

Organization development project management in the system of synergetic knowledge

Molokanova V.M.

*Doctor of Technical Sciences, professor
Department of management and project management
Dnepropetrovsk Regional Institute of Public Administration
of the National Academy of Public Administration
under the President of Ukraine*

Petrenko V.O.

*Doctor of technical Sciences, professor,
Honored scientist and technician of Ukraine
The Department of intellectual property
National Metallurgical Academy of Ukraine*

Abstract

The conducted research was aimed to analyze the application prospects of synergetic theory for the project management in the base of system synergetic knowledge. Mechanisms of nonlinear developments in view of the general theory of self-organizing systems are examined. The application possibilities of the general synergetic knowledge principles are examined as integrative disciplines for project management methodology. Comparative analysis of traditional and synergetic approaches to the organization development project management is presented. The discussion of project structure, project phases and changes in organization development projects in regard to traditional and synergetic aspects is exposed. A new management framework for organization evolutionary development on the base of a synergistic approach to project management, which supplies significant reduction of time and material resources, is proposed.

Keywords: SYNERGETIC KNOWLEDGE, PROJECT MANAGEMENT METHODOLOGY, ORGANIZATION DEVELOPMENT, PROJECTS SYNERGETIC ASPECTS, MANAGEMENT BY VALUES

Introduction

The era of global change has created many problems of transformation in Ukrainian organizations, many of which are still not resolved, and consequently, there is a need to find a solution for a significant amount of new problems under the condition of entering into the world markets and the formation of open competition. The events of recent years compel scholars to revise the concepts of organizational development on the principles of project management. In most scientific sources, organization development is considered as a qualitative change in the internal and external relations between the system's elements in the process of accumulation of organizational values in accordance with changes of the surrounding world.

Till the mid-twentieth century, development as one of the characteristics of the system dynamics was considered in the framework of the so-called classical science [1]. The axiomatic statements of the science treated system included features such as hard determinism and progressivism of development processes, the leveling of the influence of the individual and social groups. The environment was understood as a simple and sustainable model of recognized the stability and sustainability. Managerial action in organizational systems has been primarily considered as a function of the system settings balancing, countering the stochastic perturbation in the macro environment, ensuring optimized use of centralized and decentralized resources.

The analysis of literature and problem statement

In the second half of the twentieth century more common were the views of non-classical science, which object of the study was a complex system, which has its own subjective judgments with respect to any management action. Now the system development and its values are the main subjects of attention of system dynamics researchers.

Mechanisms of nonlinear developments are examined by the general theory of self-organizing systems; this theory is used only for the so-called dissipative systems. The concept of dissipation that is the dispersion of matter and energy was first introduced by I. Prigozhin [2]. The existence and dynamics of dissipative systems depend on their continuous exchange with the environment. If the exchange stops, the system collapses. It is obvious that any organization is constantly carrying out exchange with the environment by a variety of materials, energy, and information, relating specifically to dissipative systems. The main features of dissipative systems are the unbalance and nonlinearity [3].

The system unbalance arises due to the presence of energy exchange processes; information exchange processes between elements of the system and characterizes the situational interaction between them. Such fluctuations lead to non-linearity, i.e. violation linear proportional relationship between the external, or management effect on the system and its response [4]. In this case, minor exposure can result in a complete change in the structure and complexity of the system and have a significant impact on it. The order fluctuations in the system internal structure are described by such terms as «order» and «chaos» [3].

The growth of the order degree and adaptability due to the tendency of the system to constant development are generated by disagreements and contradictions, but not universalism. An essential attribute of development is variability of actor's behavior that can suddenly change its value model. The availability of alternative values in the mind of managers causes changes in the behavior of the system; it becomes a little predictable, variable, limited by the nature of the dominant interactions [5].

Ukrainian scientist V. Seminozhenko noted that "...one of the key problems of the Ukrainian strategic documents is the lack of understanding of the dynamism, variability... Almost in every document the changes that occur are not taken into account... We are constantly reacting to the obvious "surprises" ...And this is only the beginning..." [6]. As it turns out, the organization and society are in general poorly prepared to functioning in the new information society structure and are not able to respond adequately to the aggravation of the crises, the instability of the economic and social relations. The correct scientific understanding of the complex processes of interaction in nature and society requires a comprehensive study, assimilation and proper use of a new paradigm of development and learning – synergy.

In modern project management, following integration trends are clearly seen. Firstly, this is extension of the project management scope, infiltration projects in the new sectors of the economy and human relations. Secondly, the focus is shifted from managing of individual projects to managing programs and portfolios, project-oriented development of organizations. Thirdly, the penetration and integration into project management methods and tools from other management disciplines such as strategic planning, personnel management, quality management, knowledge management, creative technologies, reflexive governance and genetic technologies take place. These changes occur in response to the challenges of time, to the requirements of the current state of the world. The paradox of

the existence of modern organizations is that the number of problems that require immediate solution is not reduced, but growing. Elimination of these contradictions to acceptable limits is possible and based on the formation of a new type of management, which would include such features as possible upheaval and disaster to the study of characteristics of organizational development.

Purpose and objectives of the study

The conducted research was aimed to analyze the application prospects of synergetic theory for the project management on the base of system synergetic knowledge. The projects state near critical conditions at the moments when they are losing their sustainability against external influences and conditions for protection projects from the occurrence of chaos are examined.

Methodical materials of the study

The theory of nonlinear dynamical systems, synergetics and the theory of dynamic chaos have gone beyond specific disciplines and have proved its high scientific and practical significance. At the present stage of society transformation, the project management methodology is used as a paradigm of evolutionary development and is based on the so-called synergistic effect. Effective design of the desired future is impossible without a detailed study of this effect. It is time to conduct a detailed analysis of the prospects of application of synergetic theory in the project management for learning the project management near critical conditions, and moments when the organization loses the resistance against external influences and conditions for the occurrence of chaos in projects.

The term “synergy” (from the Greek. Synergos - (syn) together; (ergos) acting, action) is the final effect, which in case of interaction of two or more factors is significantly greater than the effect of each individual component in the form of their simple sum [4].

In most of the science sources, synergetics are considered as an interdisciplinary direction of scientific research, which studies the transition from order to chaos and vice versa (the process of self-organization) in open nonlinear systems of different nature [8]. The proposed the term “synergy” by H. Haken focuses on the coherence of the interaction of parts in the formation of the structure as a whole [9]. Since the formation of organizational values may be influenced by joined external and internal factors, we can talk about the constructive integration of the architectural and evolutionary approaches to project management. This integration is based on a synergistic view of the

dominant organizational values. Thus, today we are witnessing of a new methodological development approach to the phenomenon of organizational values. This approach can be defined as synergistic value-oriented.

The synergetic is a methodology that focuses on processes of spontaneous complexity in systems far from equilibrium state, it tries to rationally explain with the help of interdisciplinary research the effect of the occurrence of disorder and chaos self-organized structures [10]. The self-organization we understand as the processes of spontaneous ordering of the structures evolution in open nonlinear systems, organizing system due to the action of certain internal laws. If we look at self-organization from the standpoint of the human values we can understand the regulation processes in complex systems, which involve the qualitative and structural transformation of certain objective phenomenon [5]. In more detail, the process of self-organization can be opened with the key provisions of synergetic, which are openness (the existence of exchange relations between system and environment), instability (indicates the state of readiness of the system to change and the choice of their directions) and discrepancy between the whole simple joining parts which had entered into it [10].

The results of the study

In project management, insufficient attention still has been paid to nonlinear processes such as the emergence of chaos and loss of sustainability of the project in relation to external influences, predicting the emergence of chaos in the portfolios. The synergetic approach is a new way of thinking and vision of the world, a new way of producing new knowledge, new methodology. The acquisition of such knowledge is able to qualitatively strengthen the leading position of project managers, equip them with new and effective tools for the interaction of the various systems to ensure the design-oriented development [11]. The synergetic provides the freedom to design the future in the framework of the potential. Synergetic approach to the study of project portfolio management gives us the opportunity to build a range of alternative scenarios of organization development to consider the totality of factors that determine the choice of a particular scenario. The laws of synergy allow identifying the limitation of classical methods of project management based on integrity and permanence of the project's existence.

A rational approach to the organization management is difficult due to planning on the basis of stereotypes of linear thinking, which is based on a linear understanding of the functioning of complex systems.

For linear representations, the result of external managerial influence is definite, predictable consequence according to the effort and corresponds to the scheme “management decision (effect) equals the desired result.” It is believed that the more effort is expended, the more effective output seems to be obtained. Such basic provisions remain unproductive or even detrimental if they resist to their own tendencies of self-development of highly organized systems.

Supporters of the synergy claim that in each system there are many uncontrolled and unpredictable uncertainties that keep the system in a constant state of chaos. G. Hacken explains this state of the system by introduced into scientific circulation the so-called “order parameters”, which are understood as certain variables that define the behavior of the individual parts of the system [9]. The synergetic suggests that at a certain stage of development of the system, attractors occur that changes the general course of development. But it does not slow down business processes; on the contrary, it allows combining the previous processes together with future development and their overall vision. The system of organizational values makes sense in organization relationship, allows us to modulate them to incorporate feedback, to change their signs, change the rules themselves. From this perspective, organizational values can be considered as the basis of constructed business system. This allows us to consider organizational values as the bifurcation mechanism of organization development.

Bifurcation in synergy means a sudden, abrupt and unpredictable change of the nature of the processes occurring in the enterprise system [12]. The essence of the phenomenon of bifurcation is that when accumulation of certain qualities in the system reaches a critical threshold, there is a sharp qualitative leap in its nature and purposes of existence. After passing critical point (bifurcation point), as a rule, the direction of further progress is not possible and the system goes into a strange attractor [9]. The synergetics project management organization approach to enterprise development requires clarification of such phenomena as the growth of the system entropy and loss system adaptation to external conditions (Fig. 1).

As is well known, entropy is a measure of any system degradation [7]. The optimal ratio between determination and freedom (entropy) in the system is the indicator 80%: 20% by E. A. Sedov [12]. After overcoming the critical point in the process of adaptation to changes the system quickly loses its adaptive properties and is in a state of complete determination in which it can exist only in a stable environment. In the case of rapid change, the system may demonstrate abrupt transition to a state of chaos. It is typical, for example, for totalitarian social systems. In contrast, the adaptive system, which evolves reaching the optimal ratio, may go to the next hierarchical level of development and begin to form new information connections between the elements of the previous level.

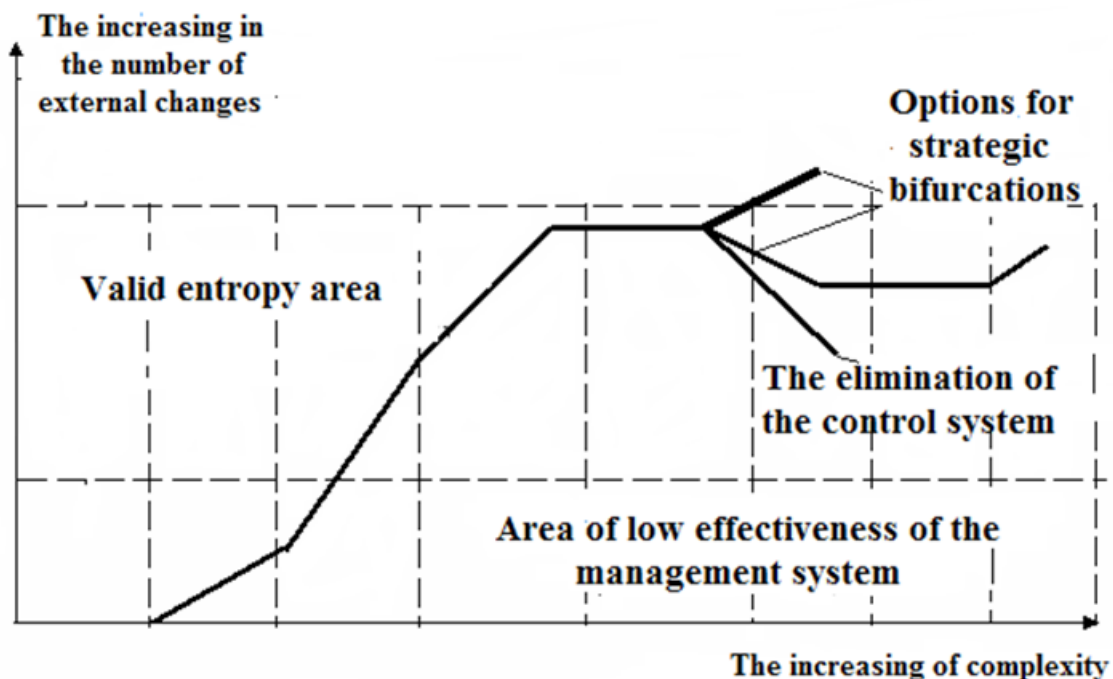


Figure 1. System in adaptation to changes in the external environment

For the system with self-reproduction properties, competition and selection to gain the ability to evolution, a mechanism of mutation and random reproduction of alternatives is also required. The random reproduction of alternative possibilities is carried out by people who do business and have the capacity for unconventional thinking [13]. If there appears a good opportunity and alternative value increases, evolution takes a step forward. Such opportunities are called innovations. Considering the possibility of application of the synergetic methodology for project management processes, it is necessary to formalize the basic synergetic provisions in respect of design concepts.

So, let us consider such basic concepts as the structure of the project, monitoring points (milestones), project results and the constant changes with traditional and synergistic point of view. Comparative

analysis of traditional and synergetic approaches to project management is given in the Table 1.

In the traditional aspect of project management, a milestone is a means of determining the effectiveness of the projects according to the chosen strategy. As we know, often during project realization, the values in the control points do not coincide with those indicators that were planned. In the course of balancing the projects portfolio, the managers try to hold projects in a certain range at a deviation from the existing plan (return to the purpose of the algorithm). The traditional approach considers changes in a linear way, by passing from stage to stage, from one checkpoint to another. The state of the project T_n is determined by the state of T_{n-1} and is followed by the next state T_{n+1} .

Table 1. Comparative analysis of traditional and synergistic approaches to project management

Characteristics	Traditional approach	Synergistic approach
Structure	The goal of creating structures in project activity is gain of higher level of functionality and organization. In this case, the structure is the distribution of responsibility for particular interaction model.	The structure is self-organization based on the imbalance. The fundamental criterion of "structure" is its ability to self-organization, complexity and streamlining due to the changes at the micro level through the development of new values.
Milestones	Checkpoints are one of the control means of the project method effectiveness and the project results. In the course of the project, lead managers try to hold project within certain limits of deviation from the existing plan (return to target).	The concept of "attractor" is given. At a certain stage of system development, it arises attractor that changes the general course of project development. An attractor has a potential that gives the system an opportunity to move to a new level of organization development.
Project changes	Development occurs linearly, by passing from one stage to the next stage. The state of T_n is determined by the state of T_{n-1} and is followed by the next state T_{n+1} .	Development is a nonlinear process, the transition from T_{n-1} to the state T_{n+1} may occur without the participation of the intermediate element T_n due to the introduction of new organization values.
Results	The vision of the project product from simple to complex occurs as a result of the decomposition into components, and the subsequent synthesis.	The emergence of a complex that is not equal to the simple sum of elements, and the manifestation of a synergistic effect.

Synergetics considers the development as nonlinear processes, the transition from T_{n-1} to T_{n+1} may occur without the participation of the intermediate element T_n . This is achieved as a result of the attractor's action. A signal for the development of managerial influence is processed information about

the deviation (feedback) of actual values from planned ones. Continuous monitoring allows the portfolio managers to identify weaknesses, to which special attention should be paid.

In the traditional aspect of the overall goal of creating structures in the project, activities are to get

the functionality and create a balance in development projects. But there is one problem – not many participants have a holistic vision of the structure in the project activity. To create and maintain a single integrated structure for even a single project is not an easy task for the team leader, which requires constant reproduction of entrepreneurial energy [14], to say nothing of the management of a portfolio of projects.

A fundamental property of the studied synergetic objects is their ability to complicate and streamline due to changes at the micro level. Thus, a synergistic methodology fundamentally changes the view of the personality influence on the course of events. People at appropriate times and instability in the system can affect macrosocial processes by their actions at the micro level. To determine the role of personality in the development of systems, synergetics introduces the concept of the attractor. The attractor is some potential for the development of each element of the system structure that gives him the opportunity to move to a new level. Thus, the success of any company is connected not only with successfully built organizational structure, clear connections of the control system, but also with extent, to which the management is able to effectively use and transform those differences of the system elements that create its uniqueness into a synergistic effect [15]. This means that management cannot be effective if the programs and projects included in the portfolio are considered outside of the context of key organizational values and are not able to consider possible synergistic effect. It follows that it needs awareness of each person to recognize own responsibility for the efficient operation, adequate to certain values.

Today everyone understands that it is impossible to create the perfect product or to obtain some kind of masterpiece, acting strictly according to plan. Attempts to limit human activities to the solution of standard processes ignoring the human desire for creative self-management reduce human activity to the actions of the robot. Therefore, it is considered a task of creating such organization that is capable to continuously recycle increasing volumes of structural information and simultaneously increase the possibility of choice, to increase structural diversity at the expense of elemental information.

When assessing organizational values, coherent organization can be kept in focus as the unit of analysis or considering the values of its separate elements, to identify common and dominant trends to predict future developments and necessary management actions. This method of study gives a dynamic

assessment of the overall organizational values system.

Let us assume that the basic values of an individual employee of the organization are defined by their psycho-physiological characteristics, life experiences, the influence of corporate culture and others. Then, the total value of the individual manager can be represented as follows:

$$C_i = F(Os, Le, Cv, m) \quad (1)$$

Where Os — psychophysiological characteristics of the personality; Le — life experience; Cv — organization values, m — other variables.

In this case, the total values of the organization V can be represented as:

$$V_i = F\left(\sum_{i=1}^n V_i, Ksyn, Lc, St, m\right) \quad (2)$$

Where $\sum_{i=1}^n V_i$ – the sum of values of individual employees; $Ksyn$ – factor, which reflects the synergistic effect arising from the interaction of the values of the employees with each other in the project activities process; Lc – phase of the organizational life cycle; St – the organization strategy; m – other variables.

At the level of project portfolios synergy occurs when the whole portfolio is more valuable than the sum of values of its parts (components of portfolio). The objective reasons for this effect can be:

- the evolutionary development of the company based on key values;
- complementary unity of the components of the portfolio;
- distribution and mutual compensation portfolio risks;
- the unity of stakeholders and their commitment to shared values.

Thus, the synergetic laws allow asserting that the hard market principles are not the only possibility in the evolution of complex systems. Bifurcation of the system evolutionary development trajectory is based on the general laws of evolution. This means that, firstly, this bifurcation is itself directed along the vector of evolution in the direction of values diversity growth, and secondly, it increases the chances of evolutionary survival of the system that is the evolutionary breakthrough of at least one of its alternatives. Constant monitoring of the components of the portfolio allows us to support the evolutionary development of the organization by resonant excitation of the desired processes in the project activity.

Synergistic value-oriented approach to project ma-

agement provides a new management framework organization evolutionary development. In the evolutionary development processes, there is a path of significant reduction of time and material efforts due to the resonant excitation of the desired processes in the form of separate innovative programs and projects.

Conclusions.

1. A synergistic approach to project management provides a new management framework for organization evolutionary development. In evolution processes, there is a path of significant reduction of time and material efforts due to the resonant excitation of the desired actions in the form of separate innovative programs and projects.

2. The most amazing fundamental property of organizationally-technical systems is their ability to complicate and streamline whole structure due to changes at the micro level. Thus, a synergistic methodology fundamentally changes the view to the influence of person on the course of events. In appropriate times in system instability T_n , people can affect macrosocial processes by their actions at the micro level.

3. According to synergetic approach, the attempts to limit human activities to the standard solution processes ignores the human desire for creative self-management and reduces human activity to the actions of the machine. Therefore, the main managerial task is creation of organizations that capable of continuous recycling increasing volumes of structural information and simultaneous increasing the possibility of choice, i.e. increase structural diversity at the expense of elemental information.

References.

1. Litvina L.A. (2014). *Global'nyy kapitalizm i ustoychivoe razvitie* [Global capitalism and sustainable development]. Available at: <http://www.sustainable-cities.net.ua> [in Russian].
2. Prigozhin I. (1985). *Ot sushchestvuyushchego k voznikayushchemu* [From existing to arising]. Moscow: Nauka. 326 p.
3. Kapitsa S.P., Kurdyumov S.P., Malinetskii G.G. (2001). *Sinergetika i prognozy budushchego* [Synergetics and forecasts of the future]. Moscow: Editorial. 288 p.
4. Belous V.S. (2007) *Synerhetyka ta samoorganizatsiia v ekonomichnii diialnosti* [Synergetics and self-organization of economic activity]. Kyiv: KNEU. 376 p.
5. Molokanova V.M. (2012). *Portfelne uprav linnia rozvytkom orhanizatsii na osnovi tsin-nistno-orientovanoho pidkhotu*. [Portfolio management of development organizations on the basis of value-oriented approach]. *Uprav linnia rozvytkom skladnykh system* [Managing the development of complex systems: Coll. Science. pr.]. Kyiv: KNUBA, No 12, p.p. 69-76.
6. Seminozhenko V. (2008). *Ukraina – 2015: ne vtratyty svoje maibutnie* [Ukraine – 2015: do not lose your future]. p.p. 4-10.
7. The future we want. The outcome document of the UN Conference on Sustainable Development (Rio de Janeiro 2012). Available at: <http://www.un.org>.
8. Haken G. (2003) *Mozhem li my primenjat' sinergetiku v naukah o cheloveke?* [Can we apply synergetics in the Sciences of man?] Available at: <http://spkurdyumov.narod.ru/Haken7.htm>.
9. Burkov V.N., Korgin N.L., Novikov D.A. (2009) *Vvedenie v teoriyu upravleniya organizatsionnymi sistemami* [Introduction to the theory of control of organizational systems]. Moscow: Libricom. 264 p.
10. Bushuyev S.D., Bushuyeva N.S. (2010) *Mekhanizmy formirovaniya tsennosti v deyatelnosti proektno-upravlyaemykh organizatsiy* [Mechanisms of formation of values in the activities of project-driven organizations]. *Vostochno-Evropeyskiy zhurnal peredovykh tekhnologiy* [Eastern European Journal of advanced technologies]. Vol. 1, No 2 (43), p.p. 4-9.
11. Sedov E. A. (1993). *Informatsionno-entropiynye svoystva sotsial'nykh sistem* [Information and entropy properties of social systems]. Moscow: Radium. 120 p.
12. X. Reschke, X. Chelles (2000) *Mir upravleniya proektami* [The world of project management]. Moscow: Alan. 304 p.
13. A Guide to the Project Management Body of Knowledge (PMBOK Guide) – Fifth Edition. – 2013 – Project Management Institute, Four Campus Boulevard, Newtown Square, PA 19073-3299 USA.
14. Bazhin I. I. (2004). *Upravlenie razlichiyami* [Management of differences]. Kharkiv: Konsum. 392 p.