# ABSTRACT

Master dissertation: 108 p., 27 fig., 14 tab, 67и sources.

**The relevance**.According to the 30th Annual State of Logistics Report by the Council of Supply Chain Management Professionals (CSCMP) there was spent over 1.64 trillion on logistics and transportation operations in USA [1]. The final costs of the product that reaches the consumer can consist up to 70% of transportation costs.

Therefore, one of the most important tasks for the transportation logistics industry is to save resources and minimize the environmental footprint during transportation of goods. To solve this problem, it is necessary to develop algorithms and software products that will decrease the routes of vehicles. In recent years significantly increased the proportion of personal delivery that employment associated with a client topical issue taking into account time preferences consignees.

The mathematical formulation of this problem is known as the vehicle routing problem (VRP) with time windows (VRPTW), which imposes certain time constraints on the service of customers. The work is devoted to research and improvement of the VRPTW problem. The work is devoted to the study and improvement of solving VRPTW problem.

**Relationship of work with scientific programs, plans, themes**. The work was done at the department of computer-aided management and data processing systems of the National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute» within the theme «Effective methods for solving problems of scheduling theory» (№ DR 0117U000919).

**Purpose and objectives of the study.** The goal of the research is to is to minimize the total cost of transportation of products to customers in a certain time period. To achieve this goal it is necessary to solve the following **tasks**:

* to analyze known results of solving the Vehicle Routing Problem;
* to improve the existing algorithms for solving the problem of vehicle routing considering time windows by modifying and combining metaheuristics;
* to develop a software implementation of the developed algorithms;
* to conduct research on the effectiveness of the developed algorithms.

**The object of study** – the process organisation of transportation.

**Purpose of the study** – Vehicle Routing Rroblem with Time Windows.

**Methods** used in the paper are based on the methods of operations research, such as metaheuristics algorithms.

**Scientific novelty.** New modified and hybrid algorithms developed for solving VRPTW.

**Publications.** The results of the research were published in the materials of VI Ukrainian scientific and practical conference of young scientists and students "Information Systems and Management Technologies" (ISTU-2021).

VECHICLE ROUTING, VRP PROBLEM, VRPTW PROBLEM, THE TIME WINDOW, METAHEURISTICS ALGORITHM, HYBRID ALGORITHM, ACO TABU SEARCH.