UDC 528.9: 711.77 (045)

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Geoinformation providing of airport development

The geoinformation providing of modern airports development is researched. In the world is accumulated large experience in the development and implementation of complex geographic information systems of airport complexes, which should be applied at the modernization and development of airports in Ukraine.

In recent years, the reform in the field of air transport has been implemented in Ukraine. The integration processes have been started in Europe, the agreement on a common aviation space has been signed, the National Transport Strategy has been developed until 2030; the State Concept and the target program of development of Ukrainian airports have been developed until 2023, the process of decentralization has begun and the passenger traffic has increased. In such favorable conditions, even regional airports have a chance to reconstruction and modernization.

According to the State Aviation Service, as of August 2018, there are 20 airports, 11 civil aviation airfields, two heliports and 42 runways in Ukraine. The largest airports of Ukraine are International Airports «Boryspil» (Kyiv), «Kyiv» (Zhulyany), «Odessa», «Lviv», «Kharkiv», «Dnipropetrovsk» and «Zaporizhia». At these airports 98% of the total passenger traffic is concentrated [1].

The fate of main airport of the country «Boryspil» in total passenger traffic amounted to 64% in 2017. According to the State Aviation Service of Ukraine in 2017, the passenger flow at Boryspil Airport for the first time crossed the mark of 10 million and completed the year with an absolute record of Ukraine of 10.55 million passengers (Fig.1).

The largest indicators during the independence of Ukraine achieved Odessa, Lviv and Kharkiv. Noticeable is the development of the air Harbor in Vinnitsa, Zaporozhye, Dnieper. Airports Nikolaev, Uzhgorod, Zhytomyr, Poltava do not work in general.

Today, the quastion of modernization and reconstruction of airports, especially regional ones, bringing the infrastructure to the requirements of ICAO and up to the modern requirements of safety and passenger service is acute. It is expensive to build new airports, so only reconstruction of existing ones is being carried out. The last large-scale reconstruction in Ukraine was for football matches Euro 2012.

In 2016, the Cabinet of Ministers of Ukraine adopted the state target program of the development of airports for the period up to 2023. The program is aimed on satisfying the needs of the state in ensuring the stable development of the aviation industry, bringing the infrastructure of air transport compliance with international standards, ensuring the acquisition of Ukraine's status as a transit state taking into account its unique geographical location, improving the efficiency of state property management. The program includes 17 airports: «Boryspil», «Lviv», «Kharkiv», «Dnepropetrovsk», «Kyiv» (Zhulyany), «Zaporozhye», «Kherson»,

«Kryviy Rih», «Odessa», «Rivne», «Uzhgorod», «Chernivtsi», «Cherkassy», «Poltava», «Ternopil», «Vinnitsa», «Sumy».
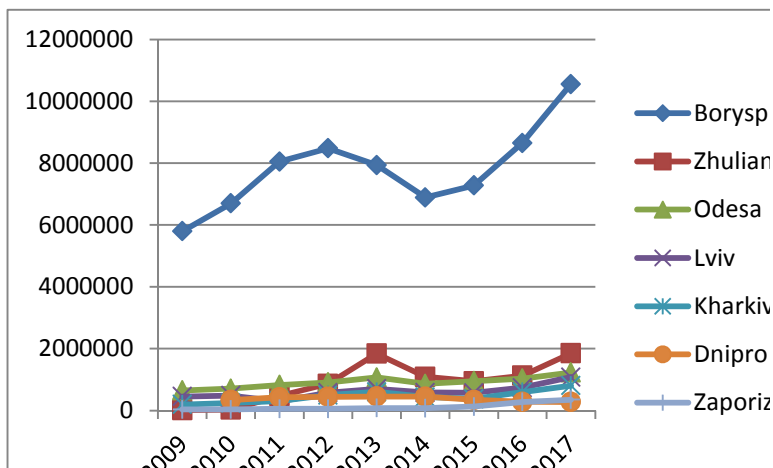

Fig.1. The passenger flow of largest airports of Ukraine in 2009-2017

For the reconstruction and modernization of the airport, its proper functioning, it is necessary to have actual and accurate geospatial information. This information can be obtained by conducting aerial photography, aerial and terrestrial laser scanning, georadar survey of the airfield surface, conducting tachymetric surveys.

As a result of engineering-geological, engineering-ecological, engineering -hydrometeorological surveys, we obtain an array of geospatial information, which should be used by the airport services in the future. Geospatial information is the basis of geographic information systems, which enable to collect, process, analyze and provide the necessary data from a common array of geospatial data. Geospatial information of databases GIS airport gives the opportunity to create a common information space which operates on the basis of uniform principles and general rules [4].

Today, about 200 airports in more than 20 countries around the world are successfully using geographic information systems to manage airports and their infrastructure. GIS helps airport operators to visualize whether it is aeronautical data, terminal structures, lighting and runway signs, ground, underground and above-ground engineering networks. By visualizing the data, the GIS shows airport managers an overall operational picture of the status of all objects, helping to effectively control the operation of the airport and its services [2].

Large airports, which are the main air gates of Ukraine, are also gradually moving to modern geoinformation technologies of data collection, management and development. Fields of GIS application at airports, especially overseas, today is extremely diverse: manage aeronautical information and airspace; the safety of the

airport and adjacent territories, and modeling of emergency situations; monitoring of environmental state and noise pollution; management of property and control of rental space; warehouse management; assessment and capacity planning and calculation of passenger traffic; management of fleet of vehicles (status monitoring technology, consideration of the level of costs and the fuel spill); managing terminals; the establishment of borders and crossings; the reconstruction of the airfield complex; commercial services and maintenance; providing of the safe operation of the airfield complex; maintenance of the transit, and so on [2].

At the airport usually operates several information systems that provide activities in various areas, which can count up to a hundred. But for the effective functioning of the entire airport complex, it is advisable to introduce a comprehensive geographic information system on a single topographic basis, which would have a single base sets for all subsystems.

In this article, we consider a component of a geographic information system that realize a system of registration of real estate objects on the basis of the Esri ArcGIS software. The system allows you to organize and visualize information by thematic layers, which can number up to hundreds. It is proposed to group the available information into three information blocks: technical, legal, commercial.

Accounting system real estate allows for efficient management of the property complex of the airport and are intended for display, analysis and management of real estate and other assets of the airport complex. The main task which is solved by real estate GIS is visualization on a cartographic basis of data about the land plots, their inventory, buildings, constructions, engineering communications, their use and monitoring of the state, date of planned check, and so on. Part of the data is stored in the form of project documentation – airport master plans, building plans, floor plans, cadastral maps and plans and other data [3].

The system allows to carryout grouping, selection and visualization of objects according to the parameters that are defined. For example, the types of objects (buildings, structures, communications, artificial coverings), their functional purpose (airfield property, objects of service and technical purpose, commercial objects), legal status (own, leased, decorated or unformed, those that are under pledge), the degree of construction and operational readiness (unfinished construction, commissioned, preserved), commercial data (leased).

In addition, the system provides the ability to display the internal structure and floor plans with the display of technical (pipelines, electrical cables, communications, alarm, video surveillance), commercial information (premises are rented with information about the terms of contracts, who is the tenant, terms, price per square meter), and etc.

Analytical information can be displayed both visually and in the form of reports, with the possibility of their transfer to other graphic and text editors.

Conclusions

For the successful management of airport complexes, design and construction of new terminals, buildings and runways, territorial planning, in developed countries for more than 20 years are widely used geographic information systems and technologies. Their use gives the possibility to make management decisions, attract

investments, monitor the state of the territory, land plots, buildings and structures, communications, provide services to passengers, ensure the safety of passengers and etc. Air transport in North America, USA, Asia, Europe is popular among the population due to reasonable prices, good service, flight safety, speed.

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