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**ECONOMIC TRANSFORMATION OF CONSTRUCTION ENTERPRISES  
BASED ON THE PRINCIPLES OF SUSTAINABLE DEVELOPMENT**

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*The article formulates and scientifically substantiates the need to create mechanisms of compensatory influence on the indicators of business activity of enterprises. This is due to the desire to «secure» their functioning for the period of implementation of national restrictions that arise as a result of the adaptation of the country's economic model to the basic principles of sustainable development. The development of a scientific and methodological apparatus for managing industrial enterprises is argued, which will make it possible to select optimal management decisions for all types of resources, including natural resources. Also, this device will make it possible to predict the impact of the external and internal environment on the life of the enterprise and promptly respond to changes to ensure economic development. The prerequisites for the creation and implementation of the mechanism of resonant compensatory management at different levels - state, sectoral (macro-), regional (meso-), as well as at the level of individual organizations that are part of conglomerates (micro-) are also given.*

*Key words: sustainable development, resonant compensation management, strategic enterprise management, theory of cycles, synergistic effect.*

*кандидат технічних наук, доцент Андрій Шпаков, Економічна трансформація будівельних підприємств на основі принципів сталого розвитку / Київський національний університет будівництва і архітектури, Україна, Київ*

*В статті сформульовано та науково обґрунтовано необхідність створення механізмів компенсаційного впливу на показники ділової активності підприємств з метою «убезпечити» їхнє функціонування на період впровадження загальнодержавних обмежень, пов'язаних з адаптацією економічної моделі країни до основних вимог стратегічного плану слідування принципам сталого розвитку. Аргументовано розробку науково-методологічного апарату управління виробничими підприємствами, який дає можливість здійснювати вибір оптимальних управлінських рішень щодо всіх видів ресурсів, зокрема й природніх, прогнозувати вплив зовнішнього та внутрішнього середовища на життєдіяльність підприємства та оперативно реагувати на зміни зміни з метою забезпечення економічного розвитку. Також наведено передумови для створення та впровадження механізму резонансно-компенсаційного управління на різних рівнях (мікро-, макро-) – державному, галузевому, регіональному, а також на рівні окремих організацій, що входять до складу конгломератів.*

*Ключові слова: сталий розвиток, резонансно-компенсаційне управління, стратегічне управління підприємством, теорія циклів, синергетичний ефект.*

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*В статье сформулированы и научно обоснованы необходимость создания механизмов компенсационного влияния на показатели деловой активности предприятий с целью «обезопасить» их функционирование на период внедрения общегосударственных ограничений, связанных с адаптацией экономической модели страны к основным требованиям стратегического плана следования принципам устойчивого развития. Аргументирована разработка научно-методологического аппарата управления производственными предприятиями, позволяющего осуществлять выбор оптимальных управленческих решений по всем видам ресурсов, в том числе и природным, прогнозировать влияние внешней и внутренней среды на жизнедеятельность предприятия и оперативно реагировать на изменения в целях обеспечения экономического развития. Также приведены предпосылки для создания и внедрения механизма резонансно-компенсационного управления на разных уровнях (микро-, макро-) – государственном, отраслевом, региональном, а также на уровне отдельных входящих в состав конгломератов организаций.*

*Ключевые слова: устойчивое развитие, резонансно-компенсационное управление, стратегическое управление предприятием, теория циклов, синергетический эффект.*

**Formulation of the problem.** For quite a long time Ukraine has been taking part in various international partnership programs aimed at consolidating the actions of the countries of the world in the fight against such consequences of anthropogenic impact on the environment as global warming and depletion of natural resources and ensuring the development of countries' economies in order to overcome social contradictions and

inequality. It is difficult to clearly define the moment in time when the transformation of the human environment has crossed the border of ecological balance, but all efforts of the world community are now focused on correcting errors in the methodology for assessing the effectiveness of economic development of the modern consumer market system. These errors consist in underestimating the negative impact of the anthropogenic factor on the deterioration of the quality of the human environment.

Since production is the main tool of modern post-industrial society for transforming the environment, it is necessary to start systemic transformation processes from it. Therefore, the priority task at this stage of the transformation of modern economic and industrial mechanisms is to postpone irreversible catastrophic environmental changes in the biosphere until the introduction of industrial technologies of the next level, which will allow the free transformation of matter and energy, and a person will become not a consumer, but a creator in an environment favorable for everyone. biota [1, 2, 3]. Hence, it becomes necessary to adapt all systems, including management ones, to the principles of sustainable development and biosphere compatibility in a balance between economic and social guidelines.

**Analysis of recent research and publications.** To understand the factors that form the basis for the formation of balances within the framework of biosphere compatibility, as characteristics of the anthropogenic influence of production, one should consider the main aspects of the theory of the biosphere by V.I. Vernadsky, who introduced the term «biosphere» as a definition of the sphere of distribution of living matter [4]. Academician A.V. Sidorenko, developing the idea of V.I. Vernadsky, founded a new term «biotechnosphere» as a transitional term between biosphere and noosphere. As a characteristic feature of this period, he considered a combination of spontaneous and conscious,

negative and positive influence of human activity on the environment. In the same historical period G.F. Maurish and A.V. Hilm [5, p. 64-68; 6, p. 91-100] used the term biotechnosphere in their works in a different interpretation, as a place for the synthesis of the functions of renewal of the biosphere and the functions of technical transformation of the environment by society. A.L. Suzdalev and S.V. Goryunov consider the biotechnosphere as a product of the transformation of the biosphere, the structural and functional organization of which is subject to significant changes under the general influence of various types of human technical activity. The process leading to the emergence of the biotechnosphere, scientists called the term «global technogenesis» [7, p. 12], which resulted in the emergence of the «technosphere» phenomenon. The concept of biotechnosphere is not identical to the term «technosphere», which describes the totality of technogenic objects and areas that have undergone global transformations in the process of human production activities. Many experts believe that the technosphere can be considered as a separate part of the biosphere, but, as in any other system, the biosphere cannot have elements excluded from interaction. Therefore, the term «technosphere» does not reflect the division of the biotechnosphere into two components, but only a different degree of technogenesis of the environment.

Proceeding from this, the border between the technosphere and the biotechnosphere is conditional, and unified methodological approaches and principles can be applied to both types of natural and technical systems that are part of them.

**Formulation of the objectives of the article.** Historically, for the main methodology of achieving the desired results in the transformation of traditional economic, social and industrial institutions, the path of methodological and strictly controlled by the authorities of building a

hierarchical structure of goals and restrictions in individual sectors of social production based on the allocation of controllable links of the biotechnosphere, namely, «natural and technical systems», Which should be considered as the main generators of social and economic benefits.

The ecological component of these natural and technical systems must be formed by engineering and technological complexes of solutions and a new economic system for the distribution of costs in production systems, taking into account the sustainable imperatives of development. That is, the management of the process of creation and operation of natural and technical systems should lead not to restriction, but to the development of technogenesis based on new proactive innovative principles. Therefore, the proposed methodological system must take into account the hierarchy of characteristics, the selectivity of their actions and the synergy of interaction effects.

**Presentation of the main material.** Traditionally, the motivational goals for the development of any sector of the country's economy are to increase the volume of production to meet the effective demand in the market using innovative technologies while improving the quality of products and ensuring a balance between the rates of development of the industry within the framework of the strategy for the growth of the national economy. However, it can be formulated in another way: the main goal of the industry's development is to make the most efficient use of available resources while maximizing the satisfaction of the interests of stakeholders under conditions of established restrictions. Considering the overall definition of the concept of «strategy» as a model of interaction of all resources that allow an organization to best fulfill its mission and achieve sustainable competitive advantages, the formation of a development strategy for a particular industry in today's conditions is to establish a balance between economic development priorities and

environmental limiting factors. to preserve the conditions for the existence of society at a level conducive to its further existence.

The selectivity of individual assessment parameters of sustainable development criteria, which have different degrees of influence within one production component, is associated with the level of assessment, which, based on industry differentiations, affects their significance in a comprehensive analysis of the performance indicators of an individual enterprise or industry as a whole. It is certain that the level of assessment (local or sectoral) is influenced by the volume of production capacity of the enterprise (volume of output), the territorial factor (scale of the consumer market) and, as a consequence, the level of economic influence (micro or macro level). In addition, at industrial enterprises, which should be considered as a set of complex systems, different management principles can be applied, which will lead to different reactionary actions as a result of centralized (nationwide) adaptive decisions and possible negative consequences of both individual market participants and the industry.

In the literature, it is generally accepted to divide management principles into general methodological and specific management ones. General methodological principles include the principles of objectivity, complexity, concreteness, dynamism. The principles of specific management include the principles of subordination, optimality, external complement to modeling [8].

According to the principle of objectivity in the management process, objective laws of enterprise development are used, taking into account the real possibilities, assessments of the actual state of the object and the tendencies of their development. At the same time, the adoption of management decisions is impartial, objective, corresponding to the real situation.



According to the principle of complexity, there is a comprehensive coverage of the control object as a complex system, its integrity, structure, functions, properties, connections, which contributes to a more complete understanding of the laws of its development and, on the basis of this, the development and implementation of the most adequate management decisions that will contribute to effective achievement goals.

The principle of dynamism implies the need to consider the "evolution" of an enterprise in movement and development, identify and track its temporal and spatial changes, penetrate into the essence of the sources of its development of driving forces. This principle works with a constant exchange of information, that is, it also determines a certain mode of dynamics of the actual management process (the duration of the stages of the management cycle, their sequence or the need to violate such a sequence) [8, p. 129-131].

The principle of concreteness of management is specific, since it involves creative (selective and creative) application of detailed studied patterns in the work of an enterprise in combination with real environmental conditions.

The principle of subordination can be formulated as follows: subordination, subordination to the lower elements is higher.

The principle of optimality is based on the principles of economic effect and consists in determining the best option for achieving the goals of enterprise development in the shortest possible time, at the slightest cost of resources.

The study of the influence of the external environment on the activities of the enterprise, the constant consideration of this influence in the justification and implementation of management decisions corresponds to the principle of external addition.



The principle of modeling involves the creation of verbal, formal-mathematical, mechanical or most adequately reflecting the structure and mechanism of a particular object for approbation of decisions and the intended behavior of an enterprise under the influence of a dominant influence. Modeling, already as a management method, is most widespread at the stages of forecasting and planning.

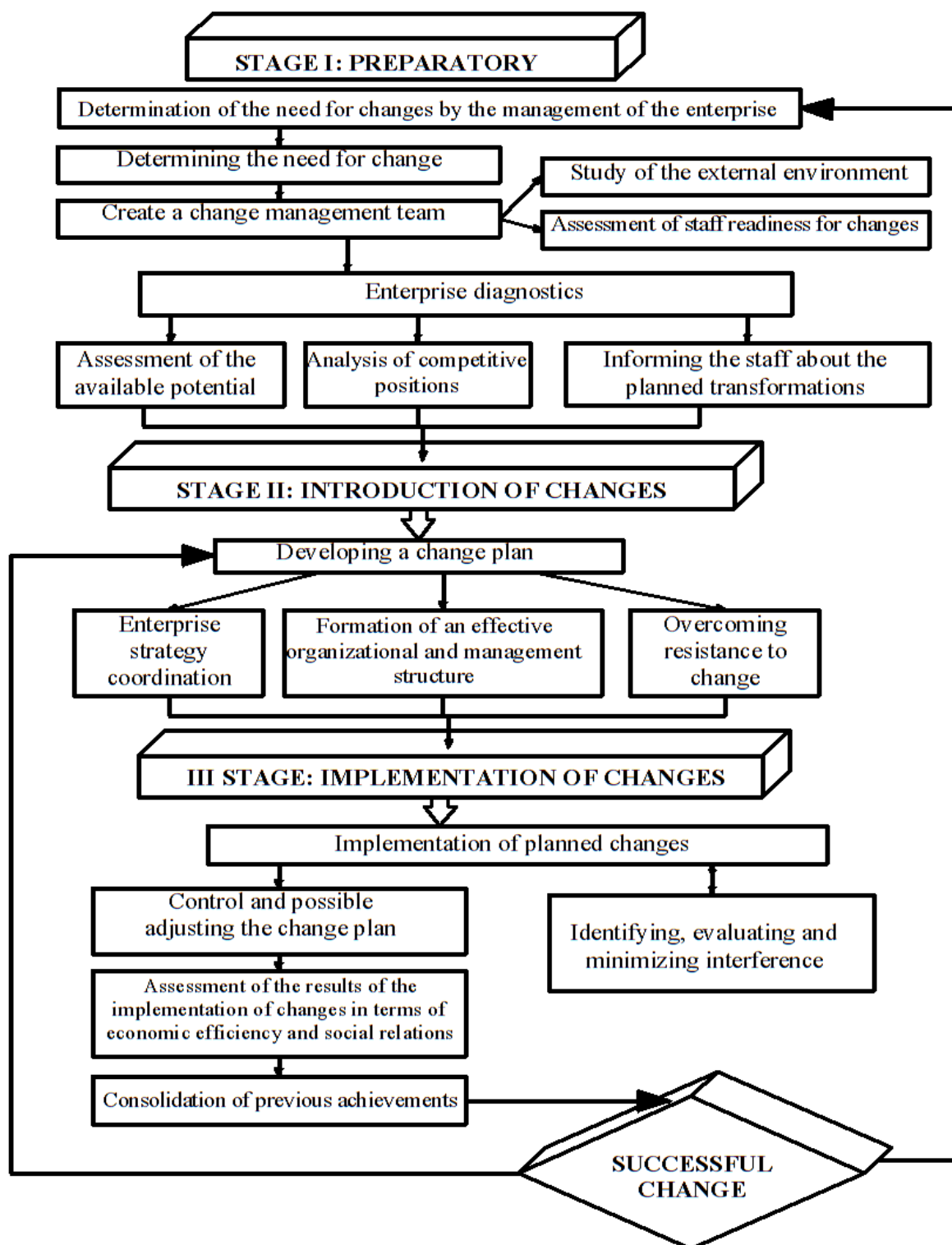
The conventionally cited principles can be attributed, according to the dominant criteria, to those oriented towards the external and internal environment.

For effective management of business entities with a focus on anticipating the requirements of the external and internal environment, it is necessary to ensure the functioning, adaptation and development. Control actions carried out in the control process are impulse, intermittent and short-term, aimed at a certain adjustment of the control object [9]. Such short-term impacts can be aimed at achieving two states of the organization: functioning or development.

In the state of functioning, the main strategic direction of the enterprise is focused on the stabilization of the organization, which sometimes ensures only its existence, restrains development. In a state of development, on the contrary, many processes of the organization's functioning are destroyed, but conditions are created for a more stable existence [10].

Depending on the depth and goals of the planned transformations, the current situation at the enterprise, the procedure for implementing certain managerial actions may be different. Only taking into account the specifics of the enterprise, assessing its capabilities and problem areas, it is possible to establish the order and stages of planning and implementation of changes [11]. Consequently, for the introduction of

strategic changes in the management of construction enterprises, taking



**Fig. 1. Stages of the change management process at a construction company.**

*Developed by the author from the source [12].*

into account conceptual approaches in change management, to one degree or another, the sequence of changes and the operation of enterprises was revealed, the main stages inherent in most domestic enterprises in the industry were highlighted (Fig. 1).

As seen from Fig. 1, it is advisable to divide the change management process into three separate stages, the passage of each is not necessary for all enterprises. Depending on the urgency of the transformations, experience in managing them, the management may combine some stages or change their sequence.

To improve the mechanisms of economic management of construction enterprises, it is proposed to use compensation and resonance management, the essence of which is based on two provisions:

- resonant management is a process of managing transitions between specific methods of interaction of mechanisms of organization, management and self-organization;
- in the process of interaction of the mechanisms of organization, management and self-organization, there are small but effective management influences that ensure the formation of synergistic effects and are able to compensate for negative economic factors and increase positive characteristics.

It is planned to create a methodological tool of resonant-compensatory enterprise management on the basis of the theory of cycles, periods of their oscillations and a synergistic effect with the specification of the conditions for the occurrence of resonance and compensation oscillations – amplitude damping.

Using the elements of resonant management in the activities of organizations, it is possible to achieve synergistic effects at the lowest cost. This method can be used for management at all stages of production: selection of a team of project participants, market research,

marketing, design, production, financing, accounting, property management, product sales, development and implementation of new technologies, materials, products [13].

Resonant management in the aspect of ensuring the adaptability of the organization gives the best results together with the use of the effect of dynamic instability, that is, the organization can maintain balance only with constant managerial influences. On the one hand, it is a threat, on the other hand, it is an opportunity to change the strategy of activity and quickly move from one quasi-stable state to another, more profitable in the current market situation.

Thus, when introducing industry standards in accordance with the implementation plan of the national strategy for sustainable development, enterprises experience certain environmental and economic constraints in their activities, which will affect the nature and pace of their development. In such conditions, one should have a mechanism of compensatory measures aimed at leveling the negative consequences and a strategic development plan for the projected point in time of maximum market assistance.

**Conclusions.** The transition to sustainable development is a complex, long-term process that requires a balanced interaction between society and the environment, the harmonization of their relations based on the observance of the laws of biosphere development. This requires the solution of a number of economic, environmental and social problems. The following issues arise before the participants of the industry markets in the field of enterprise management:

- the choice of appropriate solutions in the process of managing all types of resources: material, labor, information, financial;

- untimely (and, as a consequence, unreliable) forecasting, assessment and response to constant changes in the external environment and the rules of the game in industry markets;
- unpredictability of crisis situations and untimely development of strategies and tactics of actions during crises;
- the complexity of optimizing the structure of an enterprise in the course of reengineering with a constant change in the path of development from «evolutionary» to «revolutionary» and vice versa (theory of cycles);
- lack of a systematic methodology for the development, coordination and implementation of industry, corporate, functional and business strategies.

The efficiency of enterprise management is determined by the quality of solving such issues, the correct definition of the goal, the criteria of optimality, the correct choice of the optimization procedure, the method of obtaining and processing information about the state of the system. Only a systemic solution will make it possible to maximally compensate for the negative impact (production decline) and use the most favorable market opportunities.

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