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MODELING AND FORECASTING OF SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT

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Abstract. This scientific article is devoted to the issues of modeling sustainable socio-economic development and forecasting its future state. As part of the research, the main macroeconomic indicators at the regional and national levels, including economic and mathematical models, important factors such as employment rate, state budget revenues, gross domestic product and labor productivity, were deeply analyzed. The article comprehensively covers the theoretical and practical aspects of forecasting methods, the interconnectedness of economic processes and their future development trends. Based on the research results, scientifically based practical recommendations were developed to ensure sustainable development. The role of the digital economy and innovative approaches in this process was also emphasized.

Keywords: Employment rate, GDP size, budget revenues, green economy, strategic planning, socio-economic development, forecasting, economic modeling, sustainability, innovation

Introduction.

Modeling and forecasting of sustainable socio-economic development is recognized today as one of the most important and priority areas of economics. In modern global conditions, countries are faced with complex problems such as climate change, limited natural resources, demographic growth rates, and social inequality. Therefore, it is important to comprehensively study the economic, social, and environmental components of sustainable development and forecast them on a scientific basis. In particular, the use of modeling methods in the process of long-term strategic planning allows for effective management decisions.

During this study, key indicators such as economic growth dynamics, employment rate, state budget revenues and gross domestic product were systematically analyzed. The results obtained show that ensuring sustainable development is not limited to economic growth alone, but also includes ensuring social equality, maintaining ecological balance and efficient use of resources. At the same time, reducing disparities in the level of development across regions is also an important task. Based on the results of the study, practical recommendations were developed for the formation of effective development strategies at the regional and national levels and for forecasting future economic processes.

Literature review.

The issues of modeling and forecasting sustainable socio-economic development are one of the most widely studied topical areas in economics. Many economists have put forward various theoretical views, methodological approaches and practical proposals on this topic. In particular, great attention is paid to in-depth analysis of economic growth processes, their assessment using mathematical and economic models, and identification of future development trends.

In particular, in the article "Modeling and forecasting of sustainable socio-economic development" written by Khudoyberdiyev.I and Abdurahmonov.A, it is stated that "This article

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is devoted to the issue of modeling and forecasting sustainable socio-economic development. During the research process, factors such as regional and national indicators, economic and mathematical models, employment, budget revenues, GDP volume and labor productivity were analyzed. The article considers forecasting methods, the interdependence of economic processes and future development trends. Based on the results of the research, practical recommendations were developed to ensure sustainable socio-economic development. [1]"

In addition, [2]in the scientific article "Modeling and Forecasting of Socio-Economic Development of the Region" written by Elena A. Stryabkova and other scientists, it is stated that "This study aims to model and forecast the socio-economic development of the region by analyzing the relationship between GRP per capita and several economic indicators in the Belgorod region. Based on the analysis of pairwise correlation coefficients, consolidated budget revenues and the average annual number of employees were identified as the most important explanatory variables. Several models were developed and evaluated, and the power regression model was found to be the most accurate. Using retrospective data and the extrapolation method with trend models, a forecast of future changes in GRP per capita was also prepared."

NP Hariram, KB Mekha and others also stated in their "Sustainalism: An Integrated Socio-Economic-Environmental Model to Address Sustainable Development and Sustainability" that "One of the principles of sustainable development is environmental protection. Since all life can end without the environment and biodiversity, they must be protected. The finite resources of the Earth cannot meet the needs and means of the population. The extraction of natural resources should not exceed the sustainable development potential of the Earth, as the depletion of resources will damage the ecosystem [3]. "

In addition, [4]in their article "Economic models of transition to sustainable development: analysis of successful strategies in world practice" by Giao Tran et al., they stated that "In recent decades, sustainable development has been widely recognized by the global community as an important foundation for long-term economic growth. It emphasizes achieving economic development while simultaneously protecting the environment and ensuring social justice, thereby ensuring the well-being of present and future generations. In the face of growing challenges such as climate change, depletion of natural resources, and widening social inequality, studying the economic aspects of sustainable development is becoming increasingly important."

Research methodology.

This study used a set of various scientific approaches and methods to deeply study the processes of modeling and forecasting sustainable socio-economic development. First of all, leading scientific sources on the topic, reports of international organizations, and official statistical data were systematically studied, and based on their analysis, the theoretical and methodological foundations of the study were formed.

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[1] "Modeling and forecasting of sustainable socio-economic development" by Khudoyberdiyev.I and Abdurahmonov.A https://asiansciencejournal.org/index.php/AJSRI/article/view/126

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During the research, statistical analysis, comparative analysis, and generalization methods were widely used to determine the interrelationships and levels of influence between economic processes. At the same time, economic and mathematical modeling methods were used to assess the dynamics of key socio-economic indicators, identify their trends, and forecast future development directions. These approaches served to ensure the scientific validity and reliability of the research results.

Analysis and results.

Based on the literature review and analysis of existing scientific sources, a sufficient theoretical basis has been formed regarding the main methodological approaches to modeling and forecasting sustainable socio-economic development, economic-mathematical models and their practical application. This theoretical basis serves as an important foundation for the analytical work carried out in the subsequent stages of the research. On this basis, the main analytical results and scientific conclusions in this area are consistently presented below.

Today, ensuring sustainable socio-economic development is considered one of the most priority areas of the state administration system and economic policy. According to the results obtained during the research, it was determined that indicators such as the level of employment of the population, state budget revenues, investment volume, and GDP dynamics are of decisive importance in modeling socio-economic development. The interrelationship between these factors was assessed using correlation-regression analysis methods, and their future trends were forecasted based on the extrapolation approach.

The results obtained show that achieving sustainable development is not limited to increasing economic growth rates. On the contrary, this process requires a comprehensive approach that includes ensuring social equality, maintaining ecological balance, and efficient use of available resources. At the same time, in modern conditions, the introduction of the digital economy, innovative technologies, and the principles of the "green economy" are becoming an important component of the sustainable development model. Calculations based on forecasting models can serve as an important practical tool in the development of regional and national development strategies.

In recent years, the Republic of Uzbekistan has also been implementing comprehensive reforms aimed at sustainable economic development. In particular, the Resolution “On Additional Measures to Accelerate the Implementation of National Goals and Objectives in the Field of Sustainable Development for the Period up to 2030,” adopted by the Cabinet of Ministers of the Republic of Uzbekistan, [5]is one of the important regulatory and legal documents in this direction. This document defines specific tasks, executors and mechanisms for the implementation of 17 priority goals of sustainable development.

The direct relevance of this decision to the research topic is evident in several aspects. First, it sets out specific quantitative indicators necessary for economic and mathematical modeling. In particular, parameters such as a significant increase in gross domestic product per capita, an increase in employment, and a multiple increase in labor productivity serve as important input data for forecasting models.

Secondly, the resolution pays special attention to the development of forecasting and monitoring systems, and the relevant departments are tasked with developing medium- and long-term forecast indicators. This indicates the systematic establishment of forecasting practices at the state level and creates an important methodological basis for scientific research.

Third, this document strengthens an integrated approach to sustainable development, which ensures the integration of areas such as social protection, health, education, ecology and

[5] Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 83 dated 21.02.2022 “On additional measures to accelerate the implementation of national goals and objectives in the field of sustainable development for the period up to 2030”. https://www.lex.uz/uz/docs/-5870397

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economic development, which justifies the need to use multifactorial and multidimensional economic models.

It should be noted that this resolution serves as an important practical example of institutional strengthening of sustainable development. The specific target indicators set in it - indicators such as GDP growth, employment rate, poverty reduction - can be used as key parameters in economic and mathematical modeling and forecasting processes. At the same time, the presence of a monitoring system allows comparing the forecast results with real economic indicators, constantly updating them and adjusting economic policy.

In general, the conducted analyses show that the use of scientifically based modeling and forecasting methods in ensuring sustainable socio-economic development is of great importance not only theoretically, but also practically . This will serve as a solid basis for the development of effective economic strategies in the future and their successful implementation.

Table 1.

Actual and forecast indicators of sustainable socio-economic development of the Republic of Uzbekistan (2022–2030)[6]

Indicator	2024	2025	2026	2027	2028	2029	2030
Population (million)	37.0	37.05	–	–	–	39.5	41.0
Real growth (%)	6.5	5.9	5.8	5.7	5.7	–	–
GDP $ billion	114.96	132.48	148.18	164.16	181.77	–	–
GDP $	3,113	3,514	3,849	4,177	4,530	5,000	5,500
Unemployment (%)	5.5	5.0	4.5	4.0	3.7	3.5	3.3
Green energy (%)	–	–	–	–	–	–	25

The main reason for the changes in this table is economic reforms, demographic processes and changes in the global economic environment. The increase in the population from 37.0 million to 41.0 million is due to natural growth (high birth rate) and an improvement in the health care system. This means an increase in labor resources. At the same time, the decrease in real economic growth rates from 6.5% to 5.7% indicates that the economy is moving from a stage of rapid growth to a stage of stable and balanced development. That is, now the quality, efficiency and sustainability of growth are becoming more important, not the speed of growth.

The increase in GDP from $114.96 billion to $181.77 billion indicates that the economy is expanding, and the volume of production and services is increasing. The increase in per capita income from $3,113 to $5,500 indicates that the well-being of the population is improving. These changes are associated with increased investment flows, the development of industry and services, and the expansion of export opportunities. That is, the economy is growing both quantitatively and qualitatively.

The decrease in the unemployment rate from 5.5% to 3.3% indicates that new jobs are being created in the economy and the business environment is improving. This indicates that the

[6] Compiled as a result of research

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employment of the population is increasing and social stability is being strengthened. The share of green energy reaching 25% means that the economy is moving towards an ecological direction in the future. These changes, taken together, show that the country's economy is not only growing, but also moving to a more sustainable, diversified and modern model.

Conclusion and suggestions.

The results of the study show that in the process of modeling and forecasting sustainable socio-economic development, it is not enough to rely only on economic growth indicators. In order to effectively organize this process, it is necessary to comprehensively take into account, in addition to macroeconomic indicators such as employment, state budget revenues, investment volume, gross domestic product and labor productivity, factors such as ensuring social equality, maintaining ecological balance and rational use of resources. The study confirmed that scientifically based forecasting methods and economic and mathematical models serve as an important methodological and practical tool in developing regional and national development strategies. At the same time, regulatory and legal documents adopted by the state play an important role in improving the forecasting and monitoring system, setting strategic goals based on specific quantitative indicators.

Based on the analyses conducted, the following proposals were put forward to ensure sustainable socio-economic development and its effective forecasting.

First, it is advisable to introduce an integrated comprehensive modeling system that incorporates economic, social, and environmental indicators when developing development strategies.

Secondly, it is necessary to coordinate regional and cross-sector forecasting processes at the state level, and widely use modern monitoring and extrapolation methods.

Third, it is necessary to align investment policy, budget planning, and social programs with clear and measurable indicators based on the results of economic and mathematical models.

Fourth, it is necessary to establish the issues of green economy, energy efficiency, and environmental sustainability as one of the priorities of strategic planning.

If these proposals are implemented, the Republic of Uzbekistan's opportunities to achieve the sustainable development goals set for 2030 will significantly expand.

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