SYNERGY OF SYSTAINABLE DEVELOPMENT MODEL

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Abstract

It is well known that the concept of sustainable development is based on the assumption that societies need to manage three types of resource (economic, social, and natural). The field of sustainable development can be conceptually broken into three constituent parts: environmental sustainability, economic sustainability and sociopolitical sustainability. The analysis of the sustainable development history in last years shows, that synergetic balance between the above mentioned parts (directions) represents necessary condition for sustainability, fulfillment of which depends on the entire policy.

This problem cannot be solved without system approach, such as living systems analysis, system modeling and simulation, complexity theory, and synergy methods. The role of system sciences is more and more determined in the viewpoint of behavioral modeling of the most complex system. In general development represents system building in dynamics, while sustainability is associated with stability of the system. On the other hand degree of development of any system can be defined as a function of complexity including diversity. In general usage, complex systems tend to be high-dimensional, non-linear and hard for modeling. Structurally sustainable development represents the treelike structure and genesis of system fractals (or clusters) i.e. the hierarchy of epistemological levels, every level of which corresponds to the degree of system dimension. At the same time, at any level system may be considered just in two aspects: horizontal (epistemological) and vertical (hierarchic). As the more complex the system is or has a multilevel structure the more developed it is. Therefore system development is distinguished as ascending process in hierarchy when transition to the upper level occurs only after the formation of the lower level.

In this paper, we present a new approach for a formal description of the complexity with respect to the viewpoint of modeling and simulation of sustainability that is conditioned by the existence of nonlinear environmental, economic or natural factors. Contemporary systems models are more likely to be non equilibrium models emphasizing the concept of entropy and synergy. Originality of this work is in the description of system in a form of the quantum graph with synergetic edges as the fuzzy entropy/synergy superposition. Diversity is conditioned by system homeostasis and heterostasis or fitness-function. In the given context, during the developmental processes in dynamics, achievement of clusters unity can be realized, when every two system clusters forms the new united cluster, which provokes redistribution of synergy-entropy, its balance and increasing fitness.

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