New applications are becoming available for airlines to analyse revenue data in detail within hours of flight closure so that analysts can be aware of performance. This makes it possible to make revenue management decisions dynamically rather than reactively.

Systems & techniques to analyse revenue & yield performance

Analysing revenue and yield performance involves several levels for an airline. The first is analysing the fares, fare classes and revenue already generated on flights prior to departure, while also examining the fares all competitors have available and how these are changing. By doing this, the performance of each flight can be improved before all remaining inventory is sold, and gives airlines the possibility of selling remaining inventory at higher fare classes to obtain a higher yield mix, or of selling at lower fare classes to avoid low load factors.

A second level of analysing revenue and yield performance examines revenue and yield data from existing bookings pre-flight and from revenue accounting post-flight. This information can be used in a feedback process to improve future performance through better forecasting. It is also possible to further analyse which sales channels are delivering the highest volume of sales in which cabin classes and on which routes. With an increasing number of codeshare agreements and airline alliances, airlines also need to know which connecting flights and pro-rate agreements are generating the most revenue for them.

Real-time sales analysis

Sabre is one provider of systems to analyse what competitors are doing in a market or particular route. "Competitors' fares are clearly an important issue in today's market, and airlines need to react dynamically to what their competitors are doing," says Darren Rickey, vice president

of airline solutions management, AirVision Management and Planning at Sabre Airline Solutions. "We have a 'Competitive RM' module in AirVision so that an airline can look several times a day to see the fare classes offered by their competitors. The system gives the airline user the availability of each fare offered by every competitor. The airline can decide whether to match a fare, or leave their own fare availability unchanged. This decision will depend on the speed at which remaining inventory is being booked and sold. This process can be managed in real time and the user constantly monitors, re-assesses the situation and adjusts. Changes in capacity and schedules can also be monitored."

Revenue opportunity

As well as the software for analysing competitors' action in terms of fare availability, capacity and schedules, a range of analytic tools now allows airline analysts and revenue management (RM) managers to improve sales performance for each flight as it progresses prior to departure.

While revenue performance can be determined some time after flight departure with data from revenue accounting, this is only useful in making long-term analysis of the data so it can be used to forecast future demand and for making general decisions in relation to RM and pricing.

What airlines really need is to analyse sales performance in the days and weeks prior to departure so that decisions relating to fare availability and RM can be made. The objective is to improve the overall yield mix.

Sabre's AirVision application can be used by analysts prior to particular flights to identify opportunities for improving revenue performance. "This starts with basics such as seats already sold and bookings already taken, as well as current revenue generated," says Rickey. "More detailed analysis can be made by drilling down into existing data and analysing average yields and revenue per seat that has already been achieved. This information can then be used to make decisions about fare availability going forward up to time of departure. Analysts can pre-define standard reports and look at these at regular intervals.

"The real value comes in AirVision's revenue opportunity module," continues Rickey. "This presents data for a particular flight in tabular form. Columns of data shown are presented for each cabin or fare class *(see table, page 23)*. One of these is demand, which is a measure of the number of people expected or forecast at each fare class, and is based on past performance. Next to this is actual traffic, which is the actual number of tickets sold at the fare class. Then next to this is 'no controls', which is the number of seats that would have been sold at the fare class without any RM management intervention. The cheapest fares available would therefore be sold first, resulting in a low revenue performance for the flight. The next column is 'perfect controls', which is the opposite of 'no controls' and achieves the best yield mix the airline can expect to get.

"Actual revenue *(see table, page 23)* is the revenue achieved from the actual traffic or seats without any RM management input," continues Rickey. "Maximum

SABRE AIRLINE SOLUTIONS REVENUE OPPORTUNITY

Fare class	Fare revenue	Demand	Actual traffic	No Controls	Perfect Controls	Actual Revenue	Minimum Revenue	Maximum Revenue
Y	$100	25	20	0	25	$2,000	$0	$2,500
B	$70	40	25	20	40	$1,750	$1,400	$2,800
Q	$50	80	45	80	35	$2,250	$4,000	$1,750
Total		145	90	100	100	$6,000	$5,400	$7,050

Revenue opportunity = $7,050 - $5,400 = $1,650
Earned revenue = $6,000 - $5,400 = $600
% earned revenue = ($600/$1,650) X 100 = 36%

revenue is the total revenue that you would generate at the 'perfect controls' level, which is at the highest possible fare class. In the example shown, five more seats were sold at the highest fare of $100, and 15 more at the next fare of $70. Moreover, if 'perfect controls' had been instigated earlier, 10 fewer seats would have been sold at the lowest fare of $50. Using perfect controls, an additional $1,050 would have been generated and maximum revenue would have been $7,050. If no RM controls are used at all, most fares would be sold at the lowest fare class of $50, and only 20 at the next highest class of $70, thereby generating a revenue of only $5,400.

"The idea behind this revenue opportunity module is to compare the difference in revenue achieved with what would have been generated with no controls, and what would have been generated with perfect controls," continues Rickey. "Revenue earned is the difference between actual revenue and minimum revenue, which in this case is $600. This can also be expressed as a percentage of the total opportunity possible. The revenue opportunity is the difference between maximum and minimum revenue: $1,650. The earned revenue rate is therefore 36%.

"This basic tool can be used prior to departure to improve yield mix by employing RM measures to sell the highest number of remaining seats at the highest fare class," continues Rickey. "Because it cannot be said for certain what maximum revenue actually would have been, it has a degree of subjectivity. However, if an airline is achieving an earned revenue rate of 60% or more then the analysts have done a good job, although the best achieve rates of 80-90%. Of course, what is actually achieved depends on how soon analysts intervene and apply RM management controls."

The dynamics of spoilage and dilution also need to be considered in applying revenue opportunity. Spoilage refers to seats being unsold because the pricing decisions were wrong. That is, too high. Dilution occurs when many of the remaining seats are sold at low fares and only a small number of high fares. There is a trade-off between dilution and spoilage. When weak pricing and RM decisions are applied, a large number of seats are filled, which dilutes the yield mix, but few go empty so there is little or no spoilage. Conversely, when only high fare classes are made available only a small number of seats are sold, leaving large numbers empty, but a high yield mix for those sold is achieved. As controls on lower fares being available are relaxed, more seats are sold, which slightly dilutes the yield mix at first. The analyst's objective is to get the best compromise between spoilage and dilution, which is the best yield mix possible and also the highest possible load factor and absolute amount of revenue.

"Once this practice has been applied over a sustained period and earned revenue and other parameters of dilution and spoilage are known for each flight, they can be plotted," says Rickey. "This way an analyst's performance can be tracked so that they know how to improve their performance. This whole process is a business tool for bringing revenue performance back to target."

An additional tool provided by Sabre is an executive dashboard. This provides an overall view of the airline's current performance according to various revenue parameters. This can show performance for a pre-defined period of a day, several days, week or month. Key performance indicators (KPIs) shown are: absolute revenue generated; on-time performance of departures and arrivals; total forward bookings and sales for the month to date; and load factor. Revenue already sold for the month to date can be split between the different sales channels to see how each is performing.

Revenue performance

Post-flight passenger volume and revenue performance analysis has several uses. Raw data for making analyses can first come from market intelligence data (MIDT). This is limited to just data from travel agents, and does not include any other type of sales channel. While MIDT data does not provide an airline with the full picture of all sales, it does have information relating to competitors. It can therefore be used by an airline to compare its own performance with its competitors.

Besides MIDT data, an airline also has its own sales data achieved through all sales channels, which allows it to make a full analysis of its own performance. This is useful because detailed information about unit yields and revenues, and yield mixes can be obtained. This data can be observed over extended periods, and trends will reveal where an airline has an opportunity to improve its performance.

Travelport's Beacon application analyses MIDT booking and average fare data. "The application can provide airlines with two categories of information," says Chris Colaco, vice president of data solutions at Travelport Airline Solutions. "The first is to provide airlines with information and data about their own performance over time in terms of passenger numbers, quantity of revenue, average fare and yield. The second is to let an airline know its performance relative to its competitors by plotting the performance of several airlines over time with regard to the number of high-yield passengers and market share.

"There are several data sources an airline can use, which include its own revenue accounting data and purchased MIDT data," continues Colaco. "Travelport's Business Intelligence tools such as Beacon and Market Master provide web-based tools for analysing MIDT and other data. These systems can

slice and analyse data in a number of ways. One of the key elements airlines want to know is passenger volumes, and revenue for a given origin and destination (O&D) market. They need to understand where this demand is coming from and how this demand is being satisfied. That is, which airlines are carrying the passengers via which routes and at what fare levels. Beacon provides airline analysts with tools to analyse available data.

The first parameter most airlines choose is to analyse the data by market, individual routes, flight numbers and individual flight legs. The data also includes information on gross and net fares. The system analyses the data to calculate the average fare for ticketed bookings, the number of unticketed bookings, each airline's share, each airline's quality service index (QSI), and the fare gap. The QSI is calculated and based on the airline's departure and arrival times, the number of stops and aircraft type used on the route; which indicates the market share it is expected to get. The fare gap is the difference between the average fare for all carriers on the route and the airline's fare. QSI gap can then also be calculated, which is the difference between the airline's market share and its QSI.

MIDT data provides an airline with the readiest and most detailed indication of market demand and competitive trends. Average fare data by market and yield bucket is available, either from data provided by the airlines themselves, or from GDS-ticketing data. Benchmark data,

such as QSI, is used in the tools as well.

Beacon and other tools take in these data sets and give the user powerful ways to get an understanding of the market. The data analysis also shows the performance of competitors in a tabular format. For example, British Airways, Virgin Atlantic and Cathay Pacific can all be compared on the London-Hong Kong market. Beacon can first separate data between the two Heathrow and Gatwick airport-pairs, since yields on LHR-HKG tend to be higher than for LGW-HKG. The shares, QSI shares, and average fares can be examined and compared.

Beacon can also analyse performance on connecting flights that passengers are forced to take because non-stop services do not exist. An example is London to Tampa, with passengers flying via New York JFK as one example. In this case the passenger would make two legs, and so provide two lines of MIDT data. "A passenger's real intention is to get from A to B irrespective of the route actually travelled or the connections required to build an origin and destination (O&D) trip," says Colaco. "Airlines ultimately want to establish what fare is being paid for the O&D trip between London and Tampa."

Besides the standard analysis provided which shows data for all passengers, Beacon can also split the analysed data into fare or cabin classes. The system can group MIDT data into high-, medium- and low-fare classes. "There are actually 26 fare classes used by some airlines on some routes," says Colaco. "The system groups

these 26 into five categories, and the airline user decides which fare buckets go into which of these five groups. The same analysis can be done for the competing airlines, so their booking volume, market share, average fares and yields can be calculated."

The screen view can also be formatted for side-by-side comparison of bookings, average fares, QSI values and market share by viewing analysis by cabin class, the GDS system which generated the sale, and a particular competitor.

Beacon can also be used to view the performance of all airlines in a defined market. "This means all airlines operating on all possible connections can be viewed. Taking London-Hong Kong as the same example, it is possible to fly via various cities on Air New Zealand, Singapore Airlines, Emirates and several other carriers," explains Colaco. "Analysing all traffic on all airlines across all possible connections reveals the extent of a market. Beacon also has the power to reveal which are the top travel agencies in each market. You can drill down further into the data to see which travel agencies, not just ticketing locations, are booking the most in the premium cabins and higher fare classes. Beacon can further analyse particular points of sale. One example is that you can examine travel agents around the world that are booking on a particular route or market. Again, with London-Hong Kong, you can see where your sales are being generated, since they will not all come from London and Hong Kong. Analysis of travel agent sales are not only broken down by cabin and fare class, but also by yield and average fare."

Beacon and other business intelligence tools offer the airline the ability to build their own sales and geographic hierarchies. Market Master offers seven hierarchical levels for the sales structure. These start with a global view and go down to the individual travel agent. "An airline may want to examine a particular route that is underperforming. Market Master can list routes which have the worst QSI and fare gaps, for example," explains Colaco. "This analysis has the benefit of showing the revenue the airline is missing. If the QSI gap is large, the airline needs to know why."

Some airlines provide their revenue accounting data with sales and revenue information from all sales channels to

SITA has recently developed business intelligence tools for analysing revenue accounting data. This can be done within a few hours of flight closure, and detailed information on passenger numbers, unit revenue and yield mix can be obtained. The system can also analyse revenue generated from interline agreements, code shares and alliances.

Travelport for a full analysis of their own performance.

Full revenue data analysis

There are, however, alternative applications available for airlines to make their own internal analysis of revenue and yield performance from their revenue accounting data. Such analysis can be made at three levels. SITA has recently developed its fully web-enabled Business Intelligence tool for this purpose, which is a standard part of its Passenger Revenue Accounting system. The first level of analysis is of the revenue data once each flight has closed and departed. It is now possible to obtain this data at flight closing and analyse it within a few hours. The second level is to analyse revenue generated from interline agreements, code shares and airline alliances. The third level examines revenue generated by each point of sale.

Revenue analysis

"The system is able to provide the revenue at aircraft pushback, and with the right systems and cost data in place, can also give an audited profit at the same time," says Allen Casey, product manager revenue accounting at SITA. "The main purpose of the system is to provide information on average fare, load factor, unit revenue and unit yield. The system can also analyse several KPIs. This analysis is similar to that performed by SITA's Fleet Plan Max product *(See Forecasting & analysing route & network performance, page 15)*. This information can be read as text or viewed graphically. The KPIs that can be examined by individual flight are revenue, load factor, unit revenue, unit yield, and revenue by travel agent.

"The system can also analyse revenue for a flight number. In the case of most airlines a flight number is operated at the same time every day, but revenues vary from day to day," continues Casey. "Data is examined over a defined period in terms of passenger numbers, revenue, unit revenue and yield, average fare and other criteria. The SITA Passenger Revenue Accounting system has other correlating data that can be matched to this analysis. One example is the sales data from the airline's various points of sale. The Business Intelligence tool is actually capable of analysing the raw revenue accounting data in any way the airline

wants. Various parameters of revenue can be analysed by aircraft type, for example."

The further value of this sort of analysis is that the user can drill down into the data. When analysing by aircraft, for example, the user can even examine revenue performance by aircraft tail number if required. "The main parameters that airlines like to examine are yield, which is unit revenue per revenue passenger mile (RPM); and unit revenue, which is revenue per available seat-mile (RASM)," says Casey. "It is very important for airlines to know these parameters as soon as possible, since these can then be used in feedback to revenue management and can be used in pricing and fare availability decisions. Once data has been acquired over a period for several flight numbers, routes or a market the system will then rank the best performing flights in terms of unit revenue, yield and average fare."

Business Intelligence allows airline analysts to examine the performance of a flight over months, a year or several years. This can be viewed graphically and trended. "The user can then drill down to split the revenue into cabin classes, as one alternative," continues Casey. "Another is to split revenue earned by fare class. Again, the revenue generated by each fare class can be listed with passenger numbers, unit revenue and yield, and average fare. The data can further be investigated to provide all this information for each fare class in a table for the whole flight, thereby making it possible for the user to analyse yield mix. This can also be trended to see how each flight number or route is performing. The correct remedial action can then be taken for flights or routes performing poorly."

Interline analysis

Airlines also want to know how their interline and code-sharing agreements are performing. Marketing airlines will sell a multiple-segment ticket, and at least one segment of the ticket will be flown on another carrier. On-line portions are those sold and flown by the marketing airline, while interline segments are those that generate revenue for the airline flying the other segments of the ticket. The Business Intelligence tool provides a table of each airline that interlines with the user airline. "The table lists the interline revenue and passenger numbers for each of these carriers," says Casey. "The airline analyst then drills down into each airline to reveal the revenue, passenger numbers, unit revenue, yield and average fare by route. Then the system can rank interlining routes by those with the highest revenue generated by interline and connecting traffic. Airlines will also want to know which are their most valuable partners. Conversely, interline partners will also claim revenue from you if you are the marketing airline. You may want to compare this with incoming billing, or revenue you will be claiming from interline partners. You can then calculate the difference, and see which of your partner or interline airlines are negative or positive contributors. The user can then further drill down into the revenue date of positive contributors to analyse factors that include gross and net revenue, passenger numbers and average fare, and to see which routes generate the most interline revenue. **AC**