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Review on abstract of the thesis written by Ershov Dmitry Mikhailovich on the theme: „Models, algorithms and software of decision support system for strategic management in organization"

which is presented for obtaining a degree of Physico-mathematical sciences candidate, specialties
05.13.18 – Mathematical modeling, numerical methods and program complexes,
05.13.01 – System analysis, control and information processing (aviation and the space-rocket hardware)

In the thesis written by D.M. Ershov the models of organizational strategy are researched; numerical methods necessary for solving the problems of strategic management are developed; software which implements the proposed models and algorithms is described.

RELEVANCE OF THE THESIS

The research subject is relevant, because the existing formalized methods and models of strategic management in organizations have limitations which impede their wide practical usage. Development of mathematical apparatus of strategic management theory is required for improving the decision support systems (DSS) which are actively adopted by various organizations. Demand on DSS systems increases with increasing of computing capacities, standardization of management process, improving of communication channels.

CONTRIBUTION TO SCIENTIFIC KNOWLEDGE

The main results, which make contribution in scientific knowledge, are as follows:

- The mathematical model of complex strategy (MCS) of an organization has been built; the model of strategic performance (MSP) of organization has been formalized;
- The method for selection of the organization complex strategy considering consistency of strategic decisions has been developed; an opportunity to obtain the optimal strategy on the basis of incomplete information about the set of undesirable combinations of decisions has been proved;

- To solve the problem of building the Pareto-efficient complex strategies a branch-and-bound procedure, which is much more efficient vs. exhaustive search, has been proposed;
- Two modifications (stochastic and interval) of the model of strategic performance have been built; for the obtained models the problems of optimal resource allocation have been formulated;
- The problem of optimal resource allocation within the stochastic MSP has been reduced to the linear programing problem which contains binary as well as continuous variables (0-1 mixed integer LPP)
- To solve 0-1 mixed integer LPP the numeric method based on classical procedure of Particle Swarm Optimization has been developed; this method is more efficient vs. αPSO and Binary αPSO.
- The obtained models and algorithms were implemented with object-oriented programing techniques within special program complex;

The following additional results have been obtained in the work: 1) sufficient condition for the independence of the optimal resource allocation on the external objectives' accomplishment levels, 2) distance indices, 3) method for calculating an indicator which characterizes the reduction of strategic performance uncertainty after evaluation of various groups of the interval MSP parameters.

The main results of the work have been published in scientific literature. Two papers have been published in editions indexed by International bibliographic databases Web of Science Core Collection, MathSciNet, Mathematics Abstracts et al.

CONCLUSION

The abstract is a work of a high academic level and connects Physico-mathematical and mangement scientific fields. On the base of the results presented in it I can conclude that Dmitry Mikhailovich Ershov deserves obtaining a degree of Physico-mathematical sciences candidate in declared specialties.

Assistant profesor Marko Hell, PhD

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07.10.2014

Dean Prof. Željko Garača, PhD

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