

**DETERMINATION OF CONDITIONS TO PROVIDE TRANSPORT LOGISTICS
SUPPORT SERVICE TO AIRCRAFT AT AERODROMES IN UKRAINE**

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At present fairly outdated vehicles to provide maintenance and out-of-date transportation and technological schemes to deliver the means of aircraft servicing are used at aerodromes at the places of permanent and temporary deployment of the Air Force units of the Armed Forces of Ukraine. It brings about the decrease of combat power and the increase of both material costs and time to provide logistics support service to aircraft.

A need for a high quality evaluation of a particular service at the different types of aerodromes demands new approaches and tools to get the results with minimal resources and money. The creation of optimal conditions to deliver the means to service aircraft involves a great deal of data processing [1], the choice of rational decisions for various types of services [2, 3], the determination of routes under the conditions of uncertainty and the constraints of time [4, 5]. Therefore, to improve transport logistics support service and the combat power of the Armed Forces of Ukraine, it is necessary to focus on the issues of the optimal use of transport resources for various types of aircraft preparation under various operational conditions of a transport complex.

A current transformation in digital technologies at enterprises and service systems has a considerable impact on different business models. It concerns the maintenance of civil and military aircraft at aerodromes. The operators of modern airlines modernize their multifarious activities in maintenance and repair, using modern integrated digital bases and a corresponding intellectual data analysis to improve operational efficiency in terms of the use of details mentioned as well as unproductive idling and other expenditure on maintenance [6].

Operational functionality is of primary importance for both civil and military aviation. Failure to organize such support and provide a particular possibility can bring about the delay or cancellation of flights (sorties). It can cause a considerable expenditure of money and time, the annoyance and dissatisfaction of customers or the failure to carry out particular tasks. In addition, to avoid these unplanned features the operators of aircraft must also ensure that given normative requirements are performed [7].

A number of researches use different approaches to design various models to search effective solutions related to the determination of conditions for transport servicing, aircraft inclusive. So, the authors of some articles suggest that a simulation model on the basis of agents to generate combat sorties has to be implemented [8, 9]; the training models of a Gaussian process that can be used for the preliminary rapid evaluation of new plans to deliver the means of support for maintenance [10]. An accurate model of mixed integer programming can be used as well [11]. The model includes the polynomial quantity of agreed variables and restrictions, guarantees high quality decisions calculating them for a rather short time span. The development of a compact optimization model enables us to take operational decisions to provide maintenance for aircraft and improve the degree of maintenance in terms of their impact on running costs [12, 13, 14]. It is possible to evaluate the safety and efficiency of the various types of aircraft maintenance strategies due to agent modeling, stochastically and dynamically coloured Petri nets and neural networks [15, 16, 17, 18].

Research into the features of the operational transport logistics service of aircraft at aerodromes has been conducted on the basis of a flight delay and the problems of the global optimization of service staff work [19]. The optimization of the servicing of various aircraft taking into account

uncertainty has been proposed by this article authors in [20]. The results of an individual model design and optimal servicing strategies have been presented in the experiment chapter.

The aim of this research is to develop the conditions of the transport logistics support service of aircraft for the rational distribution of transport resources and the reserves of freight and service capacities at aerodromes in Ukraine.

There are several types of aircraft flight preparation in Ukraine: preliminary, preflight, turnaround and postflight. Each preparation has its own requirements to maintain the aircraft using technological materials to fuel it etc. The most complicated and risky preparation types are preflight preparation and turnaround one that are carried out in the runway area. Transport resources are used as much as possible to provide services as well. Delays in servicing can cause rather negative consequences.

The delivery of technological products from depots at aerodromes to aircraft to provide maintenance and shipment takes place during all types of flight preparation. The delivery process is influenced by natural and climatic conditions, time of day and the choice of a rational scheme to service aircraft. At present the principle ‘one aircraft – one vehicle’ is a basic option to provide servicing, i. e. one vehicle with specialized technical equipment, which is installed on it, has to service one aircraft. At the same time, one aircraft can be serviced by one to four vehicles. There are two schemes to service aircraft – the current (basic) scheme, which uses vehicles available, and the proposed scheme, which can use modular constructions. The proposed variant uses a wheeled tractor, which is manufactured in Ukraine, and mobile modules that are specialized trailer-mounted means to have aircraft serviced. The vehicle proposed can contain four modules simultaneously.

The considered variant of aircraft transport servicing uses current transport means – individual vehicles that are equipped with specialized technical equipment. The proposed variant of a transport service modular construction includes four modules for all types of technical services. The conditions of transport logistics take into account the current types of aircraft preparation, the development of rational traffic routes, the impact of natural and climatic conditions, time of day and the schemes to position aircraft for servicing. The criterion to determine the conditions of transport logistics for aircraft is the total delivery costs that are influenced by the number of modules in a modular construction, delivery distance, consignment size, technical speed and servicing time. The layout of a service area is designed on the principles of safe logistics and possible transport routes.

On the basis of the analysis of aerodromes in Ukraine the statistical characteristics of impact parameters are determined. The interaction features of logistics means and aircraft at aerodrome, which has the necessary general and specialized means of ground services, are determined. The full factorial simulation model for aircraft transport logistics is designed. The results of its modeling indicate that the proposed multilink modular construction is the most economical one when providing services to a certain number of aircraft and the level of the functioning capacity of resources is determined. On the basis of the results of the modeling of transport logistics support service it is possible to carry out the operational control of conditions for a short time span in real time. It is of primary importance in warfare and during the rapid change of logistics requirements.

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