

PRINCIPLE OF PLANNING THE PRODUCT LOAD FACTOR OF AIRLINES

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The article is dealing with the principles of planning the load factor at airlines, which is a crucial issue in view of the economic crisis threatening the existence of many airlines. It provides an overview of categories of airlines based on their focus and activities. Described are also the various products and strategies adopted by them. The aim is to present the issue of planning and point out how airlines can approach product load factor planning so as to maximize profits.

Keywords: Planning, product, revenue management, strategy, payload

1 INTRODUCTION

Every airliner is providing its services in a highly competitive environment, which makes them adapt to market changes, competition and the ever changing requirements posed on transportation. Consequently airliners are doing their best to achieve maximum revenues so as to survive and operate efficiently in that environment. To this end, they must perform planning making use of various principles of increasing payload of their products. This paper is focused, in my view, on the dominant principles of planning payload of the airline products. There are lots of studies made abroad and much information related to the topic of planning. Publications Modeling Applications in the Airline Industry, Airline Operations and Scheduling and The Theory and Practice of Revenue Management served as sources of my information. Already the three materials presented a large amount of information on planning of all airline operation. Therefore, this text is providing only a brief outline of planning of product payload of airliners.

2 AIRLINES AND THEIR PRODUCTS

Airliner is understood as an aviation company possessing a valid licence of operation or its equivalent. There exist various criteria airliners can be classified by:

Table. 1 Classification of airliners

Criteria classification	Classification of airlines
Classification by the difference in the length of stages and nature of network	Regional airlines Continental airlines Long-haul airlines
Classification by the principles of offering and selling transport capacity	Regular airlines Irregular airlines
Classification by the product offered	Classical airlines Low-cost airlines
Classification by the nature of commercial load factor	Passenger airlines Cargo airlines Package-delivery airlines
Classification of international and domestic airlines	International airlines Domestic airlines
Classification by form of transport organization and the ways of interconnecting related stages of flight	Network airlines Point-to-point airlines

2.1 Products of the airline

Product is the sum of everything that can be offered to the market to the attention of the customer to buy, use or consume and is capable of satisfying their needs and wishes. They can be physical objects, services, destinations, organizations and.

The main product of an airline:

- Transport of passengers (scheduled, chartered-on order)
- Transport of cargo
- Transport of mail matter
- Transport of valuables

Services on board

Services on board belong to supplementary products of the airline. The most important criteria affecting level of services on board are:

Tarif rate- in the business class there are bigger spacings between seats, more refreshment and greater baggage weight allowed.

Length of flight- if exceeding 4 hours, refreshment is served twice in various amounts and dressings matched to time of day.

Time of day- along with the length of flight is a basic factor limiting the amount of food served in the same certain tariff rate

Special groups- are cases of transport on non-scheduled flights on order. Passengers are not expected to be provided individual care as it is offered at scheduled flights.

3 STRATEGIES OF AIRLINES

Strategy is a way or means of achieving long-term goals. Strategy provides answer to the question: what are the alternatives to the best use of means and the potentials of AL to attain them. The goals must be concrete, measurable, achievable and reasonable

Process of selecting a strategy

1. Defining the current strategy
2. Analysing the current products of the airline
3. Choosing a strategy and analysing the strategies adopted

3.1 Basic strategy

On assessing the economic environment and the competitive offer as well as the consumer segments, one can start defining one's own strategy. For our purposes, airline strategy is understood as a solution to three basic questions:

- Position of the company at the market and the sources
- Extent and way of performing activities on the part of the airline
- Organisational and further principles of operation of the given airline.

Market position of the company and sources available to it

The fundamental idea when deciding on the strategic market position of an airline should be in trying to identify permanent or long-term competitive advantages enjoyed or to be potentially enjoyed. Competitive advantage can be anything, what enables the airline to earn profit than usually by way of lower necessary costs or by realizing extra sales.

Range and performance of airline operations

When deciding on the range of airline operation in practice, three basic models are applied:

- Providing air services exclusively
- Providing air and related services
- Portfolio of independent services

3.2 Strategic alternatives

Defining the main strategy is followed by defining the strategical alternatives and their assessment.

Strategical alternatives of an airline:

- Airline serving business travellers
- AL focused on private travellers (flying for recreation)
- Strategy of cargo airline
- Airline focused on all market segments

4 PLANNING OF PRODUCT PAYLOAD

The basic task of planning is to choose the best strategy and guarantee attractiveness of the airline product. Airlines allocate a great amount of resources to provide services for their passengers. It is planning and efficient management of these resources that will determine whether the airline will survive and succeed. Quality of the concept of planning leads to remarkable successes despite various lacks of such resources.

Planning at a company involves:

- Strategic planning(planning for several months or years ahead)
- Tactical planning(short-term decisions that are on the daily agenda)

4.1 Determining the strategy of the airline

Planning as to which segment to focus on is to follow from the fact that decisions of travellers regarding the choice of journey is affected by several factors, which can be divided into 3 categories:

Category one includes factors related to time-tables such as prices of flights, time of departure and arrival, overall length of flight, type and size of the aircraft, ethos of the company.

Category two is related to individual, socio-economic characteristics, which include revenues of the people, their age, gender and participation in frequent flyer programs of airlines. Individual revenue affects the sensitivity to the prices of fair-tickets.

Category three is regarding characteristics of the journey itself, which can be a business trip, individual and domestic or international. The category involves factors such as geographical location of the beginning and end of the journey (time zones, flights overnight etc.).

In general one can start with historical data of airlines active in the given region. For example the Austrian flew in the years of 2010 109 millions of passengers on scheduled flights, which is a 9,7% inter-year increase, whereas the low-cost Wizz Air did so with 11 millions of travellers, which accounts for an increase by as much as 15%. Here we can see a difference in the number of passengers transferred, but Wizz Air flying less travellers with a higher year-to-year increase in numbers compared to the Austrian Airlines. However, one has to take into account the different strategy of the company and the product as well. Austrian Airlines is a standard, classical airline company whereas the Wizz Air is a low-cost airline.

The difference between the two strategies can be clearly shown and compared if presented in single.

Having matched all the advantages, an airline may choose the most advantageous model.

Low-cost airline	Classical airline
Lower level of services before, during and after flight	Higher level of services before, during and after flight
Fast turnover of aircraft at the airport	Longer turnovers of aircraft at the airport
Single-family fleet of aircraft	Great variety in aircraft fleet
Point-to-point	Hub-and-spoke
Denser seat layout of aircraft	Lower density of seats on board
Making use of regional airports	Making use of primary airports
On-line sale of air tickets	Greater emphasis on mediators such as travel agencies

Table. 2 Differences in airline strategies

4.2 Plannig the load factor for the aircraft fleet

Optimal composition of the aircraft fleet and their capacity is one of the basic building stones of the company success. Operating poorly loaded aircraft will result in lower revenues or even to losses, similarly as facing demand with unsatisfactory capacity. All that will end in lower satisfaction of customers owing to limited offer ultimately resulting in their choice for the competitive company. When choosing an aircraft fleet, it is important to calculate as to what results are expected on certain lines or networks of lines and also how the transportation process can be effected by e.g. season of the year, political situation, acts of terrorism etc.

The main tool in allocating the individual aircraft and thereby the aircrew is the time-table of the airline. It is one of the main instruments of optimal distribution in terms of airline products. As it has already been said, the airline Schedule is attributed different preferences. However, it is generally valid that it enjoys priority number one with travellers choosing an airline company. Business class passengers at flight to long distances are said to allocate to schedule as much as 48 % importance, whereas those flying in economy class rate it roughly at 40 %.

Time-table is developed usually two times in a year, one for the summer and the other for winter period, as there is a substantial difference in demand, broken down in months and even days of the week, or even during the day as it. During labour days are mostly used by business travellers heading for destinations of business meetings.

4.3 Indicators of aircraft load factor

Extensive use of aircraft, or its daily load factor is given by the number of flights and their duration per day. Their average value is calculated as a ratio of sum of hours flown per year and the number of days in a year. It can be increase e.g. by minimizing the down-time at intermediate landings or 1 time losses owing to maintenance and repairs. Extensive use brings us closer to intensive utilization, which shows how many travellers or cargo is carried compared to its maximum capacity of the payload. i.e. to what extent the aircraft is used in terms of seat capacity or cargo compartments in a percentage, the so-called coefficient of load factor (L_f). It is calculated applying the following expressions

$$L_f = \frac{PAX}{CAP} \text{ or } L_f = \frac{RPK}{ASK}$$

where PAX is the actual number of passengers on board, with CAP denoting aircraft capacity ASK meaning available seat kilometres, offered passenger-kilometers, calculated as the product of the number of seats offered for sale and the distance flown. RPK, revenue passenger kilometre, the profit from the passenger per kilometer. Namely, when at a concrete flight e.g. from Bratislava to Berlin takes 90 passengers

aboard its Boeing 737-500, whereas its capacity is 108 seats, then the load factor coefficient is:

$$L_f = \frac{90}{108} = 0,83 \text{ i.e. } 83\%.$$

The achieved load factor coefficient is important, however, taken alone says nothing of the airline performance, as a high coefficient can result in losses if revenues are low. Therefore a break-even load factor was introduced to measure the operational performance of the airline, operational costs and revenues. If the actual load factor is larger than the break-even coefficient of the load factor, the airline earns sufficiently to cover its costs. For example Ryanair has been capable of maintaining a very low level of the break-even load factor.

Table 3 Actual and break-even load factor of the Ryanair airline

Year	1999	2000	2001	2002	2003	2004
Load factor	73%	73%	77%	81%	84%	81%
Break-even load factor	58%	54%	57%	58%	57%	62%

Another parameter of assessing utilisation of the aviation equipment, is the average daily/yearly use of aircraft. This indicator is calculated as an average daily number of block hours (time of the time interval measure between the moment of departure from the apron and till the arrival of the apron at the destination airport), during which the aircraft is in use.

4.4 Principles of utilization of lines by the airline (revenue management)

In order for the airline to achieve the highest possible total revenues for the individual lines, a system termed as revenue management is employed. Revenue management is a process of analyzing and forecasting demand of clients with the aim to optimize the level of prices to maximize profits. In other words, one has to constantly analyze and forecast demand, concretely future product or event and subsequently adjust prices so as to sell the right product at a right price to the right customer at a right time for the purpose of profit maximization.

Traditional management is based on the following traits:

- Each flight is segmented into reservation classes, each of classes is connected to appropriate tariff product.
- Tariff products may combine distribution channels, comprising protectional measures, which ensure efficient market segmentation.

For each selling class there is a relatively independent demand, higher tariffs have less restrictions and are reserved later. Traditional approach is based on the prognosis and protection of a sufficiently enough seats for passengers of higher income. On learning this

assumption, the rest of the seats will be gradually made available at lower tariffs. The resulting disponibility of seats is adjusted so as to obtain a mix of business travellers, who maximize the expected revenues at the departure. All classes, down to the lowest ones are then established on a current availability basis. The problem is solved using an optimisation algorithym, based on the prognoses of demand, in terms of bookings for each departure for already years ahead. The required prognosis is defined for an unlimited demand for each class.

4.5 Key areas of revenue management

Included among the key areas of revenue management are:

1. Forecasting
2. Pricing
3. System of seat offer
4. Overbooking

4.5.1 Forecasting

Forecasting is an important component of planning in every company, however, of extremely critical in revenue management of airlines because of the direct influence exerted by reservation limits determining airline profits. It is a rather complex issue. One has to take into account the problems such as seasonal factors, economic situation, the constantly changing taxes etc.

Revenue management as a system, requires forecasting of variables such as demand, price sensitiveness, potentials for flight cancellations, and this problem depends on the quality of these forecasts. In practice, forecasting is a demanding task for revenue management, requiring substantial efforts in terms of development, services and time. Forecasting cannot be understood only as a forecasting of a certain number for a specified day, flight of demand for a specific object. Forecasts are mostly incorrect and it is necessary to understand them in statistical terms, which imply uncertainty regarding forecast of future results.

4.5.2 Pricing

Pricing of a product or service represents knowing and understanding on the part of the society and guarantees growth of the organization. The product fails if it is not perceived by the customer as exclusive, or it is not going to provide the required satisfaction. Price of the product must be determined so that the airline company could make use the profits from the increased demand. It is the most natural system of revenue management. Airlines make use of various forms of dynamic pricing, which include adaptability of prices, seasonal events, coupons, discounts or sale-outs to be capable of reacting to the oscillation of market and uncertainty of demand. Pricing is usually categorized as static and dynamic pricing. In static pricing, the price is set for the entire reservation period. In dynamic pricing, the prices are changing throughout the period mentioned.

4.5.3 System of seat offer

In air transportation, airlines make use of two different approaches, i. the **nested** and the **non-nested**. The method **nesting** is about controlling the availability of discounted classes. It structures the available capacity for a given flight into sub-sets, when in each subset is allocated part of the available seats. Each subset corresponds to a concrete tariff class. Subsets for very low discounted are lower than the discounted full (for reservation there is a lower number of seats available). In the course of the process of capacity selling, nesting is in control of the dependencies that exist among the various subsets so that the set of full tariffs could make use of seats already allocated to subsets with lower tariffs, should higher demand is experienced.

The **non-nested** method maintains that there is no difference between seats rates, before they all are equal, whereas the **nested** says that even though the seats are in the same class, they can have the chance to earn more as the rest of the seats in the same class. In the non-nested system, ticket prices are increasing as the flight datum is approaching, whereas in the nested seats are being sold in the form of groups. After the group is sold out, the tickets are sold for other groups.

4.5.4 Overbooking

It is a process based on the intention to confirm (sell) more reservations as the actual number of seats available in the aircraft. From historical point of view, overbooking is the oldest and financially one of the most successful practices of revenue management. Airlines make use of these methods to compensate for the effect of cancelling reservations or simply not arriving for flights.

At overbooking, the following cases may occur:
 1 *Spoilage*- if the reservation level is set too low, (more travellers turned out to be no-show as expected), then the aircraft is departing with empty seats, which could have been filled by the refused demand.

2 *Refusal of the traveller*- If the reservation level is set too high, it generates apart from extra revenues (as a lower number of passengers has been refused) and extra costs as well. Thereby, the airline is facing the risk that more travellers might enter the board of a flight than its available seat capacity.

Setting the level of overbooking for a given flight depends on the ability to compensate for the extra costs of risks from oversales with the revenues obtained from selling additional reservations. When the level of overbooking is increasing, net income from overbooking is increasing till the break-even point, then increase in costs incurred from oversales is exceeding the value of additional reservations. Optimal level of overbooking is at the point when the marginal revenues obtained by reservation are equal to marginal costs of the additional sales.

4.6 Revenue management of air cargo transportation

Over the recent years, the branch of air cargo transportation has increased substantially, which increased the pressure on management staff to maximize revenues in this field. Increase in demand for cargo is higher than increase in demand for passenger transportation. Massive increase is forecast for the demand in this area: world air cargo transportation will increase every year by 6,2% during the two decades ahead. As a result, lots of airlines have started to realize the potential in revenues in air cargo transportation. They are trying to focus on this area as an important part of their businesses.

Differences in the revenue managements of cargo and passenger transportation

The concepts applied in the revenue management of cargo transportation are similar to the ones used in passenger transportation. However, there are differences stemming from the business processes, thereby posing a rather complex problem. The differences identified are as follows:

- Uncertain capacity- cargo capacity is changing from flight to flight, whereas the number of seats available for passengers is unchanged.
- Three-dimensional capacity – all the dimensions of the cargo (weight, volume and position) are to be taken into account for each flight. The passenger transport revenue management, one seat is taken only by one passenger.
- Cargo customers – low number of customers of a certain airline may have a high number of orders. In passenger transport, there are millions of clients, and behaviour of a single client will not affect the overall flight.
- Combination of price/mass – Determination of the price per cargo is made on the basis of the value of the cargo and its mass. In passenger traffic only the rate of the passenger tariff is considered, as the travellers are divided by the price structure, whereas cargo is divided by price and mass.
- Potentials for routing – compared to passengers, one can consider several alternatives of routing cargo.

4.6.1 Revenue management system for cargo transportation

Efficient system of the revenue management for air cargo transportation is exactly forecasting and making use of the available resources, which leads to higher revenues i.e. profits. The available resources and the expected demand are compared within a systems-based optimization process with the aim to maximize revenue.

Function of the revenue management system for cargo transportation:

Management of resources – forecasting and managing cargo capacity and overbooking.

Identification of demand- developing forecast of demand, based on the knowledge of the value of the

various types of demand, while knowing the strategic importance of some of the customers.

Combination of resources and demand – is meant as determining the applicable offer price and ascertaining that the offered cargo compartment is protected at high demand. The process of optimization is to find the right price/mass combination, which is about determining the quantity of cargo approved for sale for every price/weight level. This level is set by the offer price, which represents the minimum admissible price for the order.

The individual key areas of air cargo revenue management are common to that of the passenger transportation.

For the separate calculations, forecasting of the demand, allocation of seats in the aircraft and setting of the optimum level of overbooking specialized softwares are applied. These computer programs have been developed for many years matching all changes that occurred in the market of air transportation.

Currently such software is available to airlines provided by several specialized firms.

5 CONCLUSION

From my point of view, planning the load factor of the product is a highly topical issue due to the economic crisis posing a big threat to the functioning of airlines. If a company is capable of making best use of its product in the highly competitive, its profit and existence are guaranteed. Planning product load factor is a very wide topic interrelated to many other areas of airline company management.

This text in the theoretical plane is an objective presentation of the principles of load factor planning as done by airlines. It represents the way of selecting a strategy and product of an air operator. Both aircraft load factor planning and revenue management are the principal tools of planning the load factor of a flight and profit maximization.

BIBLIOGRAPHY

- [1] Nariadenie (ES) č. 2027/97 o zodpovednosti leteckého dopravníka pri preprave cestujúcich ich batožiny v leteckej doprave.
- [2] PRUŠA, Jiří: Svet leteckej dopravy. 2007. ISBN 978-80-8073-938-6
- [3] HANÁK, Peter. Obchodno prevádzková činnosť v leteckej doprave. Žilina 2004. ISBN 80-8070-280-2
- [4] HANÁK, Peter. Analýza plánovania pri výbere lietadlovej techniky, Žilinská univerzita, Katedra leteckej dopravy 2010
- [5] Žihla Z. a kolektív: Provozování podniku letecké dopravy a letišť, Brno 2010. ISBN: 978-80-7204-677-5

- [6] Sabre Airine Solution. A Look at the Cargo revenue management [online]. A discussion of revenue management for air cargo businesses [cit. 2012-02-16]. Dostupné na internete:
<http://www.sabreairlinesolutions.com/images/uploads/Cargo_Management_White_Paper.pdf.

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