ABSTRACT

Master dissertation: 112 pp., 12 fig., 20 tab., 1 app., 36 sources.

The relevance. Researchs in the UK have shown that up to 70% of the cost of a product that reaches the end consumer are the costs associated with logistics operations in one way or another. In view of this, road maintenance becomes a necessary process aimed to maintain the proper technical condition of roads and enabling the rapid and safe movement of vehicles to avoid emergencies, etc. Therefore, road maintenance requires quality route planning for specialized road technics.

The mathematical model of this problem is known as the Arc Routing Problem, which is a subset of Vehicle Routing Problems. There are many mathematical models developed for the above problem, but taking into account additional conditions often leads to the creation of a new model and, accordingly, finding a new one or modifying an existing method of solving. The work is devoted to researching and developing the algorithm for solving the ARP 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 objects of the research. The goal of the research is to improve the quality of road maintenance processes in the city districts by minimizing the transit time of all routes and taking into account restrictions on car capacity and deadline classes of the work.

The following tasks need be solved to achieve these tasks:

– to investigate the subject environment and peculiarities of its functioning;
– to analyze the known results of solving the arc routing problem;
– create the formulation of the Min-Max Capacitated *k*-Chinese Postman Problem with Deadline Classes;

– to develop the modified algorithm of the formulated problem and to investigate its effectiveness;
– to develop the information system for city road maintenance planning.

The object of the research – logistic processes of road maintenance.

The subject of the research – vehicle routing problem, which is oriented on the passing of routes by vehicles and takes into account the deadline classes of the work and the capacity of cars.

Methods of the research, used in the paper, are based on operations research methods, heuristic and metaheuristic algorithms.

Scientific novelty of the results is the modification of the algorithm for solving the arc routing problem and the use of this algorithm within the information system.

Publications. The results of the research were published in the scientific journal «Paradigm of Knowledge», at the materials of the XIII International scientific and practical conference «Mathematical Modeling and Simulation of Systems. MODS 2018» and III Ukrainian scientific and practical conference of young scientists and students "Information Systems and Management Technologies" (ISTU-2019).

VEHICLE ROUTING PROBLEM, ARC ROUTING PROBLEM, VRP, ARP, PLANNING, INFORMATION SYSTEM, ROAD MAINTENANCE, OPTIMIZATION, CHINESE POSTMAN PROBLEM, CCPP, MIN-MAX, DEADLINE CLASSES