

Prognose the Amount of Discount Tickets Before the Sale

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Abstract

This article is focused on simple estimation of the number of tickets that can be offered to passengers at discounted prices, so that it is still cost-effective for the airline considering operating costs. Using simple modeling calculations on sample examples, an estimate of ticket prices in the pricing process was calculated, useful especially for small airlines that need at least a briefly overview of initial pricing options.

KEY WORDS: *revenue management, pricing, marketing, sale, flight tickets*

1. Introduction

We can simplify revenue management in the area of ticket sales defined as streamlined sales within dynamic pricing. It encompasses a number of activities that lead to dynamic pricing and the highest profitability of sales.

Some authors understand income management and yield management as identical concepts that we can define as managing pricing and plane ticket sales in an effort to offer potential passengers the right service for the right price at the right time. We could confuse these two terms as synonyms, but reputable authors see the difference between yield management and revenue management [1-5].

It is reported that yield management can be understood as managing the capacity of an aircraft, load factor - includes the effort to sell as many airplane tickets per flight as possible. Revenue Management is revenue of earnings- it focuses on profitability, pricing and sales efficiency.

This article discusses one of the ways how to determine the number of cheaper airplane tickets before they are put on sale based on a simple method using the Newsvendor model [6-12].

2. Applying of Revenue Management

The entire process of revenue management begins with data collection, and it is important to place emphasis on the accuracy and credibility of these data. In the internal airline system, these data collects, for example, ticket prices, competition, customer behavior and stores them. In addition to gathering data, we are getting to segment our customers, what is the other principle of applying revenue management in practice, and it is also one of the most complicated steps. At the beginning, airlines split customers into simple segments (for example, holiday and business travelers, business travelers with high price sensitivity and low price sensitive passengers, etc.). At present, however, passengers are segmented to the most relevant groups in order to better understand their buying behavior, and thus better tailor sales to the satisfaction of not only the airline, but also to the satisfaction of the passengers themselves.

Revenue management requires forecasting of various factors affecting on airplane ticket sales, such as forecasting demand or market share. Predicting is a critical role of revenue management and requires a lot of time and models to process these data. While we can predict forecasts as to how customer behavior evolves and we can estimate the market situation, optimization will tell us how the airline should react to change.

Optimization involves solving of two important issues in order to achieve the highest possible revenues. The first is determining which target function should be optimized. The airline must decide between price optimization, overall sales or other aspects. Secondly, it has to decide which optimization technique to use.

For airline companies, we must not forget about overbooking. By setting the level of overbooking correctly, airlines are better able to compensate seats cancelled at the last minute or just before departure, resulting in more efficient seats sales. On the other hand, bad decisions in overbooks can be expensive and costly. If the limits are set too low (more passengers will cancel the flight than expected), the airplane will fly out with empty seats, which is a huge loss for each airline company. An empty seat in an aircraft has no economic value, it is a loss. If the upper limit is incorrectly estimated, there may be a situation when more passengers arrive than was initially estimated, so the airline has to make offsets, which again is not an inexpensive matter. In this second situation, when more passengers arrive and

it is necessary to adapt the indemnities, there is another risk - the risk of leaving dissatisfied passengers. Loss of passenger's favor means next additional losses, which need to be considered in overbooking models. If overbooking is to be successful, it is important to consider not only the additional revenue resulting from the offering of more flights, but also the probability of the number of canceled flights (based on historical data), the cost of passenger compensation and also on the recapture probability - that the passenger will again use the same airline (and not another, competitive). In the context of overbooking we can meet the term nesting. This approach simplifies the operation of ticket sales by automatic checking. When the seats begin to sell, the first is closed the lowest-priced airplane tickets (the lowest rated class). The highest ranked airplane tickets will be closed only when the overbooking is reached.

3. Principles of Flight Ticket Price Fluctuations

Flight ticket prices depend on many factors and each airline company has its own analysts.

The demand of passengers after the flight depends on the season, based on previous historical data, it is possible to predict the demand for the coming season. At the peak of the season, airline companies can increase their flight ticket prices, because more passengers are expected. A similar situation is repeated during public holidays and during the opening of vernissages, exhibitions and other social events. Out-of-season is an effort to increase profits at reduced prices for flight tickets, thus increasing the capacity of the airplane to fill up, and also thus increasing revenues or profits, so that the flight is ultimately not lost. Get extra ticket prices out of season can increase capacity utilization by offering lower prices for flight tickets on the same routes as those offered during the peak season. Data collected from past years then helps the manager estimate, when the peak of the season occurs. Demand for air travel is seasonal as well as time character. The peak of demand is during the summer months, the bottom of the season is in autumn, and demand also increases gradually and is more apparent until a few days before departure).

In addition to the aforementioned season, we also have to take into account the peak during the day, which we understand as the busiest hours on a given route for 24 hours. From previous statistics, the airline company could predict that the greatest demand for tickets will be in Monday's morning what we can justify that at this time of day starts working week and increase the number of business passengers for workshops. This is an opportunity for the airline company to plan higher airfares at this time, as it is a high assumption that they will be sold. A similar situation occurs on Fridays and Saturdays before noon, when a large number of travelers want to be at home during the weekend, so often have to pay interest for the ticket more. On Sunday around lunch time, the number of passengers is high because starts working weekend and some people need to be in the final destination early Monday morning.

Flight ticket fluctuations also depend on the time of their sale. Under this term, we mean the tactics of each airline company's own, especially when the prices of airplane tickets are increasing or reducing, what is based on an estimate of customer behavior. This tactic results from long-term information gathering as well as from precise segmentation. In general, the price of the flight ticket will be higher, the closer the day of departure will be. Despite this, there are rules established airlines, they know customer behavior so well that at some point just before departure will offer a low price.

4. Sale of Cheaper Flight Tickets

During the flight tickets pricing, the airline company must pay particular attention to covering the cost of flights. Once covered, it is possible to work with all sort of variations to work with price. It is important to know how many flight tickets the airline company can sell for the full price, or also, for more expensive and how many tickets it can be offer cheaper.

At the very beginning of the ticket sales planning for a certain flight, a simple estimate based on the Newsvendor models could be enough, which is used when we need to estimate the lifecycle of products that are quickly subject to indifference or also to estimate long-term investments. The main idea is to estimate the quantity of goods offered in the case of unknown or hardly predictable demand. We can also apply this model when selling tickets.

Newsvendor model:

$$P(f < x) \leq \frac{C_u}{(C_u + C_o)},$$

where f - number of tickets for full amount; x - the number of seats reserved for the full amount; C_o - price of the ticket in the discount; C_u - lost opportunity for profit.

For example: The airline company has determined that the maximum flight ticket price will be 400 €, but six months before departure it wants to reduce the price to 250 €. Based on previous statistics, we can estimate the demand for 60 flights with a standard deviation of 10 flights. It is clear from the calculation that the airline company can offer 54 full-fare tickets if it wants to cover the costs. There are only 6 tickets that can be cheaper.

In this example, we can see how to work with the limit of the maximum flight ticket price and the lowest price of flight ticket. The advantage of applying this method in practice is the simplicity and speed of the calculation in preliminary analyzes when it is advantageous form practical form of view to first find out the possible effects of changes in the price of tickets on the profitability of the airline. This is, therefore, a rough calculation on which base a

more accurate estimation of the movement of ticket prices is then easier in the context of complex pricing issues.

5. Conclusion

Revenue management means more than just streamlining flight ticket sales. It includes an analysis of passengers thinking, comprehension of competing airlines companies, an effort to move forward in marketing, streamline the tool for price discrimination in flight ticket sales and many other aspects. It is therefore a whole set of aspects that we can uniquely call "revenue management."

When an airline company decides to actively take advantage of revenue management, it is always a long-term decision that analysts are gradually acquiring - it is necessary not only to learn basic principles and to understand the context, but also to learn to work with variables, to know the algorithms used in modeling simulations and able to read the correct outputs. The evolution of revenue management is continually advancing thanks to the capabilities of computing and the ability to connect more and more connections into a whole - decisions about pricing. Successful airline companies are constantly looking for new incentives to streamline not only revenue management but also yield management. Taking into account the complexity of ticket sales, we will get an insight into the simplicity of the simulation models.

Third-generation Revenue Management (current) evaluates historical with real-time information several times per hour to generate a prediction of total demand for a given travel class at a given time. These forecasts are then evaluated in optimization models that can calculate the recommended booking limits for the particular flight. Moreover, these optimization models also take account of historical overbooking data, so we see an optimal level of overbooking. The results are then presented as recommendations for analysts for revenue management department. These forecasts are regularly reviewed, updated automatically, and if changes are made (new flight reservations, flight cancellations, etc.), the system itself re-optimizes recommendations for analysts. So, there is a question: how can we process these processes even further?

The future could bring more sophisticated quick decision support tools that would increase the efficiency of flight ticket sales by taking even more input variables into account, in real time. American Airlines prepares a passenger decision model that works with variables such as time of departure, type of service, departure time, time between departure and arrival, ticket price and limitations. This is an attempt to automate passenger decision-making, therefore to create a simulation model of a change in demand estimate based on the above-mentioned variables when analysts will be able to better understand how demand will change when a fine for cancellation is increased or an extra baggage fee is increased. American Airlines also pays great attention to incorporating passenger choice into revenue management decision-making. Research provides estimates of how the demand will change when the passenger responds to a change in price or a new charge, or a new way of selling tickets.

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