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Innovative behavioral models as a method for a social system adaptation in the unstable external environment

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Abstract

Based on the system approach, the article investigates innovative behavioral models as a method for an effective social system adaptation in the unstable external environment, developed on the principle of co-evolutionary innovation studies. It is demonstrated that increase of dynamics and complex interactions of social systems are typical for a contemporary period; in these conditions the effective adaptation mechanisms development in the unstable external environment is possible when using the co-evolutionary innovative processes. Recommendations on creation of effective social systems adaptation mechanisms for unstable conditions are developed, based on these processes. Potential of using the co-evolutionary innovative processes is evaluated for development of effective social systems adaptation mechanisms in the unstable external environment.

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1. Introduction

Development of information society has introduced significant corrections to the external environment of social systems. Uncertainty and dynamism of the external environment have not only become a key factor, providing the impact on their functioning and development, but one of the most meaningful consequences of global information space emergence (Baburin et al., 2013, Giddens, 2012, Wallerstein, 2000). At the same time, use of information and communication technologies has created the conditions for global changes in the interaction mechanisms and social systems adaptability.

One of the most considerable manifestations of communication and information technologies' influence on social processes became an information revolution, which promoted the formation of macro-tendencies, based on the expansion of the mutual influence and social systems interaction range. These trends, which formation was predetermined to a considerable extent by intensifying the integration processes, further became a kind of catalyst for

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globalization processes; where each of them to a certain extent is a manifestation of a global synergism. Globalization has formed new favorable conditions for social systems development, at the same time creating additional factors for external environment dynamics and uncertainty. The incompleteness complicates the procedure for optimal behavioral strategies development significantly; one of the most important features of social system becomes principal in these conditions – ability to adapt fast and effectively to external environment dynamics, what is determined by innovation susceptibility of the system.

2. Subject and Methods of Research

Though the term "innovation" has been already used for a long period, its content has changed qualitatively (Gouillart et al., 2012, Janszen, 2012, Drucker, 2011). Today it would be unreasonable to interpret innovation as a separate isolated event; it is sooner a complex cyclical process, involving more and more new changes during development, and related to different aspects of society life. As a result, it is expedient to interpret innovation as a combination of processes, connected by a large number of interdependences of different complexity and nature, for developing an adequate model of innovative changes (Bogdan et al., 2012).

At present, interrelation and interdependence of specific processes in the innovative sphere constantly grow what increases the external environment of a social system steadily, in its turn. Innovations in such environment are notable for a high degree of complexity and have a probabilistic nature. At the same time, these are the innovative models that allow providing a high degree of social systems adaptation to an unstable external environment. This determines the choice of the given models as a subject of current research.

To solve the set problem, the author uses such general research and philosophical principles and methods, as: the dialectical method, the systems approach, the comparative analysis method, the principle of determinism, and the principle of development, applied in the context and with consideration to specific features of globalization processes; as well as some provisions of the theories of social management and global evolutionism, which were involved due to complex and multidimensional nature of research.

3. Results Obtained

A significant change in social systems existence and development is an integral characteristic of social processes during the late 20th and early 21st centuries. As an expected result, a new methodology of society research emerged, which is based on the synergetic paradigm, and is using the innovative models of social systems behavior. The synergetic approach, currently developing intensively, is the most adequate for analysis of complex adaptive and developing systems, which are now modern social systems (Knyazeva et al., 2012, Nikolis et al., 2013, Knyazeva et al., 2012). Based on this approach, uncertainty is not interpreted as an external anomaly in the system behaviour, which is to be overcome, but considered as a key characteristic that considerably extends the boundaries of theoretical analysis of the systems functioning and development specifics. Application of innovative behavioral models, based on this approach, allow the maximum expanding of the range of social system possible reactions for dynamic changes of external environment.

One of the most effective methods for risk mitigation of social systems functioning and development, providing the expansion of their adaptability to an unstable external environment, must become the emergence of integrated networks. Such networks include multiple subsystems that allow an optimal use of the available opportunities of their participants in different areas of activity. Thus, we can speak of global synergism manifestations, rising as a consequence of interaction of growing processes of globalization and synergy.

At the same time, emergence of integrated networks is at the initial stage now. It is determined, among other things, by that most part of social systems does not possess a required flexibility yet for creating conditions of effective adaptation to interactions within the network. Nevertheless, it is obvious that network data, even at the initial stage of their formation, present a significant interest in the context of optimal behavioral models development for modern social systems, participating in complex interactions.

Peculiarities of a modern social system and innovative processes allow creating conditions for synergetic approach application during development of optimal innovative behavioral models of social systems. From this approach perspective, increase of a system's adaptive properties is based upon transition to distributed solutions in the unstable, ambiguous situations, what provides the required flexibility to innovative processes. It is evident that non-linearity and ambiguity of innovative processes and innovations implementation environment determine a fundamentally new approach to creation of innovative behavioral models. This approach is based on an active application of self-organization phenomena.

In its turn, such circumstance inevitably causes a rise of changes in the structure, external environment and behavioral models of social systems, thus enforcing the non-linearity of the process, in which the systems are involved. In this context the problem of improving the social systems ability to response fast and flexibly to changes in the external environment acquires a special importance. However, the approach to development of innovative behavioral models, based on self-organization phenomena, and formed by a global information space emergence, cannot be effective without implementation, using the information-communication technologies, as the main role in improving the social system adaptability to an unstable environment belongs to effective use of information resources (Jerassi, 1994, Castells, 2011). Globalization, accompanied by a rapid development of communication and information technologies, has determined the necessity of a new type of social systems emergence that, on the one hand, is a result of intensive interaction of innovative process components, on the other, cannot but influence the external environment of social systems.

Growing dynamics of social systems external environment and complexity of their mutual influence mechanism is one of the most indicative features of modern times. In these conditions finding the possible trends of social development acquires a special value. However, results obtained in the late 20th century and early 21st centuries prove that development of accurate and qualified forecasts of society development is currently one the most important and hard-to-solve problems.

These difficulties are to a great extent caused by a specific nature of social systems, constituting their difference from natural and engineering systems. Social system is the whole of a complex organization, which can include both separate individuals and different social communities as subsystems and elements. Here a double determination takes place: on the one hand, actions of certain elements and relations between them (structure) determine the properties of the system as a whole; on the other hand, system determines properties of included elements to a certain extent, performs as an integral whole to the environment. Works of the following thinkers: A. Giddens, I. Wallerstein, P. Bourdieu, H. Spencer, M. Weber, E. Durkheim, T. Parsons, and other, were devoted to social systems research; however, up to 80s the specific features of social systems, determining their difference from natural and engineering systems in functioning and development, were given little attention. Nowadays it is one of the most promising and at the same time one of the most problematic trends of system researches.

When analyzing the peculiarities of social systems, we can note that, first of all, it is the question of individuals conscious activity, on the one hand, determining the driven flow of evolutionary processes, on the other, the so-called "social memory". Thus, G.I. Ruzavin highlights: "Principal difference of social systems from the natural ones is mainly in their self-organization being added by organization, as people acting in the society are gifted with consciousness, setting specific goals and guided by motives of their behavior and values. A demonstrable confirmation of this point is a long evolutionary development of such fundamental systems for society, as market, morality, science and culture in general. ... evolution of social systems is qualitatively different from natural systems evolution. It is known that in natural systems the acquired features are not passed on genetically to future generations, when in social systems the transfer of historical experience, which is sometimes called a "social memory", makes the most important condition of their further development. ... As a result, socio-economic evolution and cultural evolution go at a much faster pace rather than natural evolution" (Ruzavin, 1995).

Generally the author shares the point of G.I. Ruzavin. It should be mentioned that at present the issue is the formation of a new research area – sociogenetics, which studies the mechanisms of social heredity – "social memory" formation. However, in contrast to Ruzavin, the author thinks that the latter does not only accelerate, but also slows

down the processes of social systems evolution. This mainly refers to those cases, when socium is the carrier of "negative" social memory, creating an additional persistence in social systems development. So, for example, the experience of failed democratic reforms in the society can create a negative attitude towards any kind of active transformation, and thus delay the socium development for long.

Ruzavin mentions in his research that no matter the evident specifics, "there is also the process of self-organization lying in the social systems evolution, which under certain conditions is observed even in the simplest inorganic systems". Here self-organization can start only in nonequilibrium systems. For social systems the most important factor for nonequilibrium formation is an active interaction with the environment, expressed in substance, energy and, particularly, information exchange (along with that we note that the similar point of view was defended by N. Luhmann in 80s of the 20th century, stressing that a social system is a reproduction of communications): "Social system is always set when autopoietic relations of communication are performed, and which are isolated from external environment through limitation of respective communications. Thus, social system does not consist of people or actions, but of communications" (Luhmann, 1995). Reductive tendencies have been emphasized lately among the researchers, trying to interpret the regularities of social evolution. Nevertheless, it should be stressed that no matter the significant commonness of self-organization processes in technical, natural and social systems, mechanical reduction in this case is totally unacceptable. This is determined by the obvious social systems specifics, not allowing an immutable transfer of regularities, revealed in development of mechanical and natural systems, to social systems development. Moreover, a considerable impact is produced by perception features on the evolutionary trajectory of social systems, exposed to guiding influence of a social subject. In particular, an active interaction of subject and object takes place, what can change their communication quality type, but also the system structure. So, N.N. Moiseyev states that "observer actions influence not only the object under observation, but the system in general and thus change both the state of object under observation, which is part of the system" (Moiseyev, 2011).

One more peculiarity of social systems is that they possess a high sensitivity to changes in the external environment during constant variation of qualitative and quantitative characteristics of interactions with the external environment, what dictates the necessity of a regular review of the model used for system analysis. Besides, social systems structure, characterized by a wide diversity of subsystems and relations nature, presents an extremely complex, multifactor formation, with a high potential of generating emergent effects (Lat. "emerge" - emerge, appear), resulted from integrity properties in a complex system, not inherent to its elements or subsystems; irreducibility of system properties to the sum of properties of its components.

Such complex self-developing systems, as social, refer to category of ergatic, i.e. man-sized systems (systems with a human participation), which behavior is based on the principle of the maximum effectiveness achievement and survival. The most substantial peculiarities of such systems are non-linearity, feedback (positive and negative) and memory. Systems reflect, interact and delay in assessment of each other behavior during the development process. Social memory determines their persistence, causing, in its turn, heredity – manifestation of aftereffects. Due to involvement of a human it is important for ergatic systems to solve the problem of subject and object correlation. Two major approaches to the problem should be mentioned. The first corresponds to the position, based on the view of a subject and object disappearance as collectively exhaustive components of activity; according to the second, a functional split of a human occurs, who can be both a subject and an object. These peculiarities of the man-sized system research determine the necessity of their study from positions of a new, postnonclassical rationality, allowing not only finding a new solution to the problem of subject-object correlation, and making the science axiologically (value) oriented.

By researching the possibilities of social system models making and application, M.A. Dryuk emphasizes their specifics: "Certainly, it is impossible to draw a clear line between inanimate matter and the living world, including the highest forms of the organization — social structures, driven in action by a bioenergy of a special kind — conscious activity of individuals, similar to that how it is impossible to do the Dilthey "demarcation" of the sciences dealing with nature and spirit. However, in the inanimate nature we find only some equivalent behavioral models of complex self-organizing systems (biological or biopsychosocial forms)" (Dryuk, 2004).

Specifics of social systems determine their evolution peculiarities, which in their turn create the complexity of social development management.

For a current period it is typical to reinforce dynamics and complexity of the external environment and mechanisms of social systems mutual influence. In these conditions the problem of finding the possible trajectories of systems development and their adaptation to the external environment becomes a priority (Kapitsa et al., 2007, Bestuzhev-Lada, 2011, Nikitina, 2009). However, the results of the late 20th and early 21st centuries allow making conclusion that social systems functioning and development nowadays hardly depend on accurate and qualified prognosis about the external environment and behavioral models, based on this prognosis. Analysis of determining factors gives an opportunity to conclude that today both, the systems giving much attention to optimal models development and the systems not doing it, have practically equal chances to adapt and survive in the unstable external environment.

A high level of social medium unsteadiness often does not allow the systems use the long-term prognoses that determined the necessity to develop qualitatively new strategies of behavior. Social systems have been using the principle of rational incrementalism more often lately, stating the formation and maintenance of dynamic equilibrium with the environment using the step changes, fully corresponding to the environment changes (Quinn, 1978). In case of significant changes absence, such systems do not require the fundamental innovations and maintain the effective adaptability for a long period. However, in some cases, moderate innovations are not sufficient for a successful adaptation of the system to a dynamic external environment: fundamental changes of their functioning, reorganization of all interactions and processes are required.

In both cases of a step changes mechanism or during implementation of fundamental innovations, there is a necessity for a system to develop mechanisms and methods for creation of conditions for successful changes. Those systems adapt to the maximum that use the information and knowledge towards transformation of their external environment more fully. Nevertheless, the most significant growth of adaptation social systems capabilities, as expected, can be achieved in progress of a continuous updating strategy. As a result, permanent innovation turns into a key factor, initiating a complex adaptation of the social system.

Complexity and dynamics of social processes inevitably lead to necessity of innovative transformations acceleration in general and improvement of information processing procedures in particular (Nikitina, 2007). Finally, the developed information products are so complex and many-sided that a complete prognosis of capabilities and their application results becomes quite problematic and expensive. Therefore, today more and more attention is given to the practice, during which advantages and disadvantages of information product are studied during its application process, and the results of studies are used for creating new information products.

An innovative climate, supporting the efficiency of innovation implementation in a highly dynamic external environment, can also be very unstable, and production of long-term strategies does not simply become useless, but harmful, because currently the social system ability to respond fast to a sudden variation of external conditions is of key importance. Here the key meaning acquires the innovative activity, owing to which the system obtains the required flexibility. Thus, a social system, partially ignoring the information on external environment, can implement innovations more effectively and successfully in a number of cases.

In general, contemporary period of social development is characterized by a wide expansion of innovative activity range, what is mainly dictated by attempts of social systems to reinforce their adaptability. In particular, it resulted in emergence of totally new structures, using flexible forms of interactions. This problem logically leads to necessity of profound analysis of the learning concept, in which stress has been shifted lately from "learning in action" to "learning in application". Experience of the last years has shown that a successful adaptation of a social system is impossible without a successfully functioning learning mechanism. Together with emergence of the complex, continuously expanding networks of social systems, the corresponding information networks of knowledge emerge and develop. No matter the high dispersion of information sources, the strategies of system-participants can be united to support an optimal functioning regime. The infrastructure, which is being formed, is based on the norms of a free use of information, thus providing favorable conditions for new relations and structures.

However, modern attitudes regarding the information exchange do not have a final form, and interactions among social systems, included in the network, often have a random nature. The situation is complicated by that a complex processing of a continuously growing volume of information resources causes a number of specific problems, determined by information redundancy. It is important to mention that now the problem of redundancy has acquired a special dimension that leads to necessity of further reinforcement of their interaction intensity. Generally, the process of creation of system connections in the information space is caused by a large number of self-organization phenomena, what is typical of complex systems with a high uncertainty level. It is exactly during development of structural relations that the maximally wide range of the system's possible development trajectories arises, what is confirmed by the significance of selection of relations organization method for the system in the information space.

One more problem, caused by a global information space emergence, is an entire range of noncanonical and nonformal relations, complicating management and coordination of interaction processes in the network. These relations are formed due to combination of mass phenomena and imperfections of arising network structures. Thus, it is obvious that a contemporary situation is characterized by network structures, based on active information interactions, what brings an entire range of specific problems, requiring new nontraditional approaches for their solution (Castells, 2012, Castells, 2010).

The problem of innovative model adequacy becomes more urgent in conditions of increasing instability and dynamics of social processes. Specific feature of modern innovative processes is that any information about their progress peculiarities becomes outdated quite fast, what, in its turn, increases the gap between reality and a model. Dynamic modeling, replacing the static models, is now one of the most promising tools that allow decreasing this gap (Nonaka et al., 2008). By starting from an initial model at the early stage, it helps to implement the permanent process of its improvement and adaptation with the required degree of adequacy. Dynamic modeling of social processes provides extremely promising results by replacing the learning with a simple feedback (with the unchanged model and/or rules) with the learning of a higher order (with adaptable model and/or rules).

4. Conclusions

Creation of a dramatically new type of relations and structures is one of the most significant manifestations of the principle of co-evolutionary innovations. In case with social systems, this principle results in an increasing tendency towards consolidation, characterized by the specifics of the systems different complexity and nature. As a result, complex structures are developed, which are global networks, described by the maximum adaptation capabilities both of every participant and the entire structure. Thus, co-evolutionary innovative processes develop impressive capabilities for social systems to create the effective adaptation mechanisms in non-linear external environment.

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