

METHODOLOGICAL APPROACHES OF JUSTIFICATION OF THE CHOICE OF THE RATIONAL TYPE OF AIRCRAFT

There are the science and methodical approaches to choosing the type of plane for the air-line considered. in the article.

Key words: scientific approach, costs, income, factors, air-line

Statement of the problem

Air transport

is a branch of the economy, whose development is the most rapid and dynamic, it holds an increasingly strong position in the overall global transport system year by year. In recent years, the volume of traffic increases on average by 4.5% annually.

Fundamental changes have occurred over the past 20 years. They were reflected in the emergence of the new forms and methods of the competition, improving the management of aviation manufacturing, expansion and complication of the relations between supply and demand.

Furthermore, it is necessary to highlight the global trends in the world, without which the success of the single airline will be impossible.

Statistical analysis of the world air transport, ICAO report indicates, that majority of the world airlines have operational losses as a result of fierce competition on the market air transportation. Improve the efficiency of the air transport acquires relevance for the entire civil aviation world in connection with this problem. Improving methods of justification for the choice of model aircraft fleet for the exploitation on the overhead lines is of a great importance in the system of measures increasing the efficiency of airlines. As a result, these circumstances determine its relevance.

Analysis of the recent research

Such scholars as: Y.F. Kulaev, G.M. Yun, L.A. Yaschenko, V.Mova, V.M. Zagorulko, V.I. Boyko, DA Buhayko, V. Nosenko, AV Tsarenko, K. Marintseva, S.G. Mizyuk, N.E. Polyanska, S.A .Pereverzev, I.E .Sadlovskyy and others investigated scientific problems of improving the methods of choosing the best type of aircraft for the air line [1,2,4,5,8,9,10].

Unsolved aspects of the problem

Analysis of scientific works and publications showed that problem of choosing the optimal type of the aircraft fleet for the overhead lines, improving the efficiency of its operation constantly in need of additional research these issues, increasing their systemic nature, the development of new approaches to improve methods for solving these problems.

The aim of the article is to study of scientific and methodological approaches, improving methods of justification for the choice of optimal aircraft type in line.

Statement of the main content

One of the main tasks which faced by the airlines is the formation of a rational aircraft fleet structure and increase of its efficiency. Great importance has the improvement of methods justification for the choice of a typical fleet to operate on the air routes while planning. Determination of the rational aircraft for the network aircraft, optimal distribution fleet on routes, the choice of the optimal type of group for a particular aircraft are the most typical situation at the airlines system.

The first three types of the problems are solved in advanced planning when determining the types of aircraft (development schedule, efficient regulation of traffic). Justification for the choice of aircraft in airline network is the most common problem. The complexity of the solution is that aircrafts needs to be distributed over the network overhead with a limited number of it types to get the best solutions for the selected evaluation criteria in deviation from the optimum range flights.

Accepted a compromise solution, that provides minimum and maximum selection criteria during the justification of a model of the aircraft fleet for the overhead lines. Performance measures or their groups are used depending on the purpose of solving the problem. Linear programming problem which is solved by the various criteria under the given constraints - choosing the optimal type of the aircraft fleet for the overhead lines. For instance, the criterion "maximum carrying capacity", are useful when it is necessary to perform the maximum amount of the traffic with a limited fleet.

Minimization of the operational costs applies under the current planning using aircraft fleet. Applications of modern optimization methods such as justification aircraft for the air lines not exclude the factor analysis and evaluation of the results obtained in the implementation of economic and mathematical models. It is necessary to know the patterns of optimality criteria changes on the various factors for realization of this approach.

Investigation of the factors that influence on such integral indicators, for instance, performance of the aircraft and transportation costs are also allow the use of discovered patterns in operational practice while planning the air transport process by traditional methods. In modern terms changed not only targeted towards solving economic problems, but also qualitative changes occur contents tasks in the time dimension.

The importance of the operational analysis and cost management are increased due to the transportation costs by type of aircraft for flights, destinations, types of traffic categories of passengers, cargo types, etc. Methodical approaches based on the consideration of the most important market factors, results of the complex analysis methods for determining the cost fares for the air travel.

It should include the following methodological approaches:

1. Improving of the current methods of calculation costs and transportation costs based on:

- Using functional process grouping the costs, namely, grouping expenses for increased transport operations of separation costs, which depend and does not depend on the distance of transportation.

- Detailed calculation meters.

2. Taking into consideration the specific conditions of the operation of aircraft to determine the scope of their effective use, development rates by the type of traffic based on individual airlines costs.

3. Improving the formation of fares with regard to consumer value service provided as a lever to improve the quality of passenger service. Consideration of the costs differences in various conditions, and the degree of social and economic justification for the validity of certain requirements in passenger traffic, Consumer price indicators of transport services (Class cabin, saving time in the absence of intermediate landings, the flight time of the day, seasonal uneven load passengers on routes, direction of flight, etc.).

Problem of justification for selecting the type of aircraft is decided on the basis of technical and economic factors: category of overhead lines and its length; non-stop flight

range with the maximum payload; maximum flight range of the aircraft; volume of traffic on routes; technical and economic passenger details (Commercial load, the number of passenger seats, practical flight range of the maximum commercial load, etc.).

Sequence justification of the rational aircraft type choice is carried out in several stages:

1. At the first stage of a comprehensive study of the transportation market held the potential demand forecasting, assessment of the degree of monopolization of the market and forecast traffic volumes on aircraft airline [7.8.9].
2. In the second phase of a given aircraft selected those technical and economic parameters, which correspond to the category, length of transmission lines and traffic.
3. The third step is the pre-selection of aircraft using the following technical and economic performance which are based on peer review: beginning of the operation, the empty weight ratio aircraft to aircraft take-off weight, the commercial impact of aircraft weight, specific fuel consumption (g / pass.-Km, g / ton), the relative fuel consumption (tons per hour per 1 ton of take-off weight)

Then calculated the cost, return transport by type of aircraft in accordance with the above methodology and techniques based on the cost of the initial and final mobile operation [1,2,4,6,9].

Chosen the most significant, namely technical indicators, to improve the aircraft fuel efficiency, the degree of passenger capacity using, flight range of practical commercial maximal workload , the unit cost of passenger seats during study the influence of the main factors in the cost of transportation.

Consider the sequence of rational choice type of aircraft in flight Kyiv-Beijing-Kyiv.

1. The first phase of the line for Kyiv-Beijing was selected 7 types of aircraft: B-737-200, B-737-300, B-737-400, B-737-500, B-737-300-ER, B-767 ER-200, A-330-300.

According to the method of aircraft that have received the least amount of ranks in comparison with other accepted for further calculations.

In order of priority, these are aircraft: B-737-500, A-330-300, B-737-400, B-737-300, B-767-200ER, B-767-300-ER, B-737-200A.

In-depth analysis of the technical and economic factors and compliance nonstop flight range with maximum load and maximum range commercial airplane flying overhead line with the category and its length shows that only satisfy these criteria in the 767-ER-300, B-767-200-ER, A -330-300.

Analysis of the ranking showed that the technical and economic indicators most relevant characteristics of the line in the plane A-330-300, then the B-767-200-ER, B-767-300-ER.

These types of aircraft chosen for further study: defined cost, return transport studies of these indicators depending on various factors.

The results of calculations of cost, return transportation and financial performance operation of the "Kyiv-Beijing" are given in Table. 1.

Table 1

Annual income from the operation of airlines Kyiv-Beijing

№	Figures	Units of measure	Types of aircraft		
			B-767-300ER	B-767-200ER	A-330 -300
1.	The total cost of flying hours	USD. / hr.	12356	11414	14533
2.	The cost of passenger	cents / km	8,36	9,11	7,34
3.	Profitability of the passenger	%	25,96	15,59	43,46
4.	Operating costs	thousands of U.S..	26516,7	29128,9	26623,8
5.	Operating income	thousands of U.S.	33577,5	33577,5	33577,5
6.	Operating result (profit or loss)	thousands of U.S.	7060,3	4448,1	6953,2

Comparative analysis of the economic and financial performance of aircraft shows that in terms of cost and profitability of the A-330-300 more effective.

The cost of passenger traffic on the A-330-300 is 7.34 cents / km, and on the B-767-300ER is higher by 13.9% and in the 767-200 - ER - 24.1%.

The cost of passenger traffic decreased on average by type of AC by 27.6%, including the B-767-300ER to 28% on B 767-200 - ER - by 26.3%, if you change the percent passenger load of 25% to 100%.

Analysis of profitability calculations on the published fare International Air Transport Association shows that the passenger load factor equal to 0.45 carriage on all types of aircraft profitable.

Higher return transportation is provided to aircraft with a large seating capacity and better fuel efficiency.

The analysis shows that it can be recommended such airplanes for using like: A-330-300, B-767-300ER, B 767-200 – ER.

Conclusion

In the development of the recommendation on the areas of rational using of aircraft measures to reduce costs and increase profitability air transport, as well as the graduation design in justifying the choice of rational type aircraft were used proposed methodological approaches.

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