

Long-Term Forecasting Technology of Macroeconomic Systems Development: Regional Aspect

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Abstract. Conducting of effective public policy is impossible without the scientifically substantiated evaluation of taken decisions. Long-term modeling and forecasting is the tool that allows evaluating the impact of the ongoing reforms on macroeconomic systems' development. This requires the processing of huge amount of diverse information. This article is devoted to modeling and long-term forecasting of regional macroeconomic systems' development. The simulation model based on the method of system dynamics is proposed. The generalized forecasting technology, which includes simulation model setup, validation and long-term forecasting, is developed. The numerical experiments and the forecast of Kharkiv region development until 2025 were carried out on the basis of the suggested information technology.

Keywords: forecasting, information technology, region, development.

1 Introduction

Modeling and forecasting of the complex objects' and systems' development is an integral part of decision-making process on different management levels. It allows to evaluate various aspects of object functioning and consequences of implementation of one or another management decision, and to elaborate a long-term development strategy.

Modeling and long-term forecasting of the territorial systems' development at the regional level is an important direction in this field of study. The complexity of the problem is stipulated by the variety of social, economical, and ecological processes that take place inside of the given systems, their interaction with the nearby territorial entities, dependence of the regional system upon the decisions made on the state level, and the environment.

The noted peculiarities of the regional macroeconomic system place limitations on the methods and means used to model the concerned object. It is obvious, that in order to conduct a comprehensive modeling of a regional system, a set of models having different nature and structure must be developed. This set of models should allow to forecast the main social, economic, and financial indices of the region's development, and to estimate the tax and expenditure, monetary, and administrative-territorial policies being pursued. However, the usage of the given models is associated with the

collection, processing and storing substantial amounts of diverse socio-economic and financial information, received from different sources. It is impossible to solve this problem without implementing modern information technology.

Therefore, only the integration of the given models as a single information-computing environment will permit creating an effective technology for regional development forecasting, which can be used by the state or local authorities for elaborating the plan of development for the region, and estimating the impact of the ongoing reforms.

This paper is devoted to modeling and long-term forecasting of regional macroeconomic systems' development. The analysis of the existing forecasting methods is conducted in the second section. The third section is devoted to the set of mathematical forecasting models for the region's development, elaborated by the authors. The functional structure of applied information technology, based on the proposed models, is presented. The fourth section deals with the implementation of the suggested technology. The results of the regional system development forecast on the example of Kharkiv region until 2025 are provided. The fifth section contains conclusions on the conducted research and the directions of the further analysis.

2 Analysis of the Existing Approaches of Long-Term Forecasting of Macroeconomic Systems

Only two main “working” approaches can be distinguished from the variety of methods for modeling the structurally complicated macroeconomic systems. They are econometric [1,2] and simulation modeling [3,4].

Econometric models provide quantitative description of the interconnections between economic objects and processes, and they are developed for the forecasting of the economy's dynamics [2]. Modeling of the developed countries economies is often carried out with the help of econometric models. Wharton [5] and Brookings [6] models are especially popular.

Analysis of the econometric approach, based on the methods of modern applied statistics, shows that development and practical application of such models are based on the usage of rather simple, but highly effective methods and software tools, the elaboration degree of different applied aspects of which is quite high. The main disadvantages of these models are formal usage of regression analysis techniques which results in inadequacy of the models, and the limited forecasting interval which prevents from their usage for long-term forecasting.

Let's consider another group of methods including causal (simulation) models. The most known of them is the model of system dynamics [3,4]. J.W. Forrester developed the method of system dynamics and applied it to the examination of the processes of global economic development. The results, obtained by Forrester, were used in many models of world dynamics [7,8,9].

When analyzing the models and methods of world dynamics, some methodological disadvantages should be pointed out. For example, the territorial peculiarities are not