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**ALGORITHMIZATION OF THE SOLUTION OF THE CREATIVE
PROBLEM OF SYNTHESIS OF COMPOSITE BUILDING MATERIALS
USING HEURISTIC METHODS**

Abstract: the complex problem associated with the selection of the composition and chemical synthesis of new composite building materials can be solved using heuristic strategies, the article highlights the algorithms of an effective approach to solving the problem.

Keywords: heuristics, chemical synthesis, method, construction, composite material, criterion, stage, prototype, alternative, analogue, solution.

Introduction

Solving the problems of composition selection and chemical synthesis of new composite building materials using heuristic methods – decision-making consists of successive stages [2]. The process of solving such problems using heuristic methods actually consists of 5 consecutive steps [4]:

1. Setting the question of chemical synthesis, defining goals and objectives [1].
2. The selection of the prototype substance and method that can be used based on the analysis of the shortcomings and defects of the prototype and the existing contradictions in its development [3].
3. Change the prototype using the selected methods and create several new technical solutions as alternatives.

4. Analysis of new technological solutions from the point of view of expediency and efficiency of use.

5. Choosing the most optimal of the alternative options as a solution to the problem of chemical synthesis, if any option does not meet the requirements, using other prototypes, repeat the laboratory synthesis processes provided in steps 2-4 until the optimal solution is created.

Materials and methods:

This includes empirical methods such as modeling, fact-finding, experiment, description and observation, as well as theoretical methods such as logical and historical methods, abstraction, deduction, induction, synthesis and analysis, as well as methods of heuristic strategies. The research materials are: scientific facts, the results of previous observations, surveys, experiments and tests; means of idealization and rationalization of the scientific approach.

Results and discussion:

The solution to the problem, that is, the chemical technological process, can be represented as consisting of the five steps described above, but in fact the number of steps is determined by the complexity of the task [5]. Below we will explain the 8 stages of making a decision on a creative problem using an example.

At the first stage, a question is posed on a creative task. At this stage, data is collected, processed and analyzed. The main task of this stage (solved by analysts) is to timely notice signs of difficulties arising in the research process, and fix the causes, bring them to the attention of decision makers.

The second step is to diagnose the problem. The first step to solving the problem is to identify it. There are two views on the problematic situation. According to the first, the situation of unattainability of the set goals is a problem. According to the latter, untapped potential can also be considered a problem.

The third stage is the formation of constraints and criteria for decision-making. Solutions to many problems, which are the product of creative thinking, are not realized due to the lack of raw materials, technologies and machines or other resources with special properties necessary for the implementation of the decisions made at that time. In such situations, coordinating actions of constraints are necessary, which narrow down the options for making design decisions. In addition to identifying limitations, the project manager should also set standards for evaluating a options. Such standards are called criteria, and they also serve as recommendations for evaluating architectural solutions.

When designing a new substance or composite material, the following requirements and limitations serve as criteria: architectural and construction attractiveness of the substance, non-repeatability; requirements determined by the functional process taking place in the room: lighting, temperature and humidity conditions, etc.; energy saving requirements for the technical use of the building, the effective use of renewable energy sources; requirements for strength, spatial uniformity and seismic resistance of the design scheme chosen during the implementation of the project; availability of materials and raw materials; availability of technological possibilities for implementation, production performance of machines and mechanisms can meet the requirements of the project; requirements for labor protection and prevention of negative environmental impact; technical and economic requirements and restrictions [7].

If the project is devoted to restoration and reconstruction issues, additional requirements and restrictions to the above should be taken into account: preservation of the historical flavor of the building; as a result of reconstruction, do not adversely affect the strength, spatial and earthquake-resistant aspects of the building [6].

The fourth stage is the formation of a variety of alternative solutions to the problem. Usually, the chief architect carefully draws acceptable alternatives and limits the options.

The fifth stage is the evaluation of alternatives. When evaluating solutions, the manager compares the advantages and disadvantages of the options, as well as determines the possible consequences in general. To do this, the project manager needs specific information about the results of the initial evaluation of the options [8].

The sixth step is choosing an alternative. If the problem is identified correctly, the alternatives to the solution are thought out and evaluated, it is relatively easy to make a choice, that is, to make a decision. It remains for the moderator to choose an alternative option with the most positive consequences.

The seventh stage is implementation. Solving the problem does not end with choosing an alternative, but limiting the choice of a course of action does not matter much to the customer organization. To solve the problem or use the solution, first get the desired substance [8].

Conclusion:

The eighth stage is feedback. Before and after making a decision on the project, conducting an examination and obtaining detailed information about what happened during the synthesis of composite material allows the project manager to make timely adjustments and prevent negative phenomena and consequences.

A team of scientific analysts and technologists can choose one of the heuristic strategies: brainstorming, a collective method of searching for original ideas, a multidimensional matrix method, a collective notebook, the Delphi method and other methods [9].

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