SYSTEMS ANALYSIS OF REGIONAL DEVELOPMENT PROCESSES

M.G. Zavelsky

Institute for Systems Analysis, Russian Academy of Sciences, Moscow, Russia

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Contents

Summary

Measures for supplying life supporting resources are taken within the territory, referred to as the habitat. They change the habitat itself which in all its features is an open complex system. This system represents the region or the territory whithin which the population has specific preferences. Directed and irreversible changes under the influence of economic actions represent regional development that can make the territory more or less suitable for living.

The main problems of regional development through system analysis are to reveal and identify actions that while preventing negative consequences, can lead to the best positive results to be satisfactory for all its agents. "Composition principle" is the basis for solving such problems. It assumes coordination of various interests and combination of the notions of the various stake holders regarding a preferable life support provision policy.

A system of the models is used whereby computation results are obtained and adjusted in an iterative process, to serve as a technique to realize this principle in analysis, to forecast and to manage regional development. It may be preferentially normative or descriptive. In this case, depending on the peculiarities of individual aspects represented entity agents, static or dynamic, deterministic or stochastic, programming or simulating models are applied.

As an effective way of considering uncertainty influence as well as minimization of

costs and losses due to risks associated herewith, one may use simulation of its sources response to the actions planned by regional development agents which try to optimize their behavior, relevant changes of their admissible design sets, pay-off function and a principle of the best choice.

Practical realization of system analysis conclusions for regional development requires mechanisms that can encourage a compromise behavior of its agents. It is achievable if formulation of economic policy is carried out in the course, regulated in a certain way of negotiation between authorities at various levels as a set of their economically responsible commitments to partners, entrepreneurs and population.

1. Introduction

Specific life support interactions between people and nature occur within a limited territory and determine its changes as a human habitat. Like any complex open system, it includes a multitude of specific attribute components which entail various relationships, and exchanges of energy, materials, and information with the environment. If it serves the purpose of self-adjustment through homostatical changes and is compensated by form transformation in stable conditions, then such habitat represents a region.

Imparting a regional character to existence is an objective process. Essentially it reduces to a number of factors beginning in nature diversity manifestations and national-ethnic differentiation of vital space (impact of the latter factor is usually recognized only in situations to be considered critical for a State and caused by its gross negligence). Territorial division of social labor, which occurs historically, and different benefits people discover in spatial convergence, agglomeration are of no less importance. Analysts explicate one by economic basis theory. The other is explained by hypotheses that spread phenomena having analogy with gravity force, gravitation energy and gravitation potential to human behavior.

Each region which differs from others in size, configuration, relationships and intensity of these or other kinds of human activities within its limits, is not spatially monolithic. On its territory one may observe individual settlements and areas (localities) connected with various relationships. By virtue of laws revealed by central localities theory they create a highly stable hierarchy. Its changes incarnate the same form transformation that compensates output of energy, materials and information into environment in stable condition of the habitat.

However, State life support system, side by side with spatial structure and regions as its elements, viewing it in other aspect i.e. from the diversity-of-activity position creating life resources, reveals a different one. Its components are various economy sectors developed in the process of functional social labor division under the influence of human objective reality cognition.

Any sector is also an open complex system. It combines pursuits that differ from others by manufactured products specificity, applied technologies, recovered resources, human inclinations put in motion. Therefore, those or other regions being commodity markets

and reservoirs to keep all needed for their production, are differently attractive for individual sectors and their development in a certain region affects it in its own way as the habitat and opens more or lesser life opportunities for the population.

Thus, these structures look as if they were superimposed. Transformation of some components for any region being disseminated to others through communication channels between them, results in its change at large which affects other regions and situation in individual country economy sectors. If such transformations are directed and irreversible, then there is direct evidence of regional development. It results in a new state of those or other territories that may turn out to be more or less suitable for people's life and functioning of various productions to the advantage of the economy of the whole country.

Main problems for system analysis of regional development processes are derived herefrom. That is to reveal the most probable reaction with respect to planned measures for resource supply for life support and to discern actions which, preventing negative consequences, may lead to the best possible positive results.

2. Regional Systems: Components, Relationships, Attributes

Entities of two types i.e. of natural and historical or artificial origin are components of any region as a system. The first type includes the earth with its qualitative characteristics and climatic conditions, flora and fauna, water and energy resources, entrails of the earth that are to some extent satiated with various minerals and, therefore, with specific capacity for life-supporting resources reproduction.

The second type comprises population of the given territory with a certain culture, particular life preferences that are relected in day-to-day mass behavior virtues, as are material aspects of its economic progress i.e. already existing production facilities and environment protection culture, operating infrastructure etc.

Links between these components as much as between the entire region and its environment including other spatial, national and world structures, may be normative and legal or random, and may take forms of technological, economic, social, ecological, national and ethnic as well as other relationships.

The population through its activities transforms natural components of the present region into the economy characterized by certain specialization and sectoral structure; so does it and changes during the process of territorial social labor division. It assigns economic activity types to the regions primarily according to the needs and existing conditions that are most favorable to that the assigned activities.

Technological, material and substantial links of these pursuits, acquiring various practical forms (cooperation, combination, alliance etc.), facilitate origination and evolution or consolidation within a region, between it and environment, of other relationships that exhibit real attributes of the system and its all components. The basis for these attributes is the major people's virtue i.e. self-consciousness, interests and an aptitude of self-organization to have them satisfied.

Purposeful dynamism follows from here in response to inner impulses, the entire regional system and its individual components, as well as uncertainty of their behavior under environment changes. It distinguishes organism as a non-additive entity from the sum of its components. Mutual conditionality of various activity types, life mode of residents occupying the territory, economy development and environment conditions are only superficial indi#ators of such integrity. And it is founded on specific unified group preference function that is inherent in the permanent residents of a territory and differs typically from the rest of regions. This function determines its life choice, in particular, the economic one which, through its availability, is stable relative to external force action. Therefore, just if the consequences of all actions on life support that are preferable from both national and entrepreneurs' stand satisfy each region where they occur, they can be realized in general or to be performed effectively (see *Systems Analysis of Economic Policy*).

3. Concept of System Analysis

The "Composition principle" is the basis for the systems approach to analysis, prediction and regulation of regional development (see *Modelling of Large-Scale Systems Development*). In a case like that the notion of general country life support purpose isn't set to his conscious agents from without as with "decomposition principle". But the purpose is generated during the process of their interrelations through concurrence of their own organically distinctive interests which determine their estimation of various actions and direct their behavior, having regard to the most probable reaction of the rest components of each regional system.

Such a principle, as applied to regional development, assumes, first of all, studies of motive forces and the sphere of admissible, realized actions, explicitly or by their consequences, for any of his consol)dated agents of this sort. This is the population of individual territories as a whole represented by their authorities, entrepreneurs organizing development of specific econo-y sectors, government of the country devoted to care for the interests of the whole State.

The following is required for system analysis of regional development. It is necessary to express, in criterion form, the motives which direct their behavior and to outline a set of its alternatives as the domain of a relevant objective function. If one failed to find it, qualitative and quantitative ascertainment of regular trends of their reactions as to both different similar agents' actions and other environment changes as well as possibility bounds of the reactions.

Furthermore, the analysis incorporates optimization or prediction of behavior, coordination of intentions and provision of their balanced character with the reactions of other ants agents and different system components involved in regional development processes. In this case people's actions, being evaluated in terms of diverse interests, proceed efficiently just if don't contradict one another. Therefore, there is a need to know how to identify and compare alternatives of the actions in order to decide in favor of the one that while realizing some goal, won't cause damage to other objectives, different components of regional and sectoral systems with established links and relationships of these components and systems (see *Fundamentals of Mathematical*

Modelling for Complex Systems). If coordination and a balanced character of agents' intentions are not achieved without alteration of these links and relationships, then it is required to reveal what it should be.

Matching of notions of regional development processes agents about everyone's preferable actions serves as proof of their feasibility. Two circumstances impede it, namely, (1) non-identity of choice evaluation criteria in the context of the given region, its various localities and extrinsic environment (other regions, economy sectors, country as a whole), (2) strong uncertainty of people's reaction toward economic activity of others, and, especially, response of the nature to such activity.

The first circumstance may be overcome through payment by any participant to others that, placing his own responsibility under his interests and enriching partners' reality perception, makes compromise behavior advantageous and changes their ideas of preferable choice in such a manner that they coincide. The second one requires, when evaluating economic activity alternatives, to foresee people's response that is inexplicable by interests of consolidated regional development process agents or by their reaction regular trends. It's necessary to renew conditions which set limits to permissible choice area, and objective function arguments or factor-argument values in relations characterizing revealed regularities, making it in compliance with this forecast results.

Arranging analysis in iterative process form enables to match and to balance notions of various agents about preferable actions in social, ecological, scientific and technological as well as in other aspects. As this takes place, being based altogether on "composition principle", one can and should use also contrary "decomposition principle", but as applied to subsystems which attributes it is consistent with. A normative approach, when mechanisms of optimal solution search are reproduces, should be combined with a descriptive one. It is necessary to do it in each case when such a mechanism is a "black box" for an analyst and cognitive opportunities are restricted to revelation of regularities typical for the reaction of one or other entity to the external influences.

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Biographical Sketch

Mikhail G. Zavelsky is Doctor of Economic Science, Professor, Head of Laboratory "Systems Analysis of Information Providing of Economy State Control" of the Institute for Systems Analysis (Russian Academy of Sciences); has the Chair of Economics and Finances of Moscow Institute of Economics, Law and Political Sciences; is International Informatization Academy to UNO member, European Association for Evolutionary Political Economy (EAEPE) member, Editorial Board of Journal "Economics and Mathematical Methods" (Moscow, Russia) member; has participated as an expert of the State Council of Ministers and the Moscow Soviet of People's Deputies in a number of the method and project appraisals, in particular efficiency assessment, in different Russian regions and sectors of the national economy; is author of 8 books and more than 210 articles on the theory, mathematical modeling, systems analysis, forecasting, planning, programming, and regulation of economy, industrial, regional and social development, innovations, institutional change, according of different economic interests.

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