Methodological aspects of providing balanced innovative development of construction complex of the Russian Federation

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Abstract. The growth of significance of economy’s innovative development of the Russian Federation determines necessity of deeper investigation of properties and specific features of its subsystems functioning, contents and forms of interaction thereof, seeking ways of increasing efficiency of control system. The construction complex (hereinafter referred to as the CC) as a priority area of the national economy, actively influences it and largely determines the trend of functioning, as well as the quality of life of the population. Construction, acting as the locomotive of the socio-economic development of the country and having a high cumulative potential, is associated with almost all industries and related fields of economic activity. Despite the fact that investment and construction activity makes a significant contribution to the growth of macroeconomic indicators of the Russian Federation, it is studied without a detailed understanding of the immanent properties and patterns of development as a complex self-regulating system. The strategic benchmarks for the development of the CC are structured by the demands of consumers not only in a safe, but also comfortable living environment with high environmental characteristics and aesthetic requirements. Meeting such requirements is possible under the condition of large-scale modernization of the construction sector with the use of breakthrough scientific and technical solutions in all segments of human activity. All this gives grounds for concluding that a fundamental change in the approach to the study of properties, features and factors of the development of the CC is necessary, which provokes the modernization of the management system to ensure a balanced innovation trend and high standards of quality of life of the population. Important factors in the development of the CC are fair competition, freedom of economic activity, the development of market mechanisms, corporate culture and moral values. The study of the functioning and scientific approaches to ensuring a balanced innovative development of the CC of the Russian Federation made it possible to form a conceptual vision and methodological basis taking into account the main provisions of the theories of systems, self-organization and synergetics and to briefly present it in this work.

Introduction

At present, the Russian economy is experiencing an acute need for the formation of a competitive CC that creates a comfortable environment for life and human activity that meets high standards of quality and efficiency based on modern management systems and organizational and economic mechanisms aimed at improving programs and projects for socio-economic development [1], strengthening national
security, innovation and spatial development of the Russian Federation. In order to form the concept of a balanced innovation development of the most important subsystem of the national economy, we will consider the CC from the side of system theories and dissipative structures.

The stability and balanced state of the social and economic development are determined by the methods of combining forms and methods of organizational influence in the management system, the nature of the interaction of socio-economic institutions, axiological perceptions and patterns of business entity behavior, economical interests and needs of the society [2].

The essential characteristic of the development trend of the CC in the context of a complex and multiplicative subsystem of the economy is time, since it is characterized by high inertia, stochasticity and hysteresis processes [3]. This necessitates a verified synchronous and multi-position control. At the same time, the focus of organizational changes depends on the specifics of the construction activity, geography, economic well-being of the territory, legal field, the nature of social relations and other exogenous and endogenous variables.

The present-day stage of academic pursuits relies on a high level of detail of social and economic systems, investigation of processes of self-regulation and self-organization as well as factors determining the character and direction of the development trend [4]. In this regard, this work focuses on identification of control parameters and mechanisms proving fairness of the conceptual approach to provide stability of the most important subsystem of national economy. It is strategically important to build variations of models of its balanced innovative development that can expand the instrumental base of research and ensure high efficiency of the management system.

Main part

The investigation of economical position, trends of the CC development and environment undergoing system transformations, gives rise to the imminence of dynamics in the system of organization and a new level of requirements, approaches to the CC control. Let us place emphasis on the key factors of economy and society, keeping modernization of the existing CC control system up to date: scientific and technical progress and shaping intellectual and creative, innovative type of economy; globalization as an impersonal process of building a unified world system of management and public relations; limited and degraded nature of resources, sensitizing to a necessity of transition to the energy- and resource-efficient processes and technologies (sustainable development); hyper competition on the world market and high rate of renovating product ranges, individualization of products, where the marketing and service functions make the greatest contribution to forming the new cost and value; high level of system consistency and information volumes exponential growth, which is required for analysis and taking practical managerial solutions; system transformations, sophistication of business environment and processes in terms of technical improvement of production, labor organization and management [5].

These factors are interrelated and significantly influence the strategic guidelines of the CC business entities. Under such conditions the managers find out that their fundamental theories become inefficient, traditional models making it possible to forecast and administer business need replacement with more organic understanding and non-linear thinking. The studies of endogenetic objective laws, sensitive areas, influence of structural dynamics on the CC development trend get updated. Many managers boast synergic thinking and consider the CC as a living system capable of self-development and self-organization [6]. Such understanding comes sooner or later to all investigators of complex systems, whatever field of knowledge they are involved in. H. Haken emphasizes that time has come for synergic background [7].

The CC management system shall be aimed at shaping synergic potential providing sensitivity and adequate response of the CC components to synchronous, multi-positional managerial impacts for the development according to a consolidated vector of target system. The state comes out with respect to the CC as the subject of management, it determines the goals and objectives of development and is destined to provide reaching and settling thereof. In this role it determines directions, rates, organization-and-economic and financial support of innovative development in a decisive degree. The
entirety of conditions of the latter one is provided, on the one hand, by profound historical, cultural,
technological and managerial experience, on the other hand, by the efficiently acting state
emancipating the creative potential of the CC to a maximum extent.

Considering the fact that the intellectual environment is the main source of innovations, the
influence on the CC entities is possible by means of entering negative entropy into a system
(instruments are used) and implementing the balanced development principles. Its peculiarity consists
in maximum regard of immanent CC properties, which is revealed in the process of environment
monitoring; structure and level of heterogeneity for implementing reflexive control; degree of
influence of control parameters on the order parameters, which is revealed in case of approximating
values thereof in dynamics in the process of economical and mathematic simulation for shaping
synergic system potential. It is necessary for increasing the level of the CC activity, attaining
bifurcation state with the aim of regulating PSS development and attaining synergic effects [8].

Theory and calculation

Effective management systems (Figure 1) are formed taking into account the peculiarities of the
country and territory, the state of the national economy, specific goals and objectives to be solved in
certain periods of time, resource support capabilities and industry-specific.

In this connection a detail understanding of general regularities and particularities of development
of the CC and its bodies is of great importance. The control system structure shall include basic
components and subsystems interacting with each other: organizational, informational, production and
intellectual. They are sensitive to perception of manufactured products by the end consumers, whose
reaction is taken into account in the system in accordance with its contents. A decision about
transformation is shaped in control system on the basis of combination of characteristics of CC state
and processes running therein.

![Control system structure](image)

**Figure 1.** The proposed structure of the construction complex management system of the Russian
Federation

It is reasonable to build specialized devices and subsystems as part of control system providing real-
time monitoring of state of running processes, analysis thereof and revealing prerequisites of
innovative development.

The “Information” subsystem provides for acquisition and regulation of primary data on the CC,
ranging, assessing its significance, profitability and sphere of application. This subsystem is a basic
technological platform providing all other functions and processes with the required data. The
“Organization” subsystem reflects the structure of the CC elements interaction both with respect to
composition, and capacity arranged in the form of structure-forming links and documents. Its
technological basis is formed by the network information technologies, without using these
technologies the modern management processes are inefficient. The “Intellect” subsystem corresponds
to a combination of elements of knowledge of engineering computer environment (artificial intellect) and personnel professional knowledge and experience. This subsystem based on its intellectual properties is decisive in the fields of: innovative solutions, quality of management processes, revealing symptoms of fluctuations, bifurcations and other synergic effects. Since a decisive role in all subsystems belongs to information technologies, the self-organization processes more often than not are the tasks of informational management. All subsystems are inextricably linked with each other and can not be adjusted and formed autonomously: every variant of one of the subsystems most efficiently corresponds to definite versions of the other ones; a change in one subsystem demands readjustment of the other ones, otherwise the CC management system would be ineffective. It is necessary to take into account the interrelations between subsystems and character of interdependence thereof to the full extent in case of formulating self-organization tasks. The modification of state of any element disturbs adjustments of all the system and demands a managerial impact aimed at shaping a new harmonic coordination (conjunction) of elements. The value of quantitative transformations of elements (subsystems) of the system and links between them under condition of harmonic conjunction thereof can become a prerequisite of a synergic effect. If the dynamics takes place towards worsening quality and exceeds certain permissible threshold, the system properties change fundamentally, the former settings do not already solve the problem, and it is necessary to take a decision about changing composition, structure and organization of components of the management system.

The balanced CC management changes the character of management: from enforcing an object of management to a new state to establishing favorable conditions for attaining natural target order thereby. The methodology of the CC balanced innovative development consists in coordination of specific principles, approaches, regularities, tools and properties. It is important to take into account that disproportions are able to destroy the system: in case of extreme non-linearity stiff resonance breaks the system, whilst an unlimited openness dissolves it in the environment. It is important to take into account the law of entropic equilibrium; in case of mitigation of non-linearity a feedback becomes weaker, while its excessive closeness brings about a growth of entropy.

The efforts are to be directed not only to system management, but to establishing conditions, when it would get out to innovative trend. It is consistent that the problems of where to start and what shall be the primary modernization steps always appear to be in the focus of attention in the course of discussing any modernization project. In case of absence of clearly defined algorithm of attaining synergic effects many investigators offer a trial-and-error method based on extrapolation of trends, forecasting, experience and synergic thinking of a manager imparting the well-disposed goals to the organization. Therefore, a process of apprehension of strategic goals and objectives for the CC striving for self-organization, stability and innovativeness is the basic one.

The major task of managerial structures is to simulate and forecast the development trends shaping positive feedbacks, create prerequisites of the CC transition to a new quality meeting requirements and image of the “future”. It is important to note that a path of the CC development can be assigned by the systems of differential equations with the aim of predicting and scientific substantiation of programs being developed, since they have to be realistic and feasible [9].

The short-time advantages (e.g., prosperity and high profits from production activity) can bring about in the longer term the aggravation of functioning of suchlike systems. The global problems of climatic changes, depletion of oil resources, exponential growth of population, degradation of agricultural lands, deficit of potable water are generally known and the consequences thereof have already manifested or will manifest themselves within a couple of decades to come. “A burden on the part of a man on the environment continues to grow despite the development of technologies and efforts of public organizations. The mankind has already left the boundaries and is now within uncertainty area. However, the understanding of this problem is poor in the world. In order to decrease impact on the environment and return to a permissible level, it is necessary to change the personal and public values, which will require quite a lot of time” [10].

Conclusion
According to a concept of sustainable development the main problem consists in providing a balanced state of the CC development with an imperative of precluding a disaster and society orientation to self-maintenance, which requires quite different models and approaches to management. The technical progress, innovations, formation of competitiveness, marketing management and market adaptability are necessary, but are insufficient, since the development trend is a result of non-linear interactions.

The methodological provisions of the CC balanced management system consist in the following:
- heterogeneous structure encompassing dissimilar elements: technology, organization, ecology, state of mind, psychology, politics, security as well as all types of resources and links between them;
- commitment to a positive synergic effect through principles and effects on managerial CC parameters with an imperative of analyzing a phase field and revealing the immanently inherent ways of development;
- unique architecture owing to absence of standard algorithm and commitment to a creative approach with a set of elements for development: investment, intellectual, technological, foodstuff resources forming a synergic potential.

Synergistic potential is a system property that is formed as a result of intersubjective interactions and structural and institutional dynamics mainly due to intangible assets, complementary effects and is accompanied by an increase in the activity and entropy of the system. It provides the sensitivity and adequate response of its subjects and links to small exogenous (mainly managerial) influences and endogenous transformations for the development of a system of goals and achievement of the desired state along a single vector.

The conservative approaches not taking into consideration the natural ways of evolution (attractors) immanently inherent to the managed system are inefficient from the positions of a concept of balanced innovative CC development. V. D. Ayurov pointed out that it is irrational to impersonally control the dissipative systems, since the controlling actions in case of imposing functioning modes to dissipative system not inherent for it bring nothing but harm thereto and get always rejected [11].

Summary
1. The management system of balanced innovative development corresponds to a concept, methodological aspects and mechanism of balanced innovative development for increasing efficiency of managerial impacts, providing integrity, homeostatic balance and synergic potential. The system shall include the main subsystems interacting with each other: organizational, informational, production and intellectual.
2. In order to increase the organized nature, controllability and predictability of the CC, it is necessary to understand the principles of balanced innovative development, which proceed from peculiarities of the system being investigated, control rules, stable and investment-innovative development.
3. Dynamics of the path of the CC development is determined by three key factors: existing limits, permanent drive to a growth and lagging between approaching the limit and hysteresis. The structural component of development is exposed to an impact of economic waves of different duration, but this influence, as practice shows, is interdependent.
4. It is advisable to direct administrative activity to the struggle against entropy for progressive CC development so that the rate of its reduction in the CC is higher than the rate of growth in the national economy, introducing and incrementing the level of negative entropy (information, knowledge and innovations, public morals, corporate culture) forming the intangible assets. Otherwise, it will be necessary to permanently increase a degree of the CC openness.
5. The generalized order parameters are important for the CC, which are expressed in: a) coherence of values reflecting availability of vector of entities movement in heterogeneous environment; b) informational interaction reflecting an ability of entities to borrow, use and generate new information on the basis of available knowledge; c) concentration of multiplicity of entities characterizing availability of dissimilar structures in the system and imminence of interaction thereof; d)
concentration of resemblance of entities demonstrating availability of a chance of interchangeability thereof.

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