

# Use of Mathematical Models in the Research of Futurological Analysis in the Economy of the State

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**Abstract.** Research questions of the contemporary development of the society remain relevant due to the increasing global problems and also the ideological priorities of the influencing images of the future and the necessity of their prediction. In this regard, a special role is played by futurological activity, which as a field of knowledge, is engaged in the study of the future of the world. Currently, numerous research institutes are being actively formed, special research centers are being created to predict the future of mankind, its political, social and economic growth and emerging crises, risks, conflicts, etc. a New stage in the further development of futurological research is the growth of the pace of various changes in society. Thus, studies of the future state of society are becoming an international problem.

## 1. Introduction

Research into the current societal state of the art remains relevant, as global issues are emerging while the world-view priorities redefine the image of the future, which requires prediction. Futurology, a scientific discipline concerned with the world's future, has a special role to play in it. Today, there appear numerous research institutes and centers to predict humanity's future, political, social, and economic growth, as well as the newly arising crises, risks, conflicts, etc. As societal development speeds up, futurology takes a new turn in its development. Thus, futurology studies become an international matter of research. Many of them focus on two scenarios: the worst-case scenario, which links further societal development to a series of crises and catastrophes; and the best-case scenario, which holds that future will see a series of reforms induced by the very course of production economy. Economics is a major component in futurology.

Science-backed economic forecasts have to be appropriately substantiated; the authors hereof deem it necessary to define all the economics- and mathematics-supported aspects of futurology and to discuss their significance for further practical application. Futurology as a science concerned with social processes was first proposed in 1943 by German sociologist O. Fleichthem.

In the United States, special forecast-oriented publications appeared in the 1950s–1960s; President Kennedy had a special Year 2000 commission established to hold conferences and to develop the concepts of future society. Futurology as a special field of science was studied by P. Dixon, S. Lem, R. Jungk, E. Janch et al. New researchers appeared in the later 20th century, whose studies furthered

futurology as a science. Of interest are papers by G.N. Malinetsky, V.P. Bransky, Ye.N. Knyazeva on the synergistic concept of future, as well as the opera magna of transhumanists D.A. Medvedev, A.V. Turchin, M.A. Batin, I.V. Vishev et al. Despite the diversity of futurology, these papers lack systematization of the world-view and methodological foundations that cover the today's research of the future; besides, the mathematically substantiated solutions these papers offer are insufficient.

The goal hereof is to analyze the today's society and its course in general in the context of the world's economic achievements, as well as to substantiate the need for economic modeling based on the scenarios of the society's future and using futurology for analysis.

## **2. Expected outcomes**

The goals stipulated herein can be attained by completing the following objectives: find what makes futurological analysis significant for economic knowledge;

analyze the significance of forecasting and futurology in road-mapping the future of humanity; find what connects futurology to economics; describe the role of state-of-the-art futurology; make a timeline of its further development; validate the approaches to future studies, which are used to classify and categorize the elements of the global economic system; identify the connection between futurology and mathematical methods in economics, and use that connection to analyze the applicability of math to predicting the future; study the parametric and adaptive methods of economic modeling in application to futurology to further make guidelines for applying them to the Republic of Kazakhstan; use various scientific aspects of futurology to predict the outcomes of economic management.

Analyzing futurology as a vast set of heterogeneous scientific and non-scientific approaches to predicting and guiding humanity's future, the first step is to study the concepts of futurology on the basis of evolutionary approach. The next substep is to generalize the individual subsystems of futurology and to classify futurological knowledge. Step two is to identify the difference and interconnections between theoretical and applied futurology as well as to apply its chronology to reveal how it links to economic systems. For that step, it is proposed to study the economics of different economic actors in a sample and to apply mathematical methods so as to run calculations based on pre-developed parametric and adaptive models. This knowledge is to be made use of at the third step, which is to identify how futurological knowledge is related to typical and non-typical applied economic and mathematical methods and models. This step is expected to produce knowledge of the world's current progress in modeling economic systems. In particular, the authors hereof use the economic and mathematical methods and models based on such discoveries and inventions as the Lanchester model (mathematically antagonistic conflict), the Harris model (investment management theory), Erlang's queuing theory, etc.; this step implies developing scientifically backed approaches to economic organization in Kazakhstan in pursuit of the objectives set forth in the President's Message, Strategy Kazakhstan 2050: New Political Course of a Successful State.

## **3. Research novelty**

What makes this research novel is that the economic categorization of futurology is expected to identify how the world views, being the basis for conceptualization built upon economic

and mathematical models and methods of predictive nature, connect to each other. Theoretical studies are linked to practical applications. The economic and mathematical methods and models proposed herein can be adaptive (parametric), appealing to the existing theories of applied mathematics and identifying the economic patterns while also pointing to

the vector of further societal transformations. The methodological basis hereof comprises the theories proposed by researchers in the field, the official programs, and statistics.

Research Methodology and Hypotheses

The methodology and methods this research is to use will be based on well-tested scientific procedures.

This will enable a clearer identification of the universal economic patterns of the world's future by using mathematical descriptions (which are somewhat obscured in other fields), the abstraction of which helps abstract from most of the random properties. There might always occur a global crisis that will force humanity to continuously rethink its current economic state of the art and to plan what to do further down the road; the very possibility of such a crisis makes it imperative to study future. When subjecting this or that hypothesis to theoretical validation, it should be noted that for the CIS, the main factor of economic risk is the so-called SIN: skilllessness, indignity, and negligence.

One way not to err in studies is to get a system in place to collect and process useful data. This research will use the 'due attention' system Western banks employ in their CRM.

#### **4. Conclusion**

When there are no technical, financial, or other limits that would hinder solving a problem, however complex or diverse, the objectively existing alternatives are based on scientific generalization and application in economy. The model can describe the existing typical situations that could be formalized by mathematical approaches and science-backed decision-making. The research method is strategic analysis designed to transform the database generated by diagnostic studies. The toolkit for strategic analysis is mainly based on formal models and quantitative methods; it does consider the specific circumstances that affect decision-making and outcomes, and uses the scenarios for the future as the basis for such consideration.

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