ANNOTATION
of Zhanar Bimurat's
PhD thesis on the specialty 6D070300 – «Information systems»
on the topic «Development of models and methods of investment efficiency analysis in uncertain conditions»

Relevance of the work. Since 2015, the economic policy has generally been aimed at strengthening the stability of the socio-economic situation in Kazakhstan and improving the financial sector through economic diversification. One of the ways of its implementation was the approval of the «Nurly Zhol» («Нұрлы Жол») state program aimed at creating the single economic market in Kazakhstan by forming macroregions. JSC «Development Bank of Kazakhstan» (hereinafter – DBK) also works in this direction. The main objective of DBK, which was established in 2000, is to finance projects with high expected returns in terms of profitability and social significance. Due to the high degree of uncertainty in the market system all economic projects contain an element of risk. Thus, the expected profit should be calculated considering various random events and negative factors. Allocation of funds under these conditions requires a systematic approach to project selection and the assessment of expected returns and risks. The expansion of the investment activities of banks in Kazakhstan, including DBK, is constrained by several reasons: the inadequacy of banking strategies; historically little practical experience in the investment activities of Kazakhstan banks.

Many foreign authors' studies focus on the theory and practice of real and financial investment. They address the various theoretical aspects of risk-based investment portfolio selection, the challenges of financial and economic assessment of investment processes and the development of an integrated banking system to provide information for investment decisions. The study of these researches showed mainly a basic interest of the investors to achieve their strategic objectives, which does not fully address the investment policy dilemma in terms of financial investment dynamics. This is the main problem that arises from determining the investment policy of the investor – ensuring the liquidity, reliability and profitability of investments, which requires the investment process dynamics to be taken into account in investment modelling.

Nowadays, investor investment management issues require further development to model possible outcomes of decision-making in an environment of unstable economic parameters and processes, as well as high risk, the characteristic of modern economy.

The relevance of the topic under consideration is based on the need to establish effective investment management mechanisms to create conditions for the uniform economic growth of Kazakhstan regions.

Aim of work. The aim of the research is to develop models and methods of an information system for analysing the efficiency of investments in the conditions of uncertainty of multiple economic parameters using computer modelling.

Objectives of the study. In accordance with the aim, the following objectives are identified to be solved in this work:

- to study and analyze the current investment programme selection process;
- to develop a functional scheme and structure of the Scenario Analysis System;
- to develop methods and algorithms for computer modeling of unstable parameters with non-standard distribution laws and with consideration to the multidimensional factor, unstable situations associated with risks, force majeure and other factors;
- to analyze and justify the choice of optimization models for allocation of funds at different priorities and risks;
- to develop methods of the fund distribution optimization by reference to instability and «perturbation» of parameters of problem models;
- to develop methods and algorithms for computer analysis of funds allocation according to various priorities, instability influence of economic processes and risk factors on efficiency of investment programs.

Object of research. The research focuses on information systems for investment management.

Research methods. The objectives assigned were solved by carrying out theoretical and practical research. As part of the research we used conceptual positions of investment management, classical portfolio theories, studies of leading foreign and domestic scientists in the field of management of portfolios of financial investments and actuarial mathematics, probability theory, random processes, mathematical statistics, numerical analysis, simulation modeling.

Scientific novelty of the work. The scientific novelty of the study is the development of a Scenario Analysis System for computer modeling of economic processes in uncertain environment.

The following scientific statements are to be defended:

- methods and algorithms for modeling investment performance indicators;
- methods and algorithms for computer modeling of unstable situations and risks;
- methods of expert assessments of non-formalized risks;
- methods and algorithm of a choice of the investment project in conditions of uncertainty;
- methods for solving problems of optimum allocation of investments with «perturbed» parameters.

Practical significance of the research results. The practical significance of the study is determined by the possibility of applying its results and recommendations in the development of a simulation and analytical system for analyzing the effectiveness of investments in conditions of uncertainty.

Approbation of the work. The main results of the study were reported and discussed at international conferences: «Mathematical Methods and Information Technologies of Macroeconomic Analysis and Economic Policy» (Kazakhstan, Almaty, 2017); «The 7th International Conference on Modelling, Simulation and Identification» (Canada, Calgary, 2017). The reviews and recommendations were received from «Al Falah Investment Management» LLP and «DBK-Leasing» JSC.

Publications. In the framework of this thesis, 8 research papers were prepared and published on this topic, including:

– three articles are published in publishing houses that meet the requirements of the higher Attestation Commission of the Ministry of Education of Science of the Republic of Kazakhstan;

– three articles are published in the proceedings of international conferences;

– one article in a foreign publication and one in international peer-reviewed scientific journal.

Structure and scope of the dissertation. Thesis consists of introduction, four chapters, conclusion, references list and 2 annexes. It is presented on 73 pages of typewritten text, contains 5 figures, 48 formulas, a list of references that includes 122 titles, 2 annexes on 6 pages.

The first chapter provides an overview of existing research.

The second chapter proposes the functional scheme and structure of the Scenario Analysis System to analyze the efficiency of investment activity.

The third chapter proposes methods and algorithms based on simulation modeling to determine the values of social return on investment, net present value, methods and algorithms of expert evaluation of normalized and unformalized risks, algorithms of sudden stop of income flow with discrete and continuous time period.

In the fourth chapter the model and algorithms of the solution of the problem of placement of the investment portfolio are offered (problem-solving model and algorithms of investment portfolio placement are offered).

In conclusion, the main outcomes of the dissertation were defined based on results of presented study.