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## Talking Technology With ...

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# Competitive Revenue Management: The Next Level

*Through the use of choice modeling, the latest in revenue management technology, historical average demand assumptions are becoming a thing of the past. New choice-based demand forecasts will enable airlines to quickly identify when they are under or over priced in comparison to their competition.*

**D**uring the past few years, revenue management technology has been advancing at a rapid pace, and most of these advancements involve how to best respond to competitive changes in the marketplace. Effective pricing and revenue management technology involve getting the right price for maximum revenue. Unfortunately, an airline's "right price" in a market can't be determined without considering competitors' fare levels, restrictions and schedules.

Keeping track of an airline's current competitive situation can be a daunting task. The sales and marketing teams must keep track of the current competitive state across a very large number of market, fare, departure date and return date combinations:

- **Markets** — Non-stop flights plus connecting markets often number in the tens of thousands for a large carrier.
- **Competing airlines** — There are typically several per market.
- **Fares** — Millions of active fares are stored in the Sabre® global distribution system.
- **Availability** — This includes each competitive itinerary and future departure date up to a year in advance.

Despite the complexities involved, an airline's sales performance is directly related to its marketplace competitiveness.

Today, revenue management demand forecasts are based on historical average competitive schedules and fares. Previously, this approach didn't pose a major problem, but with the emergence of restriction-free pricing during the past few years, the airline business has changed considerably. Assumptions of stable, unchanging competitive availability are unrealistic in the current environment and can significantly reduce the value of revenue management. However, new revenue management technology, known as choice modeling, is emerging, rendering these historical average

assumptions obsolete. New data sources, such as low-fare shopping results, are used to capture available fares by carrier for origin-and-destination markets and dates, thus allowing rapid identification of situations in which carriers are under or over priced relative to their marketplace competition.

### Changes in the Business Environment

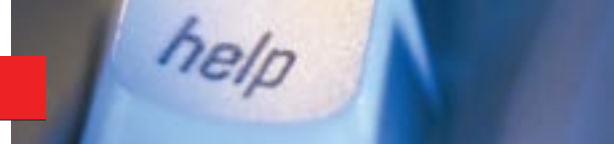
Recent years have seen significant changes in the underlying airline fare products. New fares with fewer rules and restrictions have resulted in greater revenue dilution and yield declines in many markets. New Internet-based e-commerce channels have emerged; Web fares have proliferated, and deregulation of global distribution systems in the U.S. marketplace has led to broader adoption of "most-favored-nation" agreements giving access to low-fare content and availability.

The surfacing of powerful new low-fare search engines on major Internet travel agencies, such as *Travelocity*® and *Expedia*, has led to greater transparency of airfares for customers and suppliers. In effect, it is easier for all parties to get accurate information on competing airfare products. In addition, the recent deregulation of U.S. global distribution systems has created a business climate that will permit improved historical data collection as well as new capabilities such as real-time pricing and availability.

### Changes in Revenue Management Technology

One important enabler for competitive revenue management is improved data collection. During the past 18 months, the *Sabre Holdings*™ business has put significant effort into retaining results from low-fare search requests and storing this history to a data warehouse. These low-fare search requests for a particular O&D market, departure date and return date provide insight into the relative competitiveness of various airline itineraries serving specific markets at specific times. Although not yet available as a product, historical shopping results are available for research and analysis purposes. Prototypes of new applications that issue competitive alerts to our airline partners are currently being tested, and these alerts notify revenue management analysts of specific problematic markets and departure dates in which they are either under priced or over priced, relative to competitors. Early results show that these alerts are proving useful in identifying previously unknown market competitive issues.

Also, due to the efforts of airline, vendor and academic research teams, significant improvements are being made in the areas of customer demand forecasting and revenue management optimization. One primary area of research is in the application of new statistical tools for airline demand forecasting



“... ‘smart’ controls for real-time availability and pricing will become one of the most important revenue-enhancing technologies for airlines within the next decade.”

known as customer-choice models. In addition to historical booking activity, these new customer-choice models consider demand shifts caused by changes to competitor prices and/or schedules. Early results show that these factors have a significant impact on demand, so this new technology is being built into the *Sabre® AirMax® Revenue Management Suite* to help provide more accurate demand forecasts. These customer-choice models are also being used in revenue management optimization; factors such as “upsell” (the likelihood that customers will pay a higher fare if their first choice is unavailable) and “recapture” (the likelihood that customers will book an alternate flight on the same carrier if their first choice is closed for sale) can be considered.

Revenue management inventory controls are also growing more sophisticated. Point-of-sale and journey controls are becoming widespread, and increased business flexibility from open-systems computing platforms (such as *SabreSonic™ Inventory*) are being adopted. In a recent article in the *Journal of Revenue and Pricing Management*, Ben Vinod, chief innovator for the *Sabre Airline Solutions®* business, and I discussed how “smart” controls for real-time availability and pricing will become one of the most important revenue-enhancing technologies for airlines within the next decade. We are conducting studies with travel agencies on the use of new capabilities, such as dynamic availability and dynamic pricing. These various real-time inventory and pricing capabilities are components of a complete operations engine that comprises the core of the new competitive revenue management process.

#### Revenue Operations Engines

If an airline has up-to-date competitive information regarding available flights and fares,

it can perform a real-time reevaluation of the inventory controls that were generated during the most recent revenue management planning system optimization. The purpose of the reevaluation is simple: to check that the predicted marketplace conditions match the current ones. If competitive conditions have changed significantly (either better or worse), then the resulting inventory control decisions should be revised.

For example, when overnight revenue management planning optimization processing was performed for “Husky Airlines” flight 89, it was assumed that Husky’s prevailing 30 percent historical market share would continue, resulting in a K-class demand forecast of 35 passengers remaining between now and the time of departure. However, upon checking actual low-fare search results involving a specific future departure date, our customer-choice models show that Husky’s primary competitor, “Snowflake Air,” is projected to win 90 percent market share on that date (leaving only 10 percent share for Husky and all other carriers in that market). A quick check reveals that the schedule hasn’t changed, but Snowflake has reopened its previously closed deep discount fares on two flights. Given the new market conditions, the previous demand forecast of 35 is unlikely to be realized. Husky’s demand forecasts should be decreased, the revenue management optimization model should be run again, and the resultant availability of Husky’s deep discounts would likely make it more market competitive. This simple example shows how up-to-date market competitive information can be used to improve an airline’s revenue management availability.

In our distribution channels, it will soon be possible to use information from low-fare search results to optimize prices and

availability in real time, considering current competitive conditions. These patent-pending dynamic availability and re-pricing capabilities are known collectively as active inventory, and they represent a major step forward in revenue management technology. Instead of relying exclusively on planning forecasts to predict selling conditions, active inventory uses actual current market conditions to reduce the impact of planning forecast errors. Also, by pushing more automation and intelligence into the real-time decision, it helps simplify management of markets and dates by revenue management analysts. Historically, major revenue management advancements in the industry have been inventory related (virtual and continuous-nesting O&D inventory controls). These new active inventory capabilities will be integrated into the *Inventory* component during the next few years.

#### Revenue Planning Engines

Traditional revenue management forecasting and optimization models are also undergoing major improvements. Customer choice models form the basis for future choice-based O&D demand and cancellation forecasting, which will forecast demand at the market level and allocate it to scheduled itineraries across all carriers. This technology has been used for years in the *Sabre® AirFlite™ Planning and Scheduling Suite*, but no data sources were available to calibrate demand at the O&D service/departure-date level. Shopping data has helped fill that gap, and use of a common forecasting methodology will lead to greater consistency between the *AirFlite* and *AirMax* suites’ demand estimates. In addition to forecasting, choice models will make improvements in revenue management optimization through improved estimation of up-sell, recapture and the effects of price elasticity.

**User Business Processes**

In the future, revenue management analysts will mainly focus on tracking market-level activity and competitive situation awareness. Customer-choice models and shopping alerts will highlight unusual market events for analyst review. Analysts will be able to more precisely control fare and inventory decisions through active inventory rules. This is an important step forward because restriction-free pricing has changed revenue management analysts' focus and business processes. Instead of the previous "myopic" forecasting that considers only a carrier's own historical data, competitive positioning is now the key consideration.

A typical workflow for future revenue management analysts will consist of three major steps:

1. Reviewing alerts (from operations processes),
2. Performing root-cause analysis (by revenue management analyst),
3. Taking corrective action (manually or automated).

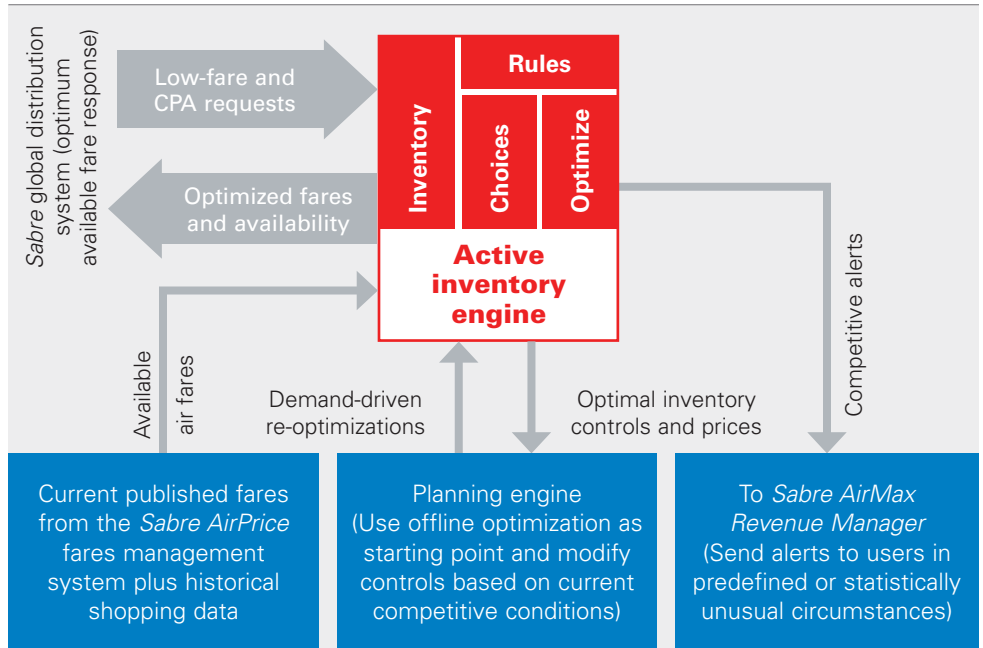
Analysts will be equipped to perform root-cause analysis using shopping data results, and this capability will include "what-if" scenario analysis (via simulation). These simulations will include a tactical capability to replay yesterday's shopping and booking transactions under different competitive scenarios (availability and fares) and estimate the likely revenue outcome using customer-choice models.

Given the importance of these operations functions, the primary focus of pricing and revenue management in the future will be to establish good decision rules and use model-based systems to automatically adapt to specific competitive situations. Analysts will review recent performances and update the model-rules logic on an ongoing basis. Since choice-model-estimated market share automatically accounts for both pricing and scheduling quality of service differences, analysts should find it easier to use than today's price dollar differences in spotting broad patterns of competitiveness across markets and dates.

**Revenue Management With Restriction-Free Pricing**

The catalyst for these recent technological advances has been the expanding use of "restriction-free pricing" by carriers worldwide. Most traditional carriers dislike the notion of restriction-free airfares because restrictions enable better segmentation of various customer types (early-booking leisure travelers versus late-booking business travelers), but they are often forced to match low-fare airlines in the affected markets to remain competitive. Fare restrictions help limit "buy down" of higher-fare passenger types into lower-fare categories — also known as dilution. Revenue performance of incumbent carriers could drop

**Active Inventory Processing**



**Historically, major revenue management advancements in the industry have been inventory related (virtual and continuous-nesting origin-and-destination inventory controls). New active inventory capabilities will be integrated into the Inventory component during the next few years.**

by 5 percent to 11 percent in markets where new airlines introduce restriction-free airfares.

If competitive pressures dictate the launch of restriction-free airfares, how can airlines offset these huge yield declines? Simulation studies by the Massachusetts Institute of Technology International Center for Air Transportation showed that the negative yield impacts from dilution can be lessened by the use of more sophisticated O&D revenue management controls. Their primary finding was that, in low-fare air environments, network revenue management is even more critical to effective control of seat inventory between low-fare airlines' local markets and connecting network traffic.

Why is revenue management even more important in restriction-free pricing than in traditional fare structures? In traditional fare structures, two mechanisms exist that inhibit late-booking business travelers from purchasing deeply discounted airfares:

- Fare restrictions (advance purchase requirements),
- Fare availability (revenue management controls).

In the absence of fare restrictions, the full burden of preventing dilution falls to the revenue management availability controls.

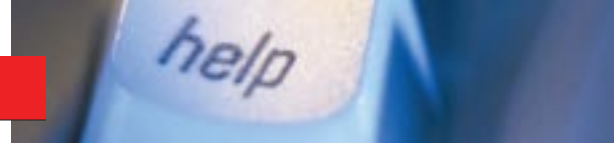
Revenue management in restriction-free pricing is much more complex than in traditional, segmented fare environments. Competitors being open or closed for sale in a given class

have a powerful effect on demand. As such, carriers must pay close attention to their competitors' availability status. An article in the April 2004 *Journal of Revenue and Pricing Management* provided an excellent discussion of the business importance and practical usage of competitive availability information in revenue management with restriction-free pricing.

**Low-Fare Search Shopping Data**

Unlike published fares, which can be obtained from sources such as ATPCO or SITA, there are no standardized industry sources of competitive availability information by O&D market and departure date. Furthermore, advances in low-fare search engines and emergence of restriction-free pricing are making ongoing competitive awareness for each future date even more difficult. The absence of restrictions means availability is the primary means of fare product segmentation. In addition, new powerful low-fare search engines such as those employed on *Travelocity*®, *Expedia* and *Orbitz* can now find "sum-of-locals pricing," where two local fares are used instead of higher-priced through fares. Detecting these non-obvious fare combinations can result in sudden, unintuitive shifts in the effective marketplace price. As such, identifying competitive imbalances and correcting them (preferably in real time) is becoming more important.

In an ideal world, pricing and revenue management decision-support systems would



consider competitors' pricing and availability. In the past, this wasn't possible. However, we have put considerable effort into storing the results of historical low-fare search transactions for large portions of the airline marketplace. Because these historical data show which carrier performed best on low-fare search results, they provide better insight into the underlying reasons for sudden demand shifts between different carriers in an O&D market. Such information is critical in demand forecasting using customer choice models. Shopping data capture and use of customer-choice models are providing important new emerging capabilities for future revenue management systems.

### Choice-Based Demand Forecasting

We use statistical choice models to estimate the probability of selecting specific itinerary and fare alternatives returned from the fare search results. Given that something is booked, these models estimate the probability of selecting a particular option displayed in the low-fare search results. The relative attractiveness of the various itineraries displayed is calculated considering schedule attributes (elapsed flight time, departure time and carrier share in the originating airport) and the available price. This probability of selection among competing itineraries is equivalent to estimating the market share of each option.

By considering both the probability of selection and current available fares among competing alternatives, the expected revenue of a sale for each itinerary can be computed as:

$$\text{Expected revenue} = \text{Current available fare of an itinerary} \times \text{Estimated share of an itinerary}$$

This itinerary-level expected revenue equation is very useful because it enables an airline to determine the revenue impact of changes in one carrier's price considering the current available price and quality of service of competing carrier itineraries. With this capability, a simple optimization model can be used to search for the "optimal" price amount (the point at which expected revenue is maximized). Intuitively, this makes sense because a carrier's maximum revenue performance under competition must consider competitors' current prices.

Expected revenue improvements are very common. Although the additional revenue associated with one transaction isn't dramatic, the cumulative impact of many small, tactical improvements to displays is expected to be significant. For bookings that involve a low-fare search (especially those made via Web channels), recent shopping simulations by the research group for the Sabre Holdings™ business show that more than 10 percent expected revenue improve-

## Interested in Learning More?

Additional information about competitive revenue management can be found in several references, including:

- "Delta's SimpliFares: Not simple, but better" by J. Brancatelli, *The Brancatelli File*, <http://joe.biztravelife.com/05/010605.htm>, 2005.
- "Price Optimization and Inventory Control: The New Generation in Revenue Management and Reservations" by B. Vinod (the Sabre Holdings™ business), *Aviation Industry Group, Competitive Airline Business Strategies: Asia & the Middle East*, 2004.
- "Airline Pricing and Revenue Management: A Future Outlook" by R. Ratliff and B. Vinod (Sabre Holdings), *Journal of Pricing and Revenue Management*, Vol. 4, No. 3, 2005.
- "Availability Based Value Creation Method and System" by R. Ratliff, A. Walker, B. Smith and A. Brice (Sabre Holdings), United States Patent Office, <http://www.uspto.gov/>, Patent Application Number 20030191725, 2003.
- "Future of Revenue Management: A View from the Inside" by D. Cary, *Journal of Pricing and Revenue Management*, Vol. 3, No. 2, 2004.
- "Revenue Management Performance in a Low-fare Airline Environment" by P. Belobaba and T. Gorin (MIT International Center for Air Transportation), AGIFORS R&YM Study Group Meeting, 2004.
- "Revenue Management Performance under Simplified Fare Structures" by P. Belobaba and M. Dar (MIT International Center for Air Transportation), AGIFORS R&YM Study Group Meeting, 2005.
- "Revenue Management with Restriction-free Pricing" by S. Mishra and V. Viswanathan (the Sabre Airline Solutions® business), AGIFORS R&YM Study Group Meeting, 2003.
- "bmi's Response to the Changing European Airline Marketplace" by S. Donnelly, A. James and C. Binnion, *Journal of Pricing and Revenue Management*, Vol. 3, No. 2, 2004.
- "Revenue Management Under a General Discrete Choice Model of Consumer Behavior" by K. Talluri and G. van Ryzin, *Management Science*, Vol. 50, No. 1, pages 15-33, 2004.

ments are typical for re-priced itineraries. Such incremental gains are very large, and it is anticipated that further improvements can be gained when used in conjunction with modern origin-and-destination revenue management planning systems.

### Competitive Revenue Management

New tools and methods that incorporate competitive positioning in the marketplace will greatly extend the impact of revenue management for airlines. New practices will help pricing and revenue management analysts better address important business requirements such as:

- Helping them better understand customer preferences using shopping data,
- Helping forecast demand and cancellations better via improved demand forecasting using

new customer-choice model technology,

- Providing better visibility into the sales process by using competitive alerts products designed to help identify problem markets and dates,
- Helping improve market-competitive position and revenue using improved real-time response systems such as dynamic availability and pricing.

It's an exciting time in the industry, and I hope you agree that these new tools will help take your marketing performance to the next level. ■

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