

RPTSS 2018
International Conference on Research Paradigm
Transformation in Social Sciences

REGIONAL ASPECT: LAYING INSTITUTIONAL
GROUNDWORKS

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Abstract

Laying the institutional groundworks of institutionalism is based on forecasting and planning, perfecting the management system of the national economy and the state socio-economic development. Developing the complex of issues and deepening of economic integration takes an offensive position; they are very fleeting and require constant research, the search for scientific justifications for the fundamental cause and effect phenomena, their interrelations and interdependencies, regularities. Determining the directions of the society development and the introduction of state policy forms a new paradigm. The synthesis methodology of the modified neural network is aimed at strengthening the management system; the studies are conducted on the basis of an artificial neural network. Analysis and synthesis forecast of modified neural network with the help of methods allow determining the way of how these processes proceed, recognizing images, interdependencies, interrelations and classifying them through the approximation of functions. The aggregate of these methods can perform the functions of forecasting, can optimize the management processes which will contribute to strengthening the institutional groundworks in the whole socio-economic space. The authors propose a conceptual model of managing the economy of interaction within the regional economic cluster of the territorial socio-economic system.

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Keywords: Region, institutionalism, managerial technical decisions, neural networks.



1. Introduction

Laying the institutional bases is based on forecasting and planning, perfecting the management system of the national economy at different management levels and conducting the socio-economic development of the region and the state as a whole. Developing the complex of issues and the deepening of economic integration takes an offensive position; they are very fleeting and require constant research, the search for scientific justifications for the fundamental cause and effect phenomena, their interrelations and interdependencies, regularities. Determining the directions of the society development and the introduction of state policy forms a new paradigm.

2. Problem Statement

In circumstances where the systemic transformations of institutional reforms happen, the state regulation including the regional level and management of future generations industries should be based on the transition from “political modernization” of the institutional system, based on the active offer of institutions on the part of the state, to the model of “market modernization” focused on the demand for institutions from the market participants themselves.

3. Research Questions

The research tasks are:

- to propose a conceptual model of managing within the regional economic cluster of the territorial socio-economic system with account of neurotechnologies and the influence of institutional factors in modern conditions;
- to propose a modified genetic algorithm of interrelations and interdependencies with possible analysis of the material and financial resources combination, the diversity of historical and economic resources, the analysis of all possible options for calculating the center of each interdependence;
- to obtain a set of optimal options for creating artificial neural networks (ANNs).

4. Purpose of the Study

Research objective is to scientifically substantiate the fundamental cause and effect phenomena on the basis of forecasting and planning for perfecting the system of managing the economy and socio-economic development of the region.

5. Research Methods

The synthesis methodology of the modified neural network is aimed at strengthening the management system; the studies are conducted on the basis of an artificial neural network. Analysis and synthesis forecast of modified neural network with the help of methods allow determining the way how these processes proceed, recognizing images, interdependencies, interrelations and classifying them through approximation of functions. The aggregate of these methods can perform the functions of

forecasting, can optimize the management processes, which will contribute to strengthening the institutional groundworks in the whole socio-economic space.

The key role of ANN as a mathematical model and its software / hardware implementation is built on the principles of organization and functioning of artificial intelligence artificial neural networks. The process of synthesizing the parameters of a specific mathematical model is reduced to performing the following functions: tuning all INN neurons (to learning), producing synthesis of the INS structure using special algorithms, the number of which input before the training is the enlarging set. These algorithms are aimed at solving the construction of the methodology for synthesizing a modified neural network.

6. Findings

In circumstances where the systemic transformations of institutional reforms happen, the state regulation at different managing levels and management of future generations industries should be based on the transition from “political modernization” of the institutional system based on an active offer of institutions on the part of the state (at different levels) to the model of “market modernization” focused on the demand for institutions from the market participants themselves. Theoretically, creating the model of market modernization of institutions should be preceded by an institutionally approved procedure for studying the demand for institutions by all subjects of the national market, and institutional changes should be integrated, mass-informative and adapted in accordance with the needs of automation (digitalization) (Burkaltseva, 2016). Automation also conducts control by means of digitalization of the technical base in an on-line mode with the use of neural networks, Internet of things, block chain technology. At the same time, by means of an intuitively adapted base, it is managed qualitatively.

On the basis of the studies completed (Burkaltseva, Vorobyov, Borsh, Gerasimova, & Chepurko 2016; Borsch, Burkaltseva, Vorobyov, Vorobyova & Chepurko 2016; Dudin, 2016; Simchenko & Tsohla, 2016; Simchenko, Tsohla & Podsmashnaya 2016; Varnaliy, Onishchenko, & Masliy, 2016), the authors propose a conceptual model for the management of interaction within the regional economic cluster of the territorial socio-economic system, presented in Figure 1. It assumes its “construction considering the influence of institutional factors in the current conditions of using Internet things, smart things in a smart ecosystem for overcoming chaos and systematization with account of neurotechnologies, rationally responding to the main three issues of the economy, effectively uses three production factors at choosing the ways of managing, its institutional support of the digital economy using the Internet of Things and block chain technologies at management different levels” (Burkaltseva, Vorobyov, Borsh, Gerasimova, & Chepurko, 2016), including the meso-level.

The regional economic cluster of the territorial socio-economic system (RECTSES) is the concentration on a certain territory of a group of interrelated economic managing subjects that are combined by economic interests, where the provision of the improvement of the economic sustainability quality happens due to synergy from interaction based on social orientation and rational resources use considering the institutional approach when forming the intra-cluster links between its managing subjects of the territorial socio-economic system.

For sustainable development of the region and its socio-economic relations, it is necessary to apply such forms of organization and cooperation of links that ensure maximum application of the opportunities for accumulation and efficient resources use within the production process in the digital economy.

The main advantage of this approach is the opportunity to consider the concept of sustainable economic development of the region through the prism of creating RECTSES in order to improve competitiveness and the investment climate through the mutual development of production, financial, infrastructure and institutional components that allow a more efficient use of the regional economy's resource potential and trade policy.

6.1. Effective policy of ensuring the economic security at the meso-level

Considering the regional level of ensuring the economic security, it is worth dwelling on its key characteristics (Figure 2), such as: attributes of regional economic structures; properties of the regional socio-economic system; an existing resource base and the life quality of the population.

Analyzing the characteristic features of economic security at the regional level shown in Fig. 2, it becomes certain that the conditionality of the region security is determined by its economic development. It can be agreed with scientists who assign a special place to the socio-economic reference system in ensuring the economic security of the region (Kozachenko, Ponomaryov, & Lyashenko, 2003).

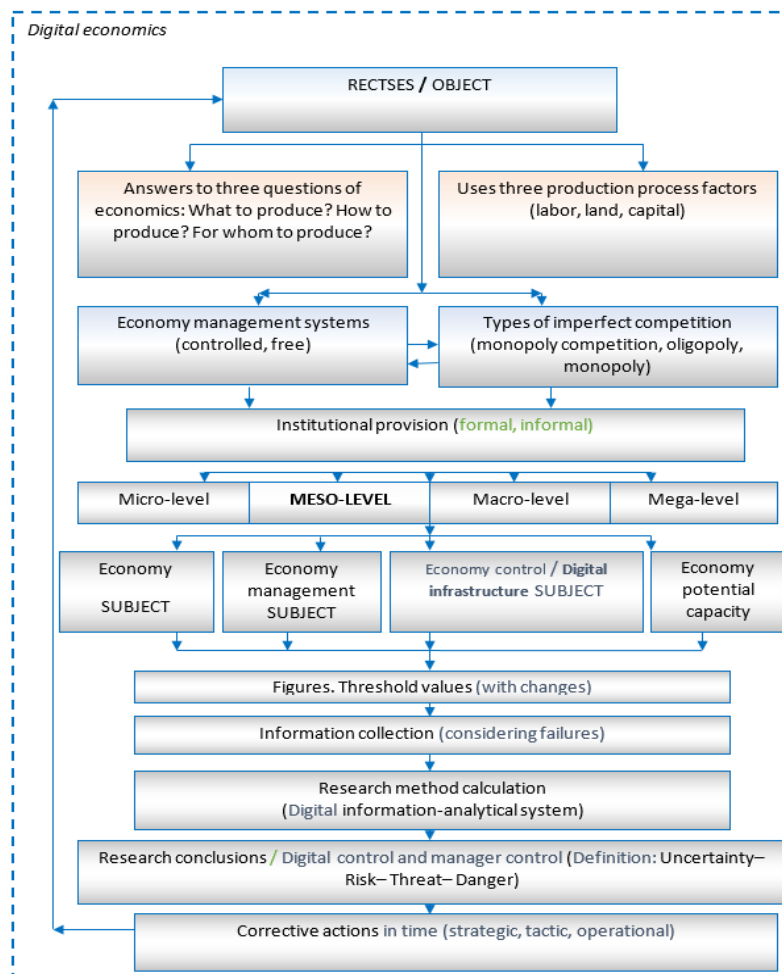


Figure 01. Model for interaction of managing inside regional economic cluster of territorial socio-economic system

Such system is aimed at aligning the interests of all participants in the regional development process and justifying adequate criteria for choosing the ways of such development on the basis of harmonizing the interests of all its participants. These mentioned socio-economic guidelines are endowed with scientific-recommendatory, formal-orientational, evaluative, strategic and restrictive-regulating functions.

Provided that these guidelines are supported by appropriate economic instruments of management (organizational, stimulating, preventing and prohibiting) and the prevalence of development interests of the region as a whole over the interests of individual managing subjects, the social and economic security of the region is strengthened.

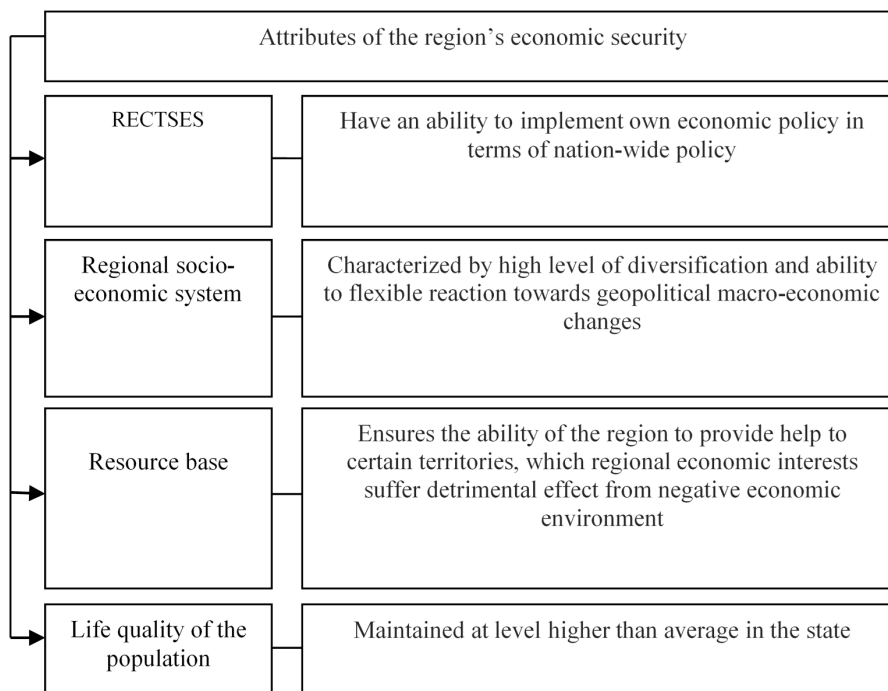


Figure 02. Structural characteristics of economic security at the regional level

At different hierarchy levels of the economic management, that provision of the economic security should happen with account of the interests aggregate (economic, political, etc.) of all its subjects concerning the priority of territorial and sectorial interests.

In the post-transformation stage of economic development, the threats to security at the macro- and meso-levels arise primarily from the disproportion of individual meso- and micro-subsystems, mainly sectorial ones, since their emergence is caused by subjective factors, depending on the development strategy and allocation of productive forces implemented by regional management structures.

In order to form an effective policy of ensuring economic security at the subregional level and to make well-considered management decisions, it is necessary to conduct a thorough analytical study of the conditions and results of the socio-economic systems functioning. The key task of such analysis is the development of a methodological approach to the study of the region economic security. However, in digitalization conditions, the local regulatory and methodological support requires the formation of an aggregate of economic security indicators to assess the main trends and dynamics of regional security

development as the basis for developing a mechanism for strengthening the economic security of regions. Please replace this text with context of your paper.

In order to perfect the analysis as an important management function, the structural and logical sequence of diagnostics of the region's economic security is presented in Fig. 3.

It should be noted that at the first stage, it is necessary to determine the objectives, tasks and methods of security research and information sources. When choosing approaches to analysis, the internal security components (soundness, stability and ability to develop) are taken as a basis, as well as the prerequisites for self-reproduction, level and sources of conflict in the region and its external economic openness.

At the final stage, it is important to comprehensively assess the status and the level, as well as the trends in changing the characteristics of the region's economic security, primarily with a view to further forecasting the parameters of economic security in the future period. Such theoretical developments are useful for practical application in determining the mechanisms and forming a strategy for ensuring the region economic security.

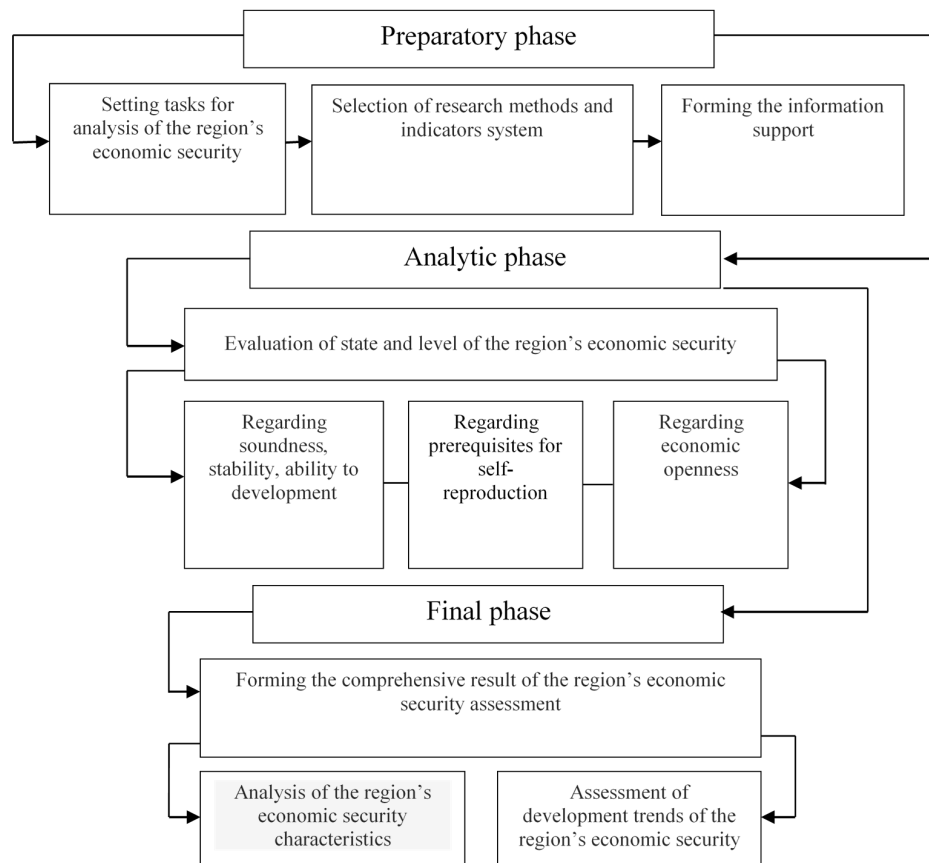


Figure 03. Structural and logical scheme of status analysis as function in economic security management system RECTSES

An assessment of the development sustainability of the regional economic clusters in a territorial socio-economic system and ensuring economic security is impossible without four components, namely:

- 1) strategies for the cluster development of regional economic clusters of the territorial socio-economic system;

2) the indicators system that characterizes the process of its implementation and the dynamics of the stability of regional economic clusters in the territorial socio-economic system;

3) qualitative increase in the gross regional product;

4) the institutional component that considers the formal and informal norms and rules for interaction between the participants of the RECTSES, the internal organization of the socio-economic situation in the RECTSES.

In addition, in order to develop an adequate strategy for ensuring the region economic security, as noted earlier, the institutional environment is of particular importance: regulatory institutions and market infrastructure institutions. Regulatory institutions are formed by a set of informal and formal constraints and rules, where the market institutions operate (all types of commercial and non-profit organizations).

The strengthening of the region's economic security is directly affected by the development level of its institutional environment, therefore one of the priority areas of regional policy is the promotion of forming the effective regulatory institutions and market infrastructure institutions. Regulatory institutions in their activity should be guided by a set of measures based on the regulatory framework of the region.

To develop and implement the concept of developing the market infrastructure (as components of regulatory support for the implementation of the state policy for ensuring economic security at the macro, meso- and subregional levels), it is necessary to establish the managed and regulated interaction of regional authorities, since their activities should be regulated within the framework of a unified concept development of market infrastructure as a strategy element of the region social and economic development in conditions of digitalization.

The main concept objective of institutional development is to identify the directions for the development of market infrastructure institutions and their practical implementation, which is aimed at increasing the socio-economic security of the RECTSES, the system competitiveness considering the formation of the social and economic climate, which in its turn has a positive impact on the real sector development and improving the quality reproductive process in the region as a whole.

6.2. Setting of the task of modified neural network synthesis

In this paper, the authors propose the developed (Bondarenko, Gatchin & Geranichev, 2012) modified genetic algorithm of interrelations and interdependencies with a possible analysis of the material and financial resources combination, the diversity of historical and economic resources, the analysis of all possible options for calculating the center of all interdependences and obtaining a multitude of optimal options for constructing an ANN. This approach will help in expanding the variety of alternatives in systems of forecasting and optimizing management decisions.

When changing the internal parameters of the network mathematical model, according to Drozdov V.I., there are distortions that are superimposed on the antigradient vector on the configurable network weights, which results in the temporary exclusion of some neurons or connections between them during network training process (Khaikin, 2006). This option allows solving applied problems: to prevent retraining, to develop the network stability, to increase the generalizing abilities. When using neural networks, the results obtained mean that the neuron activation function requires only non-linearity. When building a network, the coefficients of linear links between neurons can be selected in such a way that the

neural network will accurately calculate any continuous function from its types (Bargiela & Witold 2003; Barsky, 2004; Ossovsky, 2002).

The ability of the neural network in forecasting is directly related to its ability to connect and reveal hidden dependencies between input and output data. After connecting and revealing hidden relationships and interdependencies, the network computes the centers of each interconnection and interdependence in this state, the network is able to foresee the future value of the further sequence based on some previous values or factors. An important factor becomes the fact that forecasting can occur when the previous changes in its perspective predetermine the future development scenarios. Neural networks can be approximated by continuous functions using linear operations and a cascade connection, the possibility to obtain a device from an arbitrary nonlinear element, calculating a continuous function with predicted accuracy. This confirms that the nonlinear characteristic feature of a neuron can be arbitrary. The complexity of the network may depend on which nonlinear function is chosen; for any nonlinearity the network remains a universal approximator and performs the functions of any continuous automaton with sufficient accuracy.

When using the basis of the ANN in neuroinformatics, a special language for representing neural networks is obtained; neurons have a structure similar to biological analogs. In the research process, the most important element of neurosystems is the adaptive adder.

The functions of identifying single-element interdependencies and interrelationships help to calculate the center of all interdependences and make attempts to find the extremum by solving the learning task. In this case the solution will mean the implementation of the ANN weights. Classical methods such as Newton's method, the method of multi-step reduction of dimension, stochastic methods, allow solving only one solution of the problem posed. Researchers make attempts to solve the posed task to optimize the functions of algorithms based on the parallel processing of multiple interaction options, where their main priorities are fast convergence and insensitivity to local extremums. The main procedures in forecasting are generation of interrelations and interdependencies variants and calculation of the center of each interrelation and interdependence.

7. Conclusion

A conceptual model of managing the economy of interaction within the regional economic cluster of the territorial socio-economic system is proposed.

The ability of a neural network in forecasting is directly related to its ability in connecting and revealing hidden dependencies between input and output data. After connecting and revealing hidden relationships and interdependencies, the network computes the centers of each interconnection and interdependence in this state, the network is able to foresee the future value of the further sequence based on some previous values or factors. An important factor is that forecasting can occur when the previous changes in its perspective predetermine the future development scenarios.

When adjusting the weights of neural networks and its structure, such approach will give the possibility to select a multiple number of optimal variants of complex system transformations in the process of making managerial technical decisions.

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