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Optimal Clustering of Audited Executive Organizations employing Multi-Objective Genetic Algorithm (MOGA)

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The objective of the annual allocation of the organizations to the auditing teams in the Supreme Audit Court of Iran (SAC) is the optimal use of the auditors' human resource and the prevention of possible corruption, which is considered one of the most critical and complicated decision points. Determining the composition of auditing groups in the current situation is performed manually and arbitrarily by provincial officials. In some cases, auditor's ability to handle the accounts of that organization is not taken into account. Hence, the existence of an assessment at the beginning of the division of groups is essential. In this article, a new approach using a multi-objective genetic algorithm to select the optimal clustering of executive organizations is offered.

Inspired by genetics and Charles Darwin's theory of evolution, the genetic algorithm (GA) is based on the survival of the fittest. In this study, the Non-dominated Sorting GA-II (NSGA II) was selected as a known method in solving multi-objective optimization problems. By applying some modifications to the operators, the achieved results in relation to the criterion problem were examined. In this article, SAC of Zanjan province was evaluated as the case study.

This study aims to design a model through which a desirable level of efficiency in the audit can be attained. To this end, the effective variables on both sides of the equation are used. In this paper, the audit variables are divided into the following 12 components: 1- Independence, 2- Implementation of audit operations, 3- Auditor's ability, 4- Auditor's experience, 5- Accountability,

6- Business process knowledge, 7- Information technology (IT) and knowledge of controls 8- Business environment, 9- Planning and methodology, 10- Communication with organizations, 11- Accounting knowledge, 12- Access to resources.

In this article, a novel algorithm was presented using a multi-objective genetic algorithm (MOGA) for clustering executive organizations. To prove the algorithm in practice, this software was implemented in the MATLAB software environment. The relevant data to 30 executive organizations and 12 components related to 25 auditors in the intervals of 2014 to 2019 were given to the software as inputs.

Moreover, on the basis of the results, this algorithm takes into account all the factors required for the selection of the best auditors, as well as the factors necessary to choose large-volume organizations in terms of auditing. Accordingly, the optimal fit of the executive organizations clustering for the audit groups was achieved. The results of this study demonstrate that the new algorithm has better performance in comparison with the traditional groupings carried out in previous years.

Given the assistance of the simulation, this paper demonstrates that the new technique can be successful with regard to the basic metrics in the choice of executive bodies and their allocation to audit groups. Besides, it can contribute to the provincial authorities each year in selecting the optimal combination of executive bodies.