

## ABSTRACT

The thesis is presented in 72 pages. It contains 2 appendixes and bibliography of 29 references. Twelve figures and 10 tables are given in the thesis.

**Topic relevance.** Nowadays, making reasonable decisions it's necessary to apply expert evaluation. Therefore, it's important the information provided by experts to be the most accurate. Obviously even the most qualified expert can make some mistakes and give imperfect expertise of specific object. There are cases in which experts may be inconsistent in their conclusions. So it's necessary to track inaccuracies and try to get rid of them. At present a large number of methods of processing expert assessments have been developed. But such methods for processing expert assessments contain some significant disadvantages. Most methods proved to be ineffective or too time-consuming in the calculations when the consistency of judgments was low, or when there were contradictions in the judgments. The creation of new, more accurate methods that would be less susceptible to such deficiencies is an important task.

**Thesis connection to scientific programs, plans, and topics.** The thesis was prepared according to the scientific research plan of the Applied Mathematics Department of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute."

**Research goal and objectives.** The goal of this thesis is to improve the reliability of individual expert assessments.

To accomplish this goal, the following objectives were reached:

- examine existing practical and theoretical solutions and conduct comparative analysis;
- justify the methods and means of solving problem;
- examine in detail the combinatorial method of paired comparisons, its advantages and disadvantages;
- modify combinatorial method of paired comparisons to eliminate its main drawbacks;
- compare modified and existent combinatorial methods;

- implement modified combinatorial method of paired comparisons as part of the existing DSS.

*Object of research* is types of expert assessments; scale for expert assessments; method of paired comparisons; consistency indexes of paired comparisons; mathematical methods of processing expert assessments; decision support processes; decision support system (DSS); mathematical and program implementation of DSS.

*Subject of research* is combinatorial method of paired comparisons with feedback and its modification.

**Methods of research.** To solve the task, the following methods were used: genetic algorithm; methods of the theory of algorithms and programming (for implementing the developed algorithms).

**Scientific contribution** consists of the following:

- modified combinatorial method of paired comparisons, which differs from the existing method by the way of forming a set of consistent matrices of paired comparisons (MPP), allowing to use it for processing MPP of higher dimensions;
- for the first time, the genetic algorithm was used to improve the consistency of expert assessments by coordinated search of consistent MPP that would minimally differ from the original one.

**Practical value of obtained results.** The proposed method can be used to improve the coherence of individual expert assessments as a part of general purpose DSS decision-making in poorly structured subject areas.

**Approbation of the thesis results.** Basic ideas and results of the research were presented at the IX Scientific conference of undergraduates and graduate students "Applied mathematics and computing" (2017) and at the 17th International Scientific Technical conference SAIT 2015.

**Publications.** Thesis results are published in 2 scientific works: in 2 papers in proceedings of scientific conferences.

**Keywords:** expert evaluation; method of paired comparisons; estimates consistency; genetic algorithm; decision support.