Thesis

Airline Yield Management In Transition

for

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Western Michigan University

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by

Olgierd Hinz

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Introduction

This thesis will discuss the changing concept of Airline Yield Management in the context of the U.S. airline financial crisis of the early 21st century. It will describe Airline Yield Management by providing definitions, operational necessities, and examples. This paper will explain how and why one passenger pays much less than the other by condensing and simplifying a very complicated process.

Airline Yield Management is a powerful strategic planning tool. Utilized effectively, this tool can create high revenues for a firm. However, misinterpretations in the analysis phase can cause severe revenue losses.

Definition

The concept or goal of "Yield Management (YM)" comes down to the idea of selling the right seat to the right type of customer, at the right time, and for the right price. YM allows the airlines to allocate their fixed capacity of seats to various fare categories in the most profitable manner possible (Belobaba, 1989). The key is to find the balance between discount and full-fare tickets in order to maximize load factor. This process involves the analysis of reviewing customer behavior trends. In general, yield management is best suited for service firms like hotels and airlines.

History

In the past, U.S. airlines have operated in a strictly regulated environment by organizations including the FAA, IATA, JAA, and ICAO. Prior to Deregulation in 1978, airline policies required that all the seats on the airplane be sold at the same rate. During the 1960's, the Civil Aeronautical Board (CAB) approved different types of fares including lower-night coach fares, and touring fares on certain routes. By the end of the sixties, airlines introduced midweek and weekend fares, as well as, high-season and low-season fares to stimulate new demand. By the mid 70s, the carriers were aware that economic deregulation was eminent. Carriers such as Southwest Airlines and Pacific Southwest in California were filling up their airplanes with passengers demanding low-cost, low-fare prices and these airlines were profitable. Airline Yield Management was created in the eighties by the former President of American Airlines, Robert Crandall. During that time, competition from new low-cost-carriers had become a major problem for the legacy airlines. The World Socialist Web Site (www.wsws.org) defines legacy airlines as “companies that developed their operations and labor relations prior to the onset of deregulation in the late 1970s and early 1980s”. AYM helped American Airlines to compete more effectively in markets, occupied by this new form of airlines. People Express went bankrupt because they did not use AYM, in 1996. AA calculated that using AYM would consistently produce additional revenues in the billions; in fact it amounted to 1.4 billion dollars between 1989 and 1991 (www.optimus.com). Today, the AYM concept is growing in popularity among diverse businesses including hotel, car rentalcompanies, and

other service organizations. The growth rate is relative to the availability of hardware and software.

-Evolution in Yield Management:

The first phase in the evolution of Airline Yield Management was the development of relatively basic database management systems. Periodic extracts or "snapshots" of the current inventory and booking level in the airline's reservation system were downloaded and stored in a historical booking database. The second-generation of Yield Management systems compared historical booking patterns from the database with actual bookings on future flights. "Exception reports" were generated from this data, listing only those future departures that a predetermined set of criteria. The last and most important phase in the evolution of Yield Management involves three key factors:

1. CRS (Computer Reservation Systems), that have precipitated the growth of the airline industry from a predominantly regional industry to a national and international industry dominated by legacy carriers.
2. Internal yield management automation involves the incorporation of mathematical models for forecasting, optimization, and over-booking.
3. The development of the extensive hub system contributed as well to the evolution of current AYM.

How it works

The following part of the paper describes the factors that affect yield management.

- Relatively Fixed Capacity

  If the airlines could remove and add all the seats they wanted, then there would not be a necessity to try to maximize profits through yield management. In reality the number of seats in a plane is not changeable without a big hassle (Voneche).

- Ability to Segment Markets

  One of the purposes of Yield Management is to level the distribution of passengers. Therefore, in order to be effective, the airline has to be able to segment its market into different passenger categories. An example would be a passenger group that is expected to be willing to pay higher fares. The aim is to look for a tradeoff between maximum load factor and highest paying passengers (Voneche).

  Examples:

  1) The business person

     Ticket sales to business people are price in-elastic and time-sensitive. When they need to be at a certain place at a certain time in order to make a deal, it does not matter to them how much they have to pay in order to get there. All that matters is to be there, and to be there in time for their meeting. The businessperson is willing to pay a much higher

price to achieve his/her mission. This allows the person to be flexible.

2) The price sensitive leisure traveler

The leisure traveler is willing to give up a certain degree of flexibility for a cheaper ticket. One way airlines determine who is a leisure passenger is to lower the price if someone wants to stay over the weekend. Typically leisure travelers are willing to do that, since they most probably are going on vacation. More often, business travelers go home in the weekend.

- Short Shelf Life: seats are only available until take-off

Airplane seats are considered to be inventory in the airline industry. Therefore, if a seat in a departing airplane is not filled with a passenger, this inventory is spoiled. In other words, a seat in a plane has a very short shelf life. The aim of airline management is to have as few unsold seats as possible, in order to operate at its' maximum efficiency and profitability (Voneche).

- Advance Sales

In a situation where all tickets are sold at one point in time, there would be only one price. In reality tickets are sold over a longer period of time some times even up until one year in advance. Booking a ticket 21 days in advance enables the buyer to purchase a ticket at a lower price than if he would have purchased it only two weeks prior to take off (Voneche).

- Fluctuating Demand

In the airline industry one can readily observe demand fluctuations. Usually, the high peak season is during the summer months and the low season is during fall. So, a manager can use past data to forecast the demand. In order to maximize profits, the manager can increase prices during peak season and lower them during the off season (Voneche).

- Low Marginal Sales Cost & High Capacity Change Costs

The cost for an additional passenger is almost negligible. Also, the cost for a beverage and a meal are extremely low. However, the cost to change the capacity of the airplane is very high, because the price of an airplane is enormous. If it were inexpensive to acquire an airplane, then airlines would keep some in reserve and use them only during peak times. During low traffic times, they would have to store them. In reality, an aircraft makes only money when it is in the air. On the ground it is just a liability and depreciates in value (Voneche).

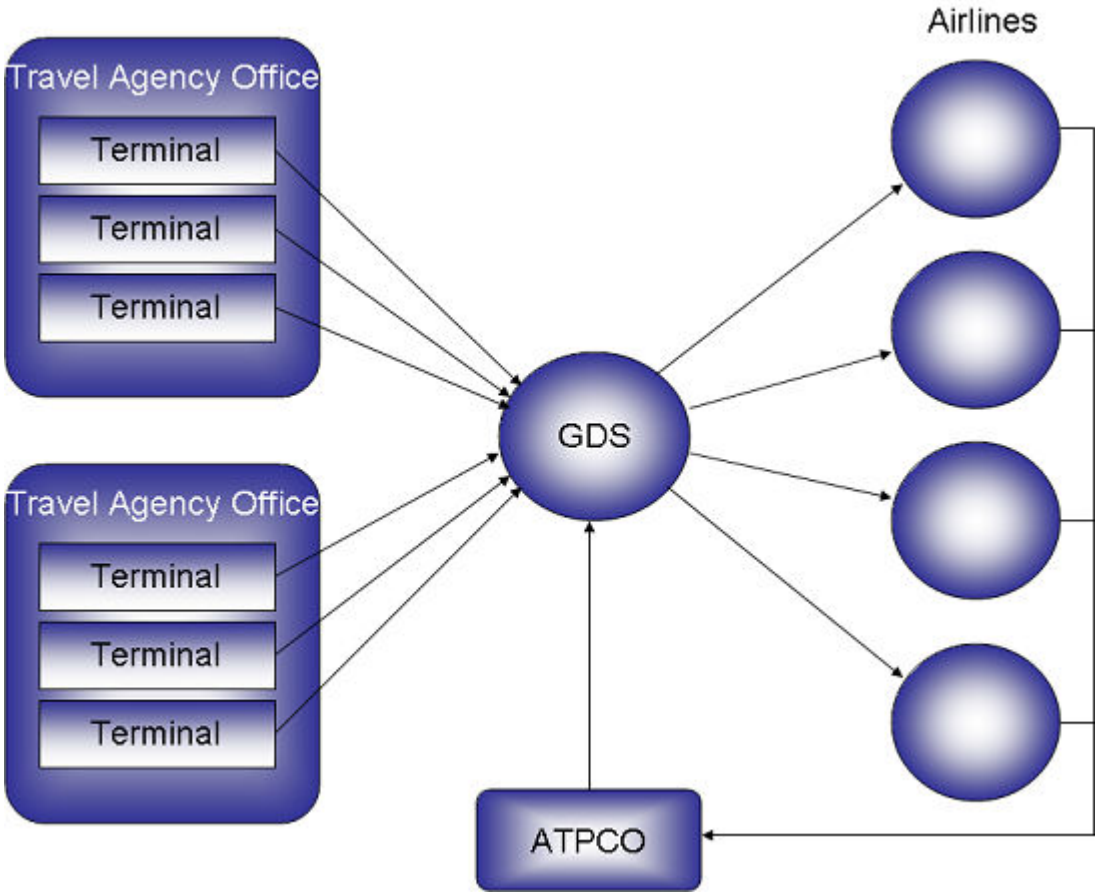
- Close relationship to up-to-date technology

One way managers can achieve high profits is by being up-to-date on demand changes by using fast Computer Reservation Systems (CRS); examples are: SABRE, Apollo, and System One. Nowadays they are called Global Distribution Systems (GDS). These systems project airline seats for customers through a network of travel agents. According to www.pagebox.com, GDS are accessed from around 40,000 to 50,000 computer terminals a day, while processing around 5,000 requests per second. One system owned by American Airlines is SABRE (Semi-Automated Business Research Environment). Others are Worldspan by

Delta and Northwest, and Galileo and Amadeus, which are owned by European airlines. All of these systems are very expensive to install and to maintain. They focus on centralizing and controlling reservation activity. SABRE is under American Airlines' control and to get access to it costs other airlines large subscription fees. An alternative to these fees is the internet. Southwest, a low cost airline, uses its web-site to sell all its tickets. This practice is used by other LCCs as well. It saves them money and allows the carrier to be independent (http://pagebox.net/airtransport.html).

The software used on GDS, which enables them to run the mainframe clusters includes operating systems from IBM (TPF) and Unisys (OS/2200). Also, more and more GDS entities are becoming independent from their founding airlines (http://pagebox.net/airtransport.html).

The following picture illustrates the functionality of GDSs:



source: http://pagebox.net/airtransport.html

APTCO stands for Airline Tariff Publishing Company (ATPCO) and it is a fare distributing company. The picture shows how a GDS provides the connection between the travel agencies and the airlines.

Example: Delta Flight 885

The following is a fictional example, which illustrates all the characteristics mentioned before. It focuses specifically on ticket fares and the process of how all seats are sold over time.

We will take a look at Delta Flight 885 to see how Yield Management works in the real world. This flight is a non-stop flight between New York's John F. Kennedy Airport and Miami International, departing at 7:10 p.m. and arriving in Miami at 10:26 p.m. It was put on the reservation system 332 days before take-off. We will take a look at how the seats are filled with a variety of fares. There are 183 seats total available on this flight and Delta differentiates the products into two groups, first class and coach.

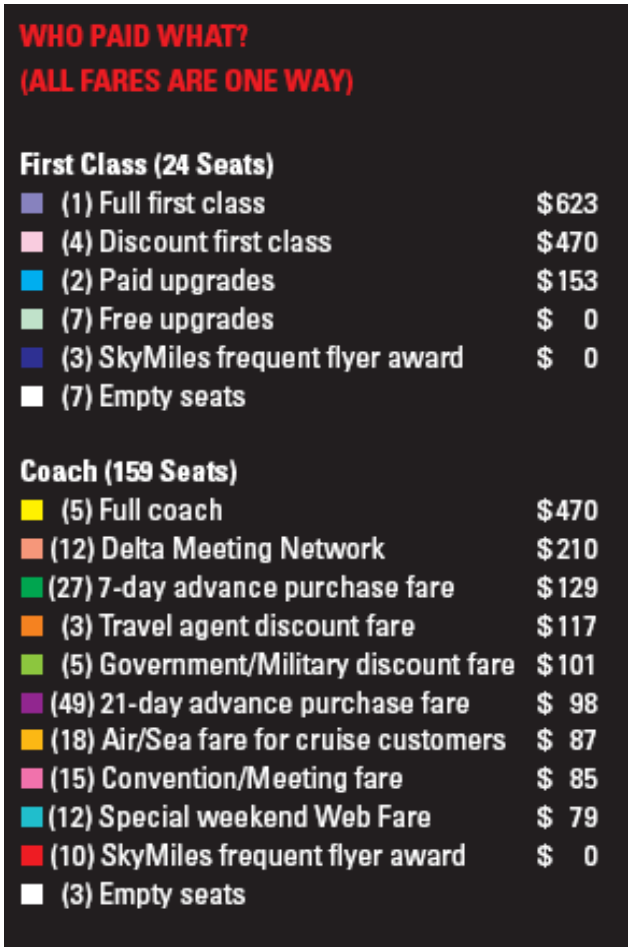
The initial thought could be to sell all the seats at the full price, which is $623 for the First class and $470 for Coach. However, only a limited number of people would be willing and able to pay these prices. Therefore, airlines need to search for a way to maximize profits by cutting fares for those who cannot afford or are not willing to pay the full fares. Using YM creates value, for example, passengers buying a ticket 21-days in advance create $33 discount value over those who purchase a ticket 7-day in advance of the flight because people purchasing earlier get a better discount. This is called value creation.

Sixty days before the flight, 50 seats are booked. Their advance bookings are common for leisure travelers. On the other hand, business passengers typically book the seats 7-days in advance. As the day of the departure approaches, more seats are filled. Thirty days before the departure, more than half of the seats are booked. Interestingly, the numbers of seats booked on the First Class remain the same, but some passengers have canceled their reservations and others booked using different types of fares. More passengers have booked at the 21-day advance purchase fare. Nearly half of all seats are filled with this type of fare. There are only two types of seats on this flight, First Class and Coach, but the seats are booked using nine different kinds of fares.

In the morning of the flight, almost all of the seats are booked, only a few seats in the First Class are still empty. However, this is not the end of the story. There are ten hours left before take-off. Some customers are going to cancel at the last minute and some are waiting for a last minute discount. Airlines know this movement would happen and they prefer filling those seats at really low fares rather than fly with empty seats. Those tickets are sold at the last minute via the Delta Web site. At the time of take-off, 173 seats are filled with passengers. At this point, all 15 different fares are used to sell as many empty seats as possible. In the end, flight 885 takes off with 95 percent of its seats filled, which is a good load factory for the industry.

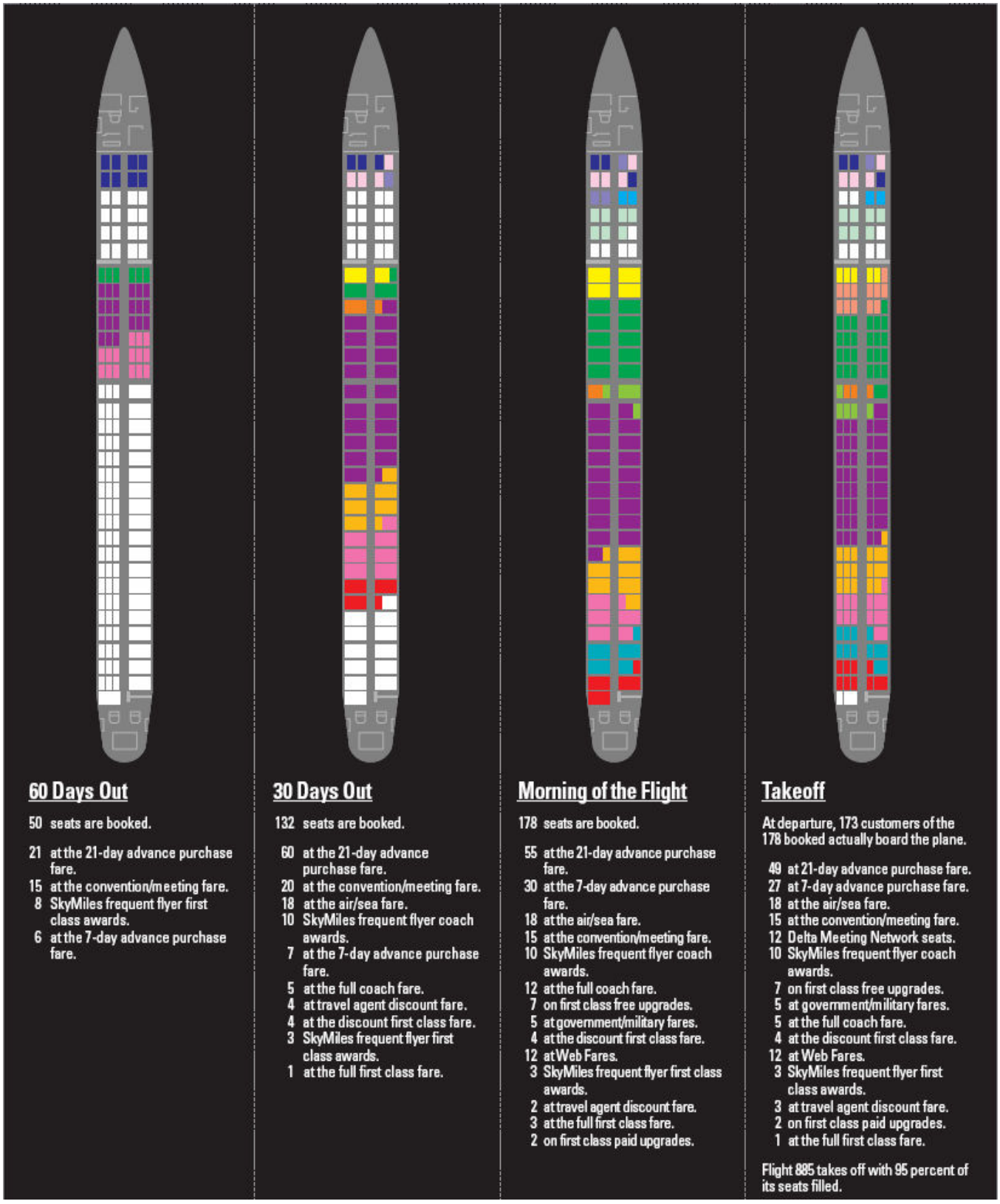
Airlines put many restrictions on the deep discounted tickets; otherwise those who purchase cheap tickets may want to sell them to others at lower prices. So they make tickets non-transferable and at some point they become non-refundable. The other rules that may be applied are no-stopover restrictions and purchasing the ticket at the time of reservation (http://www.delta.com/pdfs/plane_truth.pdf).

The following chart illustrates the variety of fares in a legacy yield management system that is used in the Delta Flight 885 example:



source: http://www.delta.com/pdfs/plane_truth.pdf

The following image is a recreation of Delta Flight 885:



source: http://www.delta.com/pdfs/plane_truth.pdf

Low Cost Airlines

Low-cost carriers (LLCs) emerged in response to the economic downfall of legacy carriers. LLCs follow a fundamentally different way to achieve their profit. In order to be able to charge very low prices they have to take a different approach. The principle idea behind low cost airlines, the way they function, what they can and cannot offer, is based upon the following principles:

1) high volume of traffic, including route frequency and number of passengers

   In order to be profitable while charging very low prices, a low-cost carrier has to ensure that the cities provide a sufficient amount of passengers. Metropolitan areas are usually the only ones who can produce this flow. Southwest, for instance, does not perceive Kalamazoo as a potential candidate for its services because of the lack of adequate population (passenger numbers).

2) cost cutting in every possible segment

   The cheap ticket prices are only possible because the operation of low cost carriers is focused on cost cutting in every segment. Employees are constantly encouraged to investigate new ways to cut cost.

3) Reliever Airports vs. Major Airports

   Having picked a city to join their network, LCCs usually do not choose to utilize the main airport in town. Reliever airports are the facilities of choice. They offer much lower gate, landing, and other fees than the larger airports. Another advantage of these airports is their close proximity to downtown areas– Chicago: Midway vs. O'Hare is a case in point here. Smaller airports also allow LCCs to reduce their turnaround times, thus

allowing for more frequency on the routes. Lower turnaround times are also possible because there is no assigned seating.

4) One aircraft type

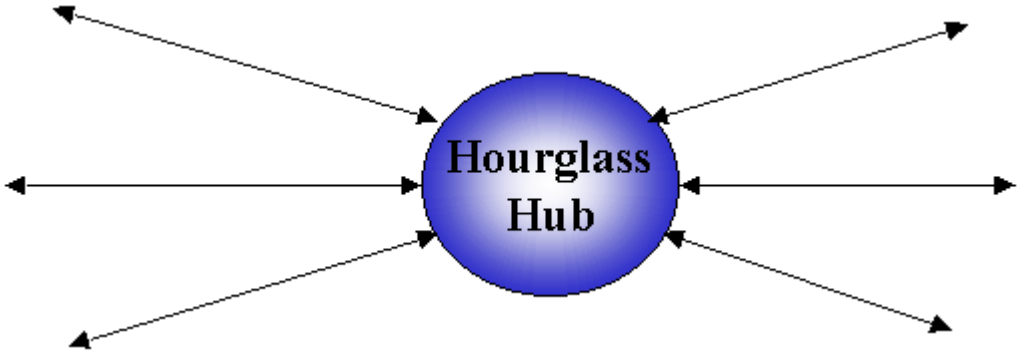
Another concept that enables LCC to maintain a very lean operational structure is the use of one type of aircraft. Almost all low cost airlines in the world take this approach. As a result maintenance costs are cut tremendously and flight and maintenance crew training is reduced as well. Also, airplane parts for only one plane have to be stored. This further reduces overall overhead costs.

Common models used are the Boeing 737 and the Airbus 319/320. Both airplanes enable service to mid range destinations and travel at high speed in comparison to older and smaller aircraft They provide enough space to transport a large number of passengers. Another positive aspect is that they operate the newest models, like the Boeing 737-800, which are very fuel efficient. All this contributes to cost savings.

5) Point-to-Point network structure to and from cities with sufficient passenger traffic.

A point-to-point (PTP) network has several advantages over a traditional hub-and-spoke structure. PTP networks feed of the high passenger numbers. Routes between cities with adequate populations are used to assure certain load factors. Feeder services, necessary in hub-and-spoke networks, are not necessary, resulting in cost savings.

LCCs like Frontier; however, practice an hourglass hub network. They do not have feeder airlines but utilize the strengths of the hub-and-spoke system.



6) Use of the internet for reservations

Low-cost-airlines focus on offering their service pre-dominantly through their own web site. This has several advantages. One of them would be the elimination of the travel agent. These agents draw their commission from sales of tickets. Eliminating the travel agent enables the airline to save costs and provide cheaper ticket prices.

Since saving money is one of the highest priorities for LCCs, it is not surprising that regular paper tickets are no longer used in day to day operations, because e-tickets eliminate the cost of paper and require less handling. This is another way to charge lower prices than the legacy airlines (http://www.tq3.be/ca/d/ica/).

Another advantage of using e-commerce is the independence it offers from computer reservation systems. As described earlier, these systems were originally set up by the legacy airlines. They are very

expensive to operate and maintain and, of course, these costs were passed on to the subscriber, the smaller airlines, which then passed them on to their passengers. So, airlines that don't use CRS save additional money. This is another reason why low-cost-airlines use e-commerce and are able to charge low prices in comparison to their legacy counterparts.

7) No Frills

With LCCs, meals, drinks, and newspapers are not included in the ticket price; however, they can be bought onboard. Also, everybody is welcome to bring their own food on board. However, since flights are usually short, food is not a great necessity.

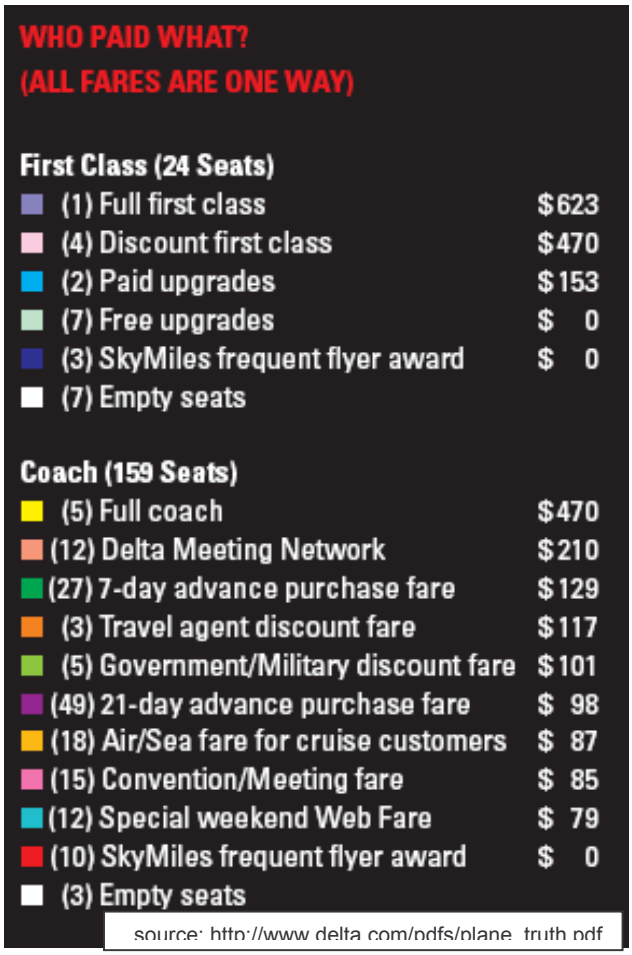
Fare Structure

This thesis suggests that AYM is not a well-defined method of operation but a process in transition. The following paragraphs will illustrate how profound changes in the approach of AYM at low-cost-airlines transformed this science from a very elaborate systems approach to a much more simplified and compressed discipline.

Let us start with the fare structure of the low-cost-airlines. Research shows that the overall number of fares for this type of carriers is much more condensed in contrast to the legacy airlines. The following chart illustrates some of them: (source: Southwest Airlines)

LCC Fare Description	*LCC Price Range*
Refundable anytime	$299
Special Fares	$199 - $299
Restricted Fares	$179 - $222
Advance Purchase	$159 - $201
Fun Fares	$109 - $181
Promotional Fares	$79 - $181
Internet One Way	$144

As you can see, the number of fares is reduced compared to the legacy airlines. Almost all of these fares are always available, no matter how many days in advance you book. The major concerns for LCCs are the conditions. Allowing a passenger to return his or her ticket at any time costs much more than having a non-refundable ticket.



source: http://www.delta.com/pdfs/plane_truth.pdf

Contrasting this simple fare structure with the example fares used in Delta flight 885 shows us how different the approach of the legacy airlines is. Their fare structure is much more complicated and aimed at various niches. LCC do not do this. For example, upgrades to other classes are not possible because there is only one type of class available. Also, since there are no classes, only one class fee is available.

Since the degree of focus on different classes at LCC's is much less, fares like

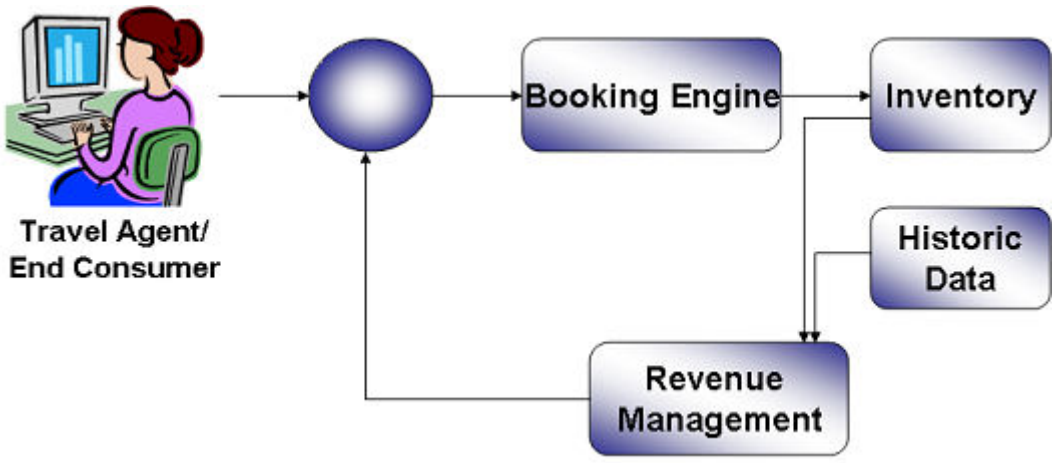
Government/Military discount fare, Air/Sea fare for cruise customers, or Convention/Meeting fares are not available.

Purchasing tickets in advance is most of the time not awarded with a lower price. However, this research shows that, sometimes, only couples of days before departure, promotional fares are made available up until a couple of days before departing. These fares are not available with a legacy carrier this close to departure time.

Reservation Process

Another difference between low-cost and legacy airlines lies in the reservation process.

The following diagram shows how legacy airlines sell their tickets.



source: http://pagebox.net/airtransport.html

Revenue management systems, taking historical data into consideration, analyse how many seats are sold and how many are still available. Using a prediction model they compute a bid price. The travel agent or end-customer can accept this price. If the requested price is lower than the computer bid price, then the revenue management

system might give a message like: “No seats for this price on this flight are currently available”.

With the internet, the reservation process changed dramatically. The internet allows a carrier to eliminate the travel agent completely. LCCs take full advantage of this technology. Since reducing costs is one of their highest priorities, simplifying the reservation process is central to achieving this goal.

The following illustration explains how this is done.

source: http://pagebox.net/airtransport.html

The end consumer visits the LCCs website. Here, all reservations are conducted. There are no intermediaries like travel agents or GDS entities any more. This allows the company to charge very low fees. The LCCs do not have to pay any booking fees that they later would have to later pass on to the passenger.

All these steps show how overall cost reduction and simplification of all aspects of Yield Management practiced by LCCs changed the way the industry fills its airline seats.

Conclusion

Airline Yield Management is not an exact science. Although the basic concepts are known, changes practiced by low-cost-carriers provide the theory with a new twist. In fact, this research reveals that Airline Yield Management constitutes a system that needs to be modified and tweaked depending on the actual market forces in the airline industry. Given the current trend toward airline globalization further research will be required in this important area

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