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Cognitive systems of monitoring and forecasting of scientific and technological development of the country/ T.V. Abramova, E.V. Vaganova, S.V. Gorbachev, M.V. Gribovskii, V.I. Syryamkin, M.V. Syryamkin, T.V. Yakubovskaya. Edited by Doctor of Engineering, professor V.I. Syryamkin. – Tomsk: Publishing House of Tomsk State University, 2012.

The present study, based on neural network and foresight technologies, reveals the interaction of technological progress and changes of economic relations, problems of long-term forecasting of world economic development and the measurement of socio-economic efficiency of the scientific and technical policy.

The book is intended for economists, teachers of economic subjects.

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INTRODUCTION

Forecasting activity is one of the functions of the economy. Having an idea of the trends and laws of the society, is possible to build a possible model of the global economic development. To improve the quality and accuracy of the forecast a comprehensive mathematical analysis of quantitative and qualitative indicators by means of cognitive intelligence should be used. In the economic theory of the XXI century. the measurement of the level and speed of techno-economic development and definition of reference indicators of socio-economic efficiency of the scientific and technology policy are becoming most urgent issues. Among the practical problems the most important are: contemporary institutional changes in order to adapt society to the new technological possibilities, modeling the trajectory of techno-economic development of the countries, working out the methods for determining the priorities of techno-economic development and identification of the most effective ways of their implementation.

Experience in macroeconomic research indicates not only possibilities, but also the fruitfulness of the use of cross-country comparisons for obtaining high-quality and fairly accurate quantitative conclusions, including forecasting. It should be noted that in modern Russia the science and intellectual potential are in the state of crisis. The situation is aggravate by the technological multistructure and sectoral imbalance of the economy. Thus, a thorough analysis and study of the theoretical and methodological parts of the work, which will result in making recommendations for the scientific and technological development of the country, ensuring sustainable economic growth, are required.

CONCLUSION

On the basis of many national and international research a neural network model of the trajectory of and techno-economic development, which allows to calculate the level and rate of fuel and energy is developed and the method of evaluating the effectiveness of technological innovation projects on a range of qualitative and quantitative parameters based on the construction of the neuro-fuzzy solution tree is proposed. Unlike traditional methods of analysis it has a rather simple but powerful strategy of the accuracy classification improvement (error level: no more than 3-5%) without interpretability damage, while maintaining the structure of the solution tree.

The developed model, in addition to the promising project choosing, explains the decision making process in a understandable way, in the structure of the Neuro-FDT diagnostic decision rules "If ... then." Thus, this technique allows to determine the significance of the indicators (trends) of the formation of new technological cycles and to identify the reference parameters of the social dimension of the economy.

Data received as a result of the intellectual analysis can be used by experts to assess the efficiency of the automated calculation of the effectiveness of technology projects in order to predict the scientific and technological development of the country and make necessary recommendations to the political and socio-economic spheres. The accuracy of the developed methods is far beyond the traditional (statistical) analysis algorithms.

Research results can be used both by private and public companies and organizations. This will help to assess and predict future changes, give proper recommendations to scientific institutions in key areas: such as security and counter-terrorism; living systems; nanosystem and materials Industry, information and telecommunication systems, advanced weapons, military and special

equipment, management natural resources, transport, aviation and space systems, energy and energy efficiency.

Scientists and specialists, related to science, can use research work in determining the basic technologies in the new technological cycle.

First of all that can be applied in the following areas: basic and critical military technologies, special and industrial technologies: bio-information technology, biocatalytic, biosynthetic and biosensor technology, biomedical and veterinary technology of life support and protection of human and animals, genomic and post-genome technologies for creating drugs, cellular technologies; nanotechnologies and nanomaterials, technologies of nuclear power, technologies of nuclear fuel cycle, technologies of safe management of radioactive waste and spent nuclear fuel, bioengineering technologies, hydrogen energy technologies, mechatronics technologies and creation of microsystems engineering, technologies of monitoring and forecasting of the atmosphere and hydrosphere; technology of new and renewable sources energy, protection of people and hazardous objects facing the threat of terrorist activity, technology of processing, storage, transfer and protection of information; technologies of resource assessment and forecasting of the lithosphere and biosphere; technologies of processing and utilization of technogenic mineral formation and waste products; software technologies; technologies of fuels and energy production from organic raw materials; technologies and distributed computing systems; technologies of risk reduction and mitigation of natural and man-made disasters; technologies of biocompatible materials creation; technologies of intelligent navigation and control systems; technologies of development and processing composite, ceramic and crystalline materials; technology development and processing polymers and elastomers; technologies of creation and management of new types of transport systems; technologies of membranes and catalytic systems; technologies of creation of new generations of space-rocket, aviation and marine engineering, technologies of electronic components creation; technologies of energy-efficient systems of

transportation, distribution and consumption of heat and electricity; energy-efficient technologies of creation engines and propulsion systems for vehicles; technologies of creation of resource-saving production and processing of agricultural raw materials and food products; technologies of environmentally friendly mining and mineral extraction.

Perhaps a long list of basic technologies will be completed as a result of continuing research.