PROSPECTS OF DEVELOPMENT OF THE SOFTWARE SUPPORT FOR THE COMPUTER SIMULATION OF THE FORECAST OF ECONOMIC EVENT USING PIECE WISE-LINEAR ECONOMIC-MATHEMATICAL MODELS IN VIEW OF FACTORS OF UNCERTAINTY IN *M*-DIMENSIONAL VECTOR SPACE

Azad Aliyev

Azerbaijan State Oil Academy, Baku, Azerbaijan
azad_dosent@yahoo.com

The development of a modern society is characterized by increase of a technological level, complication of organizational structure of manufacture, intensification of a public division of labour, presentation of the high requirements to methods of planning and economic management. Modern dynamically varied market situation as intricate system functioning in conditions of uncertainty generates a number of tasks demanding the adequate analysis, estimation and choice of the valid decisions.

Recently one of the basic directions of perfection of management of the economy, economic mechanism is the application of mathematical methods. In the present time the advanced achievements of mathematics and modern computer engineering find more and more wide application in economic researches and planning. This is promoted by development of such sections of mathematics, as mathematical programming, theory of games, theory of mass service, and as rapid development of high-performance computer technologies.

The problems of increasing of profit of the enterprise, overall performance of the personnel, creation of optimum structure of management excite any chief. He has to take the decisions in conditions of uncertainty and risk, that compels him constantly control various aspects of financial- economic activity. The introduction of the automated systems of processing of the economic information allows essentially reducing expenses connected to data processing, to increase labour productivity of the economic workers, to improve communication between different divisions of the enterprise.

With all this going on for achievement of the greatest effect at modeling and computer programming of objects of market economy the application of intellectual technologies allowing to implement the economic analysis, forecasting and planning in conditions of uncertainty is expedient, that allows alongside with quantitative economic parameters to take into account also poorly formalize qualitative factors and interrelations. Character of spatial heterogeneity and the multidimensionality of occurring economic process, convertibility and speed of change in time of multiple-factor economic parameters repeatedly complicate the decision of the given problem [1,2,3,4,5,6,7].

In works [5,6,7,8,9,10,11,12,13,14] the theory of construction of piece wise-linear economic-mathematical models in conditions of uncertainty in finite-dimensional vector space is developed. In it is formulated the postulate "spatial - temporary definiteness of economic process in conditions of uncertainty in finite-dimensional vector space"; is developed the theory of construction of piece wise-linear economic-mathematical models in view of influence of the unrecorded factors in finite-dimensional vector space, the first time is offered a method of the multi version forecasting of economic process and managements by it in conditions of uncertainty in *m*-dimensional vector space.

Here to fundamental results it is necessary to attribute construction of dependence of the any *n*-piece wise-linear vector equation $\vec{z}_n$ from 1-st piece wise-linear function $\vec{z}_1$ and all of a spatial kind of functions of influence of the unrecorded parameters $\omega_n(\lambda_n^{k_n}, \alpha_{n-1,n})$ influencing on all the previous interval of economic event of the following kind:

$$\vec{z}_n = \vec{z}_1 \left\{ 1 + A \left[1 + \omega_n(\lambda_n, \alpha_{n-1,n}) + \sum_{i=2}^{n-1 \geq 2} \omega_i(\lambda_i^{k_i}, \alpha_{i-1,i}) \right] \right\}$$

And also, construction of forecast vector - function of economic process $\vec{Z}_{N+1}(\beta)$ in view of influence of forecast function of the unrecorded parameters $\Omega_{N+1}(\lambda_{N+1}, \alpha_{N,N+1})$ in finite-dimensional vector space, kind:

$$\vec{Z}_{N+1}(\beta) = \vec{z}_1 \left\{ 1 + A \left[1 + \sum_{i=2}^{N} \omega_i(\lambda_i^{k_i}, \alpha_{i-1,i}) + \Omega_{N+1}(\lambda_{N+1}, \alpha_{N,N+1}) \right] \right\}$$

At that influencing by functions of influence of the unrecorded parameters of a kind $\Omega_{N+1}(\mu_{N+1}; \lambda_{N+1}, \alpha_{N,N+1})$ from the end of the vector equation of a piece wise-linear straight line $\vec{z}_N^{k_N}(\mu_N^{k_N}; \lambda_N^{k_N}, \alpha_{N-1,N})$ will proceed the forecast vectors - functions $\vec{Z}_{N+1}(\beta) = \vec{Z}_{N+1}(\mu_{N+1}; \lambda_{N+1}, \alpha_{N,N+1})$, which will represent generatrixes of a hyper finite surface of finite-dimensional vector space, and the points of its directing will form a line of forecasting of economic process in finite-dimensional vector space.

Further in works [5,6,7,13], the above-stated theory was applied to a case of two-dimensional economic process, and with a statement in coordinate variant. Thus, on a plane is offered: piece wise-linear economic-mathematical model in conditions of uncertainty; is given the geometrical interpretation of entered unrecorded parameter λ_m and function of influence of the unrecorded factors $\omega_n(t, \lambda_n)$; a technique of numerical construction on a plane of piece wise-linear economic-mathematical model, and also, numerical technique of forecasting of economic event and managements by it in view of influence of the unrecorded factors.

With the purpose to facilitate applicability of the given technique to the widest class of economic processes and to make accessible to a wide circle of the experts, by us in works [16,17] is developed the special software support for the computer simulation of numerical construction and definition of prediction values of economic event using piece wise-linear economic-mathematical models in view of influence of the unrecorded factors on a plane. Is shown the algorithm of actions under the given program. The given program was successfully approved on numerous examples, where was ensued the complete conformity to graphic representations before developed piece wise-linear economic-mathematical models in view of influence of unrecorded factors (convexity to top and to a bottom), and also (in a question of an establishment of sphere of change of forecast function by convexity to top and to a bottom), that testifies to its reliability. The given program was approved also for piece wise-linear models of a sinusoidal type [5,6,7].

The results which were stated in works [5-17], give necessary theoretical, calculated instruments for creation of the fundamentally - new, perspective software support for the computer simulation, at construction and multialternative forecasting of an economic condition using piece wise-linear economic-mathematical models in view of influence of the factor of uncertainty in *m* -dimensional vector space.

As a consequence of above stated in works [15,18,19,20] it was possible to develop the special software support for the computer simulation and numerical construction of economic event using *2*-tier and *n*-tier piece wise-linear economic-mathematical models in view of influence of the unrecorded factors in *3*-dimensional, *4*-dimensional and *m*-dimensional vector spaces.

All above-listed programs have passed approbation in the top-level international scientific specialized magazines where was proved its functionality and complete conformity to

calculations, pre-conducted in works [5,6,7,12], by development of the theory of construction of piece wise-linear economic-mathematical models in conditions of uncertainty in finite-dimensional vector space.

Taking into account all preceding, on our sight the maximum scientific and practical novelty could be presented the creation of generalizing algorithm for computer simulation for a case of *n*-tier piece wise-linear economic-mathematical model in conditions of uncertainty in *m*-dimensional vector space.

References

1. **Albegov M.M.** *Short-term forecasting in conditions of the incomplete information* // Regional development and economic cooperation. - 1997. – №1.
2. **Bogdanova T.K., Goldenberg A.I., Kuznechova K.S., Epshtein A.S.** *Method of the account of influence of the heterogeneous factors in economic measurements.* // Economy and Math. Methods. - 1997. - T.33, № 1.
3. **Khalmosh P.R.** *Finite-dimensional vector space*, Moscow, Publisher Fizmatgiz, 1963
4. **Bugrov Y.S. Nikolskiy S.M.** *Elements of linear algebra and analytical geometry* Moscow, Publisher Nauka 1980.
5. **Aliyev A.G.** *Economic-mathematical methods and models in conditions of uncertainty in finite-dimensional vector space.* - Baku: National Academy of sciences of Azerbaijan, Publisher "Information technologies", 2009. –220 pages
6. **Aliyev A.G.** *Economic-mathematical methods and models in view of incomplete information.* - Baku: National Academy of sciences of Azerbaijan, Publisher Elm, 2002. -288 pages.
7. **Prof. Dr. Ferkhad Ejer, Associate professor Dr. Azad Aliyev.,** *Economic-mathematical methods and models in view of the incomplete information.* Nigda State University, Faculty of economy and management, Turkey, Nigda city-2004, Pages 233
8. **Aliyev A.G.** *About one criteria of definiteness of economic process in finite-dimensional vector space* // Moscow, Economy, Statistics and Computer science the Bulletin UMO. 2008. № 2. Pages 33-37.
9. **Aliyev A.G.** *Piece wise-linear economic-mathematical models in view of uncertainty in finite-dimensional vector space* // the Bulletin of the Khabarovsk State Academy of Economy and Law, Khabarovsk - 2008. № 5(38). Pages 34-41.
10. **Aliyev A.G.** *About one principle of forecasting and management of economic processes in view of the factor of uncertainty in finite-dimensional vector space* // Moscow, Economy, Statistics and Computer science the Bulletin UMO.-2008.- № -4. Pages 27-32.
11. **Aliyev A.G.** *Prospects of development of methods of modeling and forecasting of economic events* // News of a National Academy of sciences of Azerbaijan, Series of Humanitarian and public sciences (economy). -2006. - (№ 2). -Pages 253-260.
12. **Aliyev A.G.** *Two-tier piece wise-linear economic-mathematical model and technique of forecasting of economic process in conditions of uncertainty in three-dimensional vector space* // Problems of Economy. Moscow, Publisher "Sputnik" -2009. - № 2. Pages.111-124.
13. **Aliyev A.G.** *Bases of piece wise-linear economic-mathematical models in view of influence of the unrecorded factors on a plane and multialternative forecasting by its of economic event* // Questions of economic sciences, Moscow, Publisher "Sputnik" -2009, № 3. - Pages.187-201.
14. **Aliyev A.G.** *Search of the decisions in blurred conditions* // News of high technicaleducational institutions of Azerbaijan (Azerbaijan State Oil Academy). - 2006. № 5 (45), Pages 66-71.
15. **Aliyev A.G.** *Prospects of development of the software support for the computer simulation of economic event using piece wise-linear economic-mathematical models in view of the factor of uncertainty in 3-dimensional vector space* // Materials of 3-rd International scientific - practical conference " Youth and science: reality and future ", Volume 8-Natural and applied sciences /. Nevinnomyssk city., 2010. Pages 394-404.

16. **Aliyev A.G.** *Development of the software support for the computer simulation of the forecast of economic event using piece wise-linear economic-mathematical models in view of influence of the unrecorded factors on a plane* // Moscow, Economy, Statistics and Computer science the Bulletin UMO. 2009. № 4. Pages 139-144.

17. **Aliyev A.G.** *Development of the software support for the numerical construction of piece wise-linear economic-mathematical models in view of the unrecorded factors on a plane* // Questions of economic sciences, Moscow, Publisher "Sputnik" 2009. № 5, Pages.106-112.

18. **Aliyev A.G.** *Some aspects of computer programming of economic events in conditions of uncertainty in 3-dimensional vector space* // the collection of works of XVIII the international conference. Mathematics. Economy. Education. VI the International symposium the lines of Furye and its appendix: Collection of scientific articles. Rostov-na-Donu city, 2010.

19. **Aliyev A.G.** *Development of the software support for the computer simulation of 2-tier piece wise-linear economic-mathematical models in view of influence of the factors of uncertainty in four-dimensional vector space*, // the Bulletin of the Khabarovsk State Academy of Economy and Law, Khabarovsk – 2010 - №2.

20. **Aliyev A.G.** *Development of the software support for the computer simulation of 2-tier piece wise-linear economic-mathematical models in view of influence of the factors of uncertainty in m-dimensional vector space* // Natural and engineering sciences, Moscow, Publisher "Sputnik" - 2010. - № 2.