THE SYSTEMIC COGNITIVE MODEL OF INCREASING THE COMPETITIVENESS OF THE REGION

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Abstract: Author conducts functional analysis of research and managerial aspects of competitiveness at the meso-level. From the methodological point of view, dialectical and synergistic approach to study of the region's competitiveness is assessed in the context of globalization and regionalization in the systemic, dynamic and nonlinear aspects. With regard to this study, along with synergistic and dialectical methodological tools it has been suggested to use a systemic cognitive model, which is based on a systemic paradigm. According to the paradigm, socio-economic area of competitiveness is seen as a single system, enclosing a set of independent subsystems, the composition and structure of which is determined in accordance with the specific features of the determinants of competitiveness in the region.

Introduction

In the context of the deepening globalization processes, competitiveness of a region is becoming increasingly vulnerable to the impact of internal and external factors. This is most evident in connection with the new opportunities for independent region's access to foreign markets, increasing the risks associated with preservation of the existing segments and competitive position in volatile market conditions.

Functional analysis of research and managerial aspects reveals multidirectional and contradictory process of competitiveness at the meso-level. Study of individual aspects of the competitiveness became dominant over the integrated assessment of socio-economic processes and factors. The system of statistical indicators monitoring the dynamics of internal economic environment is applied in order to assess the competitiveness of the national economy and its regions. However, this is not sufficient to identify the root causes of regional competitiveness if it is related to hardly assessable factors.

The theoretical and methodical issues of the management aspect of competitiveness at the meso-level have not been sufficiently studied. For example, today in the regions mainly program oriented methods of task implementation are used in the medium- and long term. However, the regional target-oriented social programs are formed without proper connection with the long-term strategy, orientation and vision for the comprehensive development of territories. It should be noted that the methodology and technique of comprehensive programs are outdated and do not meet modern requirements, and do not reveal the real opportunities of the region in the addressing the priorities.

Literature Review

From the scientific point of view, competitiveness is seen as a complex, multilayered and contradictory process that has objective as well as subjective features. The above characteristics of the competitiveness unambiguously indicate the complexity of finding the single and most effective methodological approach to its research and management.

If one considers the theory of competitiveness, it is evident that it is still largely evolving. Proponents of behavioral approach (Marshall, 2008) consider competitiveness as the struggle between producers and consumers in satisfying their needs. Structural interpretation of competitiveness (Creedy, 1981) analyzes the structure and market conditions (classification into types of markets as imperfect competition, monopoly, oligopoly, monopoly, etc.). Functional approach (Schumpeter, 2007) to competitiveness considers it as a process of dynamic aspiration for the new, while institutionalism (Veblen, 2007) includes non-economic factors into the study. Among them the theory of competitive advantage (Porter, 2005) is the most modern approach, which focuses on competitive advantages of the country (factors of production, demand, related and supporting industries, strategy, structure and rivalry).

The methodology of the spatial competitiveness study is mainly based on the laws and patterns of dialectics. Porter (2005), Roberts and Murray (2002), Krugman (2005) suggest consideration of regional development processes from the perspective of synergetic methodological concept. Their views are based on submission to the laws of the unity and struggle of the opposites, transition from quantity to quality and etc, which form the basis of a synergistic approach in the dynamic and nonlinear aspects (Saveliev, 2010).

Synergetic approach explores the modern processes of economic development and the interaction of socio-economic systems by using the tools of economic cybernetics, which implies the simulation of internal and external factors and relationships, the formalization of problems of self-organizing systems using the principle of causal relationships under investigation (positive and negative factors) (Caglioti,1998).

More detailed discussions of methodological positions of dialectical and synergetic approaches have advantages and disadvantages. Under the dialectical approach, one can clearly see intelligible logic and sequencing of complex management problems (tasks), taking into account the objective tendencies and regularities of the development process under investigation. This approach is effective in the evolution of the uniform evolutional development processes, stability of internal and external environments, the sequence of objective trends and patterns of qualitative changes.

However, current trends in the development of integration processes in the context of global economic relations are so volatile that any subjective factor may lead to unpredictable fluctuations in a balanced environment. Under such volatility in the short and medium term results of the dialectical research approach do not provide adequate conclusions. In the study of long-term processes, such an approach can yield more reliable results for the disclosure of general economic and political aspects of the problem.

Using synergistic approach in the study of the competitiveness of a region creates a wide scope for comprehensive and systematic review of the problem. However, the managerial tasks (programs) and the sequence of actions by the subjects are not always and entirely amenable to formalization. Not all the tools and requirements of raising competitiveness are amenable to empirical measurement, which is to be noted while modeling the situation. The strategy and the elements of adaptation of regions in the rapidly changing environment require not only a quantitative, but also a qualitative assessment of the situation. Scenario and multivariate policies of development should be clearly substantiated and subject to a sequence of actions to manage the development of a system where the synergetic approach does not apply. Therefore, multivariate and scenario calculations by this approach are only suitable for the study of short-term trends and fluctuations in internal and external environments. Consideration of factors in a volatile environment, the empirical measurement of chaotic action and many expected difficult situations impose methodological issues in ensuring the objectivity of judgment.

Systemic cognitive model

In order to select the most appropriate methodological approach it is important to rely on the specific features and characteristics of region's inter market competition and competitiveness in the context of globalization and regionalization. In particular case, complexity, inconsistency and multiplicity of factors of the problem in consideration allow us to determine its inherent qualities. As can be seen from Figure 1, spatial and functional characteristics of the competitiveness clearly indicate the difficulty of finding the single most effective methodological approach. With regard to this study, along with synergistic and dialectical methodological apparatus, the author suggests approaches that complement and improve the study of the peculiar qualities of regional competitiveness.

The basis of a systematic cognitive model is a systemic paradigm (Kornai, 2002). It is the concept of seeing the object and subject of research, according to which the socio-economic area is considered as a single system, enclosing a set of relatively independent subsystems, where the composition and structure is determined in accordance with the position of observation. Based on the concepts of systemic paradigm (Kleiner, 2007), the main determinants of competitiveness in origin (or manifestation) can be grouped into: object (A); process (B); environmental (C) and project (D) criterion.

Formally, this concept can be represented as a functional relation on the set of competitive factors a_i (aϵA), b_i (bϵB), c_i (cϵC), d_i (dϵD), (i=1,..,n), where n is the number of indicators . The mathematical basis of the empirical exercise lies on a differential model as a dynamic system, which uses representations of dynamic processes in state space. Models for the group (*A*) has the form:

$$A' = f(Fk, Hk, t) , \qquad (1)$$

where $A = (a_1, a_2..., a_n)$ is a vector of the determinants of the object; *Fk* are variables of the production factors of capital; *Hk* are the factors of human capital; t is time.

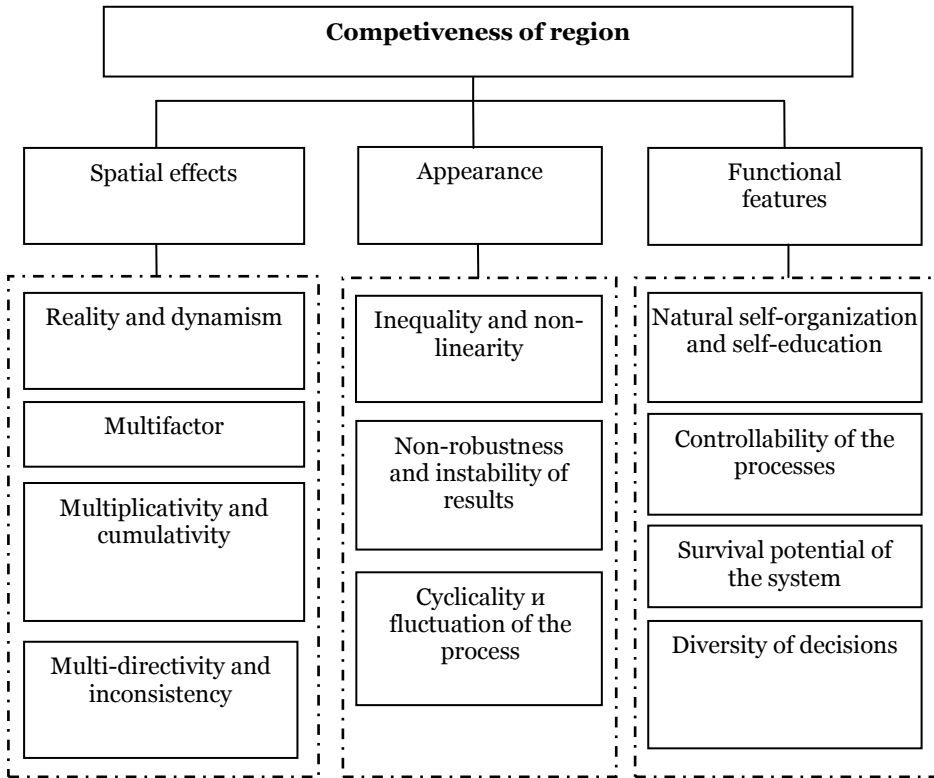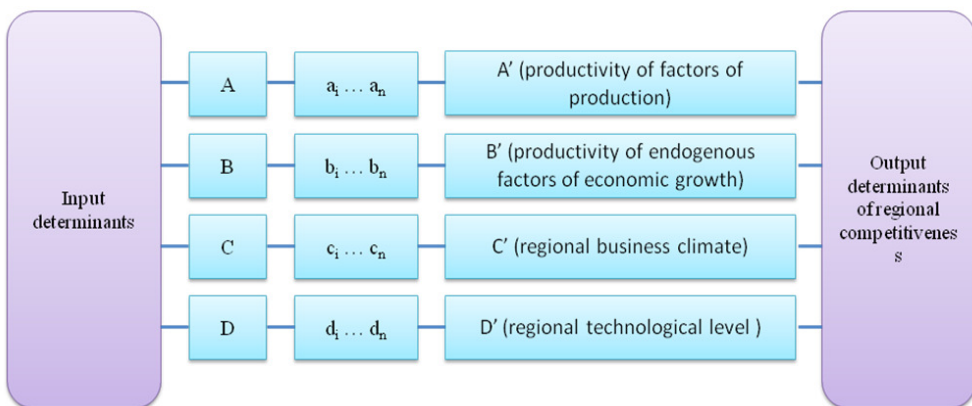FIGURE 1. INHERENT QUALITIES OF REGIONAL COMPETITIVENESS

FIGURE 2. DETERMINANTS OF REGIONAL COMPETITIVENESS

Differential model used for the group (*B*) has the form:

$$B' = f(Ed, Mc, Ia, In, t), \qquad (2)$$

where $B = (b_1, b_2..., b_n)$ is a state vector of process determinants into account factors such as level of education (*Ed*), quality control (*Mc*), investment activity (*Ia*) and the innovativeness of the economy (*In*) in the region. In drawing up the differential model group (*C*) as follows:

$$C' = f(Rr, \mathrm{Pr}, Br, Lr, Gr, t), \qquad (3)$$

we select the following state variables: the external environment (*Rr*); political stability of the (*Pr*); Business Environment (*Br*); regulatory framework (*Lr*); the quality of public institutions (*Gr*) and set links between these variables in a chain of causal relationships between factors.

Models of system dynamics of group (*D*) are based on projects data and developed in accordance with the formula:

$$D' = f(Tp, In, Iv, t), \qquad (4)$$

where *Tp* is transfer of technologies, *In* is modernization of production, *Iv* is technical and technological renewal.

While designing these models, interpretation of the state variables are done, the causalities between these variables are revealed and expressed in the form of structured functional dependences.

The logical sequence of evaluation of object determinants (A) converges to the integrated measurement of the aggregated productivity of the factors of production as labor and capital. The process determinants (B), generally, reflect the changes in the factors of endogenous growth as a result of growth in R&D sector, which eventually demonstrates the productivity of endogenous growth factors (TFP, total factor productivity). The environmental factors of competitiveness (C) form the region's business climate while project components (D) could directly or indirectly change the level of technological development in the region.

The management of competitiveness requires the logical reconciliation between the systematical approach to the study of competitiveness and managing economic mechanism of regional competitiveness. In this regard, the control of processes of the formation and development of the "object" components of regional economy, in the opinion of the author, covers primarily the spatial characteristics and quality conditions of the industrial and social infrastructure, natural and economic potential as well as the factors of production, availability of resources for the growth, the financial condition of regions, transportation, information, communications and the other components of infrastructure.

Ensuring the consistent and evolutionary progress of the "process" components, aggregated in the chain of repetitive quality factors, results from

the quality of the control of processes as education, knowledge diffusion, innovation, investment activity, etc.

Regulation of interaction between economic institutions and the behavior of economic processes in the spatial (geographical position and influence of the external environment) as well as functional (investment climate, political stability, development of market infrastructure, regulatory and legal system, etc) environments forms the "environmental" components of regional development.

The implementation of "project" components of regional economic development, including implementation of strategic, national and regional projects of modernization of the economy, technical and technological renewal of production, is ultimately reflected in the increase of the general technological level of economy.

Discussion

System measures aimed at achieving certain goals require balancing and proportionality between the elements of economic system. For example:

- the object-oriented policy of the Soviet Union, 50-60 years of the 20th century, when there was insufficient activity in environment-oriented and project-oriented policy led to the inhibition of the "process" components of the economic system.

- the decrease in the number of projects at the level of technology, know-how and technological principles in a modern Western economy with highly advanced environmental and process components has led to the development of the financial services sector through the implementation of large scale speculative and virtual transactions, which became one of the reasons for the current financial crisis and the formation of debtor's prison in many European countries.

Conclusions

Regional economy would sustainably develop and function in the interaction and interdependent chain of "object", "environmental", "process" and "project" elements. Depending on the priorities and strategic objectives of regional economic development, management of the individual elements should be combined with the implementation of specific tasks of economic reform. For example, the priority structural changes in the economy and individual industries need strengthening of "project" measures, that is strengthening and increasing the project components of economic policy. Alternatively, measures aimed at modernizing the economy of the region, suggest the priority development of project-process part of the designed regional policy, while maintaining the stability of object-environmental measures of the system.

Choice of regional development models is of particular importance, depending on the strategic goals and functional characteristics of the models used. When choosing the goals and objectives aimed at efficient use of natural resources and raw materials, economic policy should focus on creation and increase of efficient use of internal sources and resources. In this case, the

regional economic policy must be aimed at application of object-oriented models of economic growth with wide coverage area of spatial factors of the region.

Policies aimed at efficient use of natural and economic potentials of the region should focus to a certain extent both on object-oriented and project-oriented models of local growth. It is explained by the fact that the goals and objectives aimed at increasing the economic potential are more interdependent with the factors of education and intellectual potential, and other effective factors of labor productivity growth.

Strategic goals and objectives aimed at improving the efficiency and competitiveness of the region through series of measures of liberalization and improvement of the business climate and business environment, etc., are achieved through the cumulative effect of process-oriented and environment-oriented models covering the processes which in subsequent development create conditions for higher economic growth.

In the author's opinion, the proposed systemic cognitive model may grant the strategic vision and program activities for regional development, depending on the correct choice of spatial factors, with unified objectives and render harmony of the model with the tools of its application.

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