

## 1. Overview of Evolutionary Modeling Algorithms for Contract Scheduling

Illia Kozhushko, Serhii Hrybkov

*National University of Food Technologies, Kyiv, Ukraine*

**Introduction.** The analysis was carried out to determine the advantages and disadvantages between the algorithms and to define the best solution that can be used to support the planning of contract execution.

**Materials and methods.** Evolutionary modeling algorithms (EMA), genetic algorithm (GA), bee colony algorithm (BCA) and ant colony algorithm (ACA) became the material for research. Empirical research method was used to determine advantages and disadvantages between algorithms.

**Results.** In the context of contract performance planning, GA can be used to generate optimal project schedules. Each schedule can be represented as a chromosome, where genes represent a sequence of tasks and their execution. Information about each task may include completion time and cost.

GA may require a large number of iterations to find the optimal solution, especially for complex problems. The selection of parameters for GA is a complex task and can affect the speed and accuracy of finding a solution.

BCA is based on the behavior of real bees searching for food. Bee colonies have different types of bees, each of which has its own function in the colony. BCA uses this approach, where the population of agents (bees) is divided into groups with different functional responsibilities.

For example, in a colony there are explorers who search randomly and gatherers who find the most optimal path. It allows maintaining diversity in the population of agents, which increases the probability of finding the optimal solution.

It requires setting many parameters, such as the number of bees and their role in the colony. It may be sensitive to random factors, such as changing conditions at a particular point in time.

On the other hand, ACA is based on the behavior of ants that search for food in nature. In an ant colony, pheromones are used, which serve as a means of communication between ants and indicate the way to food. ACA uses this approach where a population of agents (ants) leave a pheromone trail that helps them determine the best route to food.

Each ant makes a random choice of path and when it reaches the end, it leaves a trail of pheromones. This can work in conditions where information about the task is incomplete or inaccurate. But it may be slow to solve complex problems that have many possible solutions.

**Conclusions.** The results of the study showed that EMA can be quite effective for solving the problems of planning the execution of contracts. There is no single best EMA for contract execution planning.

Each algorithm has its advantages and disadvantages and can be used depending on the specific needs and requirements of the task. However, ACA may be more efficient for problems with a large number of constraints.

### References

1. Hrybkov S., Kharkianen O., Ovcharuk V., Ovcharuk I. (2020) Development of Information Technology for Planning Order Fulfillment at a Food Enterprise, *Eastern-European Journal of Enterprise Technologies*, Vol. 1(3 (103), pp. 62–73.