MODELING THE FUNCTIONING OF AIRLINES AND THEIR SUBSYSTEMS

Nesterov O.I.
National Aviation University, Kyiv
Scientific advisor – Shevchenko Y.V., Ph.D., Associate prof.

Key words: *airlines, optimization, methodology, modeling, research.*

In recent years, in the practical activities of air transport enterprises, there has been an intensification of the processes of searching and synthesizing rational management methods. Organizational changes in the structure of enterprises in the industry are expressed not only in the division of united air squadrons of airports and airlines, but also in the formation of airline alliances, the widespread use of outsourcing methods in the practice of organizing the production of air transport services. In practice, at present, a sufficiently large number of methods and techniques are used that allow solving individual particular problems of operational management of the production activities of an air transport enterprise.

In modern conditions, the design and creation of simulation models reproducing the work of an air transport enterprise is focused on modeling large systems in which there is no place for simulation in the operational circuit of the enterprise. However, a detailed study of the system of transport support for the production of air transport services reveals large reserves of increasing the efficiency of management of an air transport enterprise.

It showed that the most essential and determining the efficiency of an airline are business processes grouped into certain links, interconnected by structure:

1. Optimization of the aircraft fleet – target management – management based on competitive strategy – marketing management;
2. Optimization of organizational structures – a systematic approach to management – situational management – risk management – structuring of personnel policy.

Thus, the key tasks of the transition to technologies for optimizing business processes are:

- optimization of the aircraft fleet of the airline;
- optimization of organizational structures [1].

The work of the model includes certain organizational elements, which take into account the existing conditions, the initial level of parameters, a set of production scenarios is formed and management decisions are formed, in the form of changing individual parameters of the model, its operation and application, these actions will form a modeling matrix. The model implements the established scenarios, the simulation results are analyzed in order to determine effective solutions. Air transport enterprises are direct manufacturers of transport products, and each individual enterprise and their aggregate in the general transport system of the country represent, as mentioned earlier, a large organizational and technical system characterized by the following properties :

- large dimension;
- the complexity of the functions performed;
- hierarchical structure;
- integrity;
- dynamics;
- the complexity of the interaction and mutual influence of subsystems and elements;
- signs of the impact of the external environment [2].

Most dynamic systems are a collection of interacting subsystems and individual elements connected in a certain way with each other. Compilation of differential equations begins with decomposition (division) of the system into separate elements. Differential equations and equations of connections between them describe processes as changes in a dynamic system occurring in time.

The construction of the model involves the use of individual calculated indicators characterizing the activities of the airline. These indicators include – average flight range (average tariff distance):

$$L_f = PT/N_{pass.}, \quad (1.1)$$

where L_f is the average flight range, km;

PT – completed passenger turnover, passenger-km;

$N_{pass.}$ – the actual number of transported passengers.

Aircraft utilization rate:

$$K_u = PT/PT_e, \quad (1.2)$$

where K_u is the utilization rate of aircraft (aircraft per day);

PT_e – estimated passenger turnover, passenger km:

$$PT_e = \left(E_{pass.} * L_f * 365\right) * K_{so}, \quad (1.3)$$

where $E_{pass.}$ is the total passenger capacity of aircraft, seats;

K_{so} – seat occupancy rate.

Estimated number of flights:

$$N_f = N_{AC} * K_u * 365, \quad (1.4)$$

where N_f is the estimated number of flights;

N_{AC} – the number of aircraft in the airline.

The result of the analysis of the performance indicators of airlines will be that any of the presented airlines can become an object of study due to the comparability of the results of production activities, interpreted into calculated indicators for constructing the rate of movement of the information resource of the model [3].

Reference:

1. Portnikov B.A. The concept of modeling and optimization of business processes / B.A. Portnikov, N.Z. Sultanov. - Orenburg: Vestnik OSU №3. 2003. 59-67 p.

2. Sergeev D.I. Fleet optimization and management based on air transport operational reliability / D.I. Sergeev - Orenburg - St. Petersburg: OSU - Academy of Civil Aviation, 2002. 173p.

3. Eremin E.L. Dynamic models and S-modeling of systems / E.L. Eremin. Blagoveshchensk: AmSU Publishing House, 2003. 336 p.