenarios of events, knowing the range of attractors, that is, accelerate evolution. New management approach is focused on internal environment, on the fact of existing very peculiar environment and its laws of evolution and self-organization [11].Along with this, is important not the force of control action but its coherence with their own tendencies nonlinear medium. If the impact on the environment is provided at the right time and right place and agreed with its own structure then it will implement its hidden features.The above principles provide new possibilities for the organization of public administration. The scientific approach to the analysis of the processes taking place in society and in the work of public authorities, the identification of attractors, and focus on the laws of evolution, organization and implementation of decision-making on the basis of their own tendencies environment can significantly improve the efficiency of public administration.

R. Haken in "Secrets of Nature. Synergetics: the doctrine of interaction "examines the problem of state economic management and indicates that the economic lives there are natural processes that may lead to the emergence of adverse events, such as partial unemployment [8].Since the change of a single parameter is often enable to achieve the effect of self-organization, this effect can be obtained in the control system of economic processes. Instead of various state control, which appears in the form of emergency are proposed differentiated management, the method of regulation by means of a control parameter (such as tax incentives for individuals). Moreover, the authors establish priorities, allowing a direct impact on economic processes, even when it first by legislators is not anticipated.In addition, due to synerhetics known that can occur randomly any process, including managed. Similarly behave complex and sophisticated system in the economy and control measures do not take into account the features of the system that can lead to chaotic flow processes. However, a synergistic effect may not always occur. For example, the combining organizations may have problems with communication, leading to losses due to internal friction and reduce the effectiveness of the combined organization.

In some works the problems of civilization development is investigated in a synergistic mode. Also the synergy in the economy, the nonlinearity of structures in public administration, organizational development as processes of self-transformation and as a form of self-organization of society are investigated.The paper S. Doroguntsov, O.Ralchuka "Sustainable development - civilizational dialogue nature and culture," the problem of interaction between nature and culture harmonize in civilization, which takes additional features, absent alone in nature, and culture [3]. Civilization, act in a synergistic mode, which aims at self-improvement and development by varying its structure while preserving system integrity and identity components. This instrument known as sustainable development can be understood as a process driven coevolution - change interdependent items both humanity (culture) and the biosphere (nature). Synergy involves the coordination of human action with capability of the nature.

In the study of public administration is very important to know the potential synergy respect social structures and social control [5].System cannot impose their way of development it should

contribute to their own tendencies; Chaos can serve as the beginning of forming a constructive mechanism of evolution; for complex systems, there are several alternative ways of development; synergy opens a new principle of superposition, the construction of complex structures that develop from simple; Synergetics provides knowledge on how to properly operate complex systems and how to effectively manage them; Synergetics reveals patterns and rapid flow conditions, avalanche nonlinear processes, self-stimulating growth. We believe that these areas meet the requirements for effective management of complex dynamic systems, which are the social and economic system, but they need more detail on the use in public administration. Important component in the applied use of synergetics is information that requires special study [1].

Public administration is the main kind of social control, which is regarded as meaningful impact on society for its improvement, preservation, improvement and development. One of the hallmarks of governance is that it is a social and political phenomenon. In our opinion in the theory of society, self-organizing, attention should be paid Defects market economy, forcing the community in times of crisis to increase state influence on the processes occurring in the socio economic sphere.

In nature, there is a diversity of natural selection. At the micro-level of the natural spontaneous movements are treated as equal opportunities, freedom of action. The deployment of self-organization can occur in a market social environment.However, market mechanisms cannot fully provide effective ways to develop: market environment can lead to chaos, which means that, the collapse of complex social systems. Market mechanisms can spend a long time for attain the attractors.Therefore, the public administration can be used resonant excitation methods that will carry out future preferred.Also need to consider their forms of organization environment, consistent with its nature. These findings coincide with our vision of the processes taking place in society, but some aspects of a market economy requires more detailed study.It concerns the functioning of public authorities and management processes they perform. Since management is informative nature, then there are questions regarding information processes, information support of governance, and deployment of self-organization in an environment where there are public administration and local government.

The processes taking place in Ukraine in modern conditions associated with the exchange of information is increasing and accelerating. This is a sign that modern society is a complex, dynamic system that is self-organizing and operating in a nonlinear medium. In such circumstances, government system, built on the principles of linearity, ineffective and there is a need for a new approach to governance, based on a synergistic approach and the ideas of self-organization.Objects that are capable to self-organization create new structures that meet their own trends. In addition, the current social and economic systems, self-important factor they exchange of information, the intensity of which is provided by the latest information technology.In Social systems stability is achieved by supporting stability of subsystems that are the parts of system and by replacing elements that are not able to perform its functions. Introduction and development of information systems in public administration are the factors of increasing stability by means of providing accurate, timely and relevant information by managers for decision making.Similarly, information systems affect the process of updating the subsystems of the social system; they can create new connections in the administrative structures that were impossible under the conditions of use of "classic" information technology to build a new system to ensure the system of government. Therefore, the development of public administration should be built on the basis of these trends.

Transparency of governance is manifested primarily through intensive information exchange with the environment. Information receives to government bodies from a higher level and from subordinate organizations and institutions. This exchange of information makes it possible to ensure the coordination of actions. Openness allows provide for nonequilibrium states of the system and its attractors. Attractors, in turn, ensure the existence the form of organization that adequate self-structuring of the system.

An important role in the development of public administration has nonlinearity. One manifestation of nonlinearity are many variations that concerning governance is manifested in the decision making process.The state employee must take into account that in this situation, for solving a

particular problem, there are several options. But the number of options is limited and the manager must identify this particular set of possible further action, and choose the most affordable option in these circumstances.However, the manager must remember that it is necessary to implement only those solutions that do not deny the natural process of self-organization in control object. Also we must consider the fact that due to presence of an unstable, non-equilibrium state of the system, even a minor exposure can lead to catastrophic consequences.The information system in these situations should provide for stability. It should provide the ability to select from limited number of possible solutions in these circumstances and allow them to make choices on the most reasonable manner.It can also provide stability nonequilibrium state of the system by analyzing the intrinsic properties of the medium, and by identifying possible ways of development. In the future this information may be used in the program-based approach to address social and economic problems.Having information for effective decision-making that information system provides to manager and using the analytical component, allows the system to determine the effects of a particular alternative. This allows determining the courses of action that may lead to negative results.

Another aspect of nonlinearity in public administration is cyclical processes that occur in it. Similarity the development of processes to the waves is a sign of social and economic processes, and waves are a form of nonlinear development.These processes are manifested in the exchange of information that exists in the public administration. The presence of both waves associated with the state of society and to seasonal fluctuations that occur in the system.In times of crisis there is a need to harmonize processes with different rhythms of development. In addition to developing appropriate programs it is necessary to ensure their implementation on the basis of political processes in the country. This development and implementation depends largely on the information base, which is statistical information and information that flows through branch channels in the public administration.The power of the information system is treated as the ability to provide an answer to the most essential questions, and the efficiency of the integrated information system is determined as a capability to support decision making at the national and local levels.

Also important role in synergistic approach play synergetic conceptions such as fluctuation and bifurcation point. Fluctuations is small deviations from the statistical equilibrium is widespread manifestations of the changes occurring in the system.However, the impact of these changes is difficult to determine without a statistical analysis of the phenomena that cause these abnormalities. For the analysis of fluctuations need an information system that can provide collection, processing, analysis and dissemination of information on the socio-economic processes in society.Such is the state statistics system that provides the necessary data, in public administration at local and national level. State Statistics Information System should be integrated subsystems for the functions of the socio-economic system and have the means to analyze statistical information that would allow drawing conclusions on trends taking place in the country, and therefore determine the trajectory of the system and the possibility of withdrawal socio-economic system from unstable situations.

Fluctuations lead to changes in the system, manifested as a bifurcation point where it has a number of alternatives. In this case the necessary information systems that provide the ability to make professional conclusions on controlled processes. Definition of the main parameters of operation, performance criteria and technical advice on the choice of alternative solutions enable a bifurcation points choose the path that ensures the development of society.

The point of bifurcation characterizes the moment when civil servants make decisions. These decisions are made at all levels of public administration system by managers of various ranks. The result of the introduction of new solutions causes fluctuations that define new bifurcation point.Moreover, this process occurs horizontally - at the appropriate level hierarchical system, and vertically, which provides coordination of different levels. This confirms the correctness of the Concept of state information system by integrating different information systems will improve the coordination of activities at all levels of government[6].

The analysis of using synergetics in public administration and in its information components enables formulates the main features of the synergistic approach to information support in

governance.This approach is determined a deep knowledge of self-organization of complex, non-linear, open systems, which are the subjects and objects of public administration. The knowledge are obtained through the collection, analysis and dissemination of information, identifying ways of further development of information society and the decision-making process, contributing to this development; providing structural changes in the socio-economic system.

Conclusions and suggestions. The analysis of processes of governance from the standpoint of synergetics gives reason to draw conclusions about the main principles for a synergistic approach to the state management.This is self-organization in both subject and object in the public administration that has informational nature; openness in government, which through information exchange as network streams provide interaction of all components of public administration; the presence of nonlinearity, which manifests itself in of multiple, cyclical phenomena and resonance, due to the diversity of the information environment in which public administration functions; Chaos as both constructive and destructive phenomenon that allows analysis by socio-economic information in government and develop effective solutions to ensure the development of institutions that are relevant for a given socio-economic system; the existence of fluctuations, which lead to deviations from equilibrium statistical information to be collected, analyzed and distributed in public administration in order to identify development trends; the existence of bifurcation points, that lead to changes in the system and are important elements in the work of civil servants, who based on information about system, analyzes the decision options and chooses the most favorable in terms of solving the existing problems.

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