The continuing evolution: Customer-centric revenue management

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ABSTRACT
KEYWORDS: customer value, inventory control, data analytics, reservations, distribution, alternate segmentation, pricing

This paper presents a new paradigm for revenue management — customer-centric revenue management. In an effort to retain profitable customers, airlines are investing in advanced analytics to gain insights into customer traits and preferences. Central to the data analytics and data mining initiatives is the revenue management and inventory control process for recommending the right offer to a customer and sales channel. A range of initiatives are discussed for acquiring new customers and retaining existing customers, followed by current trends and demands from the airline community.
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INTRODUCTION

In an effort to get closer to the consumer, airlines are investing in data mining, business intelligence and advanced data analytics to understand customer traits, behaviours and preferences in order to improve customer retention, acquire new customers and maximise the revenue-generation potential from the customer base. The renewed focus on customer loyalty and the customer experience are key areas of investment for airlines to differentiate themselves. The travel and transportation industry is a very cyclical business as demand — both business and to a greater extent leisure, are dependent on the health of the economy. Hence, the need for customer insight has never been greater (Gaffney, 2004).

Customer relationship management (CRM) applications automate the customer-facing interactions between an enterprise and a customer based on an acknowledged fact that it costs three times as much to acquire a new customer as it takes to retain an existing customer. Traditional business processes that are the focus of CRM within an enterprise are marketing, sales and service. Figure 1 illustrates an extension of the traditional CRM functions in the context of the customer lifecycle process.

Managing the lifecycle of the customer begins with the *marketing* function, which has three primary objectives of generating demand, qualifying and prioritising the opportunity, and

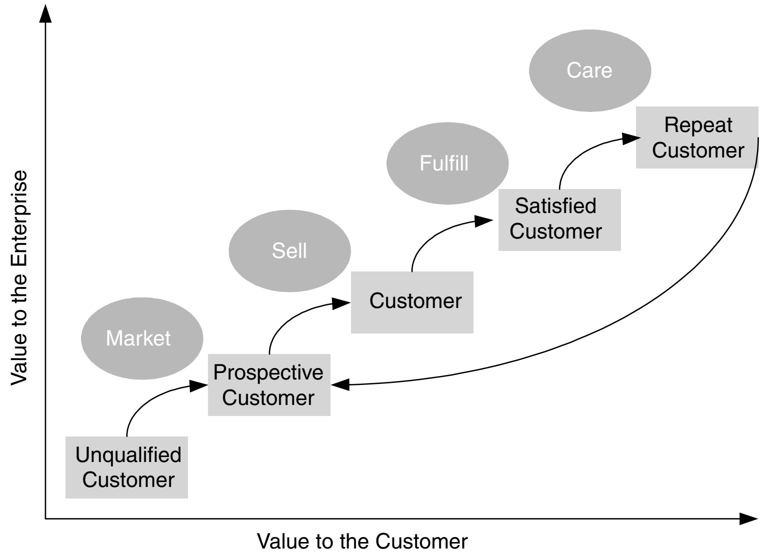

Figure 1: The customer lifecycle

finally distributing the qualified opportunities to the pertinent sales channels. The second step in the customer lifecycle is *selling* to maximise the revenue generated with every customer interaction by profitably matching offers to customer needs through targeted offers, intelligent pricing, configuration and product availability. Traditional CRM ignores the *fulfilment* process, which constitutes the third step in the customer lifecycle. In a manufacturing enterprise, the fulfilment process distributes the consolidated order across all the constituents of the supply chain that should fulfil parts of the order and manages the delivery of the consolidated order across multiple suppliers and service providers. In the airline context, all transactions are conducted electronically and there is no lead-time involved for fulfilment. For airlines, fulfilment constitutes the ticketing function. Customer *care* represents the last step in the customer lifecycle. It entails the creation of mutually profitable service agreements, addresses customer complaints and ensures a lifetime relationship with the customer. The larger the value of repeat business as a percentage of total sales for an enterprise in a time period, the more stable the airline as it is less exposed to cyclical demand patterns.

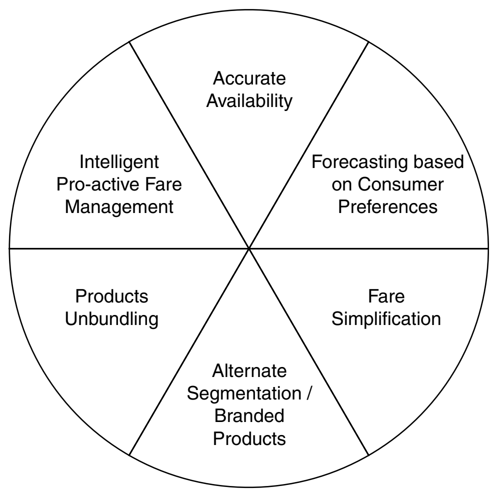

Figure 2: Key enablers of customer-centric revenue management

KEY ENABLERS OF CUSTOMER-CENTRIC REVENUE MANAGEMENT

Customer-centric revenue management is a CRM enabler to increase an airline's profitability (Vinod, 2007a, b) based on customer insight. Traditionally, it has been the role of marketing in an airline to acquire new customers in the most cost-effective manner. In today's environment, however, it requires a combination of marketing, revenue management and real-time inventory control to facilitate one-to-one targeted responses to manage the customer lifecycle across all customer touch points. Figure 2 illustrates the key enablers of customer-centric revenue management. While these initiatives can be sometimes viewed as independent initiatives, they need to come together in a cohesive framework for the practice of effective revenue management in a changing landscape.

FORECASTING BASED ON CONSUMER PREFERENCES

The arrival of the internet in the mid-1990s was followed shortly by the web travel supermarkets and the consumer direct websites. Travelocity was the first, followed by Expedia and a host of other online supermarkets. With the growth in online bookings from airline websites and web supermarkets, there is a new source of rich data to model consumer preferences and estimate demand for an airlines product. Forecasting using this approach is based on the fundamental recognition that demand is the outcome of a consumer choice decision (Ratliff and Vinod, 2005). Demand forecasting based on consumer preferences follows the actual demand process in terms of how a specific air product is purchased for travel. Consumers typically select an itinerary based on a combination of schedule attributes and price.

This new source of data used for forecasting demand based on consumer preferences is called shopping data. For example, Travelocity captures every online customer shopping session to gain an insight into customer preferences. The forecast model is based on a customer's utility function. Customer utility is a function of market share, market size, competitive schedule changes, type of service (nonstop, direct or connection), carrier preference in a market, type of aircraft (widebody, turbo, jets), requested time, departure/arrival times, elapsed times, displacement time between services, route frequency, fares and applicable restrictions. Introducing price into the equation has the advantage of being able to react quickly to major fare specials. This approach to forecasting is a vast improvement over traditional time series models, which do not consider the effects of competitor schedule quality of service attributes and prices prevailing in the market.

An effective method to forecast dependent demand, or demand that is a function of the price and other consumer choice variables, is to adopt a top-down consumer choice model using shopping data that are representative of the online and offline (travel agencies) channels. In addition, a consumer choice-modelling framework is the only elegant method to forecast restriction-free demand where only the price point determines the product and consumer demand is *dependent* on the price points. Besides forecasting demand, it can also be used to estimate the demand for new markets, impact of flight schedule changes, upsell rates, recapture rates, price elasticities and co-elasticities. Calibration of a logit choice model requires a combination of industry data, competitive schedules, competitive fares and rules, revenue accounting, historical GDS bookings, bilateral traffic data and actual passenger booking sessions reflecting the options available and the choices made by passengers.

Fare simplification

The first attempt at value pricing was American's pricing initiative in April 1992 to move to a radical simplification of a fare structure that had grown in complexity since deregulation. Instead of selling seats at several prices, American offered only four types of fares — first class, regular coach and two discount coach fares that had a 7-day and a 21-day advance purchase restriction. American's value pricing initiative also planned to abolish corporate discounts. Acknowledged by industry analysts as well ahead of its time, the value pricing initiative by American, however, collapsed when major competitors who had initially matched American's tariff structure quickly retracted, which prompted American's then CEO Robert Crandall to famously remark 'you are only as smart as your dumbest competitor.'

The low-cost carriers are the new pioneers in fare simplification (McDonald, 2006). The earliest fare simplification model, which is still practiced by a few LCCs today, relies on a pure restriction-free pricing structure. In this scenario, an airline would file multiple fares with the same identical minimal fare restrictions across all fare classes. Hence, the probability of selling a fare higher in the hierarchy is contingent on the immediate lower fare being closed for sale (Boyd and Kallesen, 2004; Gorin and Belobaba, 2004; Vinod, 2005). In other words, the fare structure promotes a 100 per cent sell-down to the lowest available fare as there is no distinction in the product, with the exception of the fare value. With this approach, when a flight is first detailed in the reservations system, there is a single one-way fare in the market. In this scenario, revenue management should forecast dependent demand based on current fare class that is open. In addition, active monitoring and closure of the selling fare at the right time is required to promote sell-up to the higher fare and maximise flight revenues.

Table 1 illustrates this fare structure.

As the LCCs have grown from start-ups to established carriers with an increasing and sometimes dominant market share, the evolution of fare simplification has gravitated towards a hybrid model based on the realisation that fare restrictions provide flexibility and the ability to target specific customer segments. The hybrid model has unique *class groups* or *restriction sets*, where each class group has the same fare restrictions but with different fare values. Table 2 illustrates the hybrid fare structure with three class groups.

The dilemma faced by the full service network airlines is how to effectively compete against the low-cost carriers in key markets that are predominantly short-haul where profitability is the exception rather than the rule. Even established and well-run carriers like British Airways have been unable to operate profitably on the intra-European routes even before the arrival of the LCCs. While retaining their traditional fare structure for connecting (flow) traffic, these airlines have to compete against the low-cost carriers on the short-haul routes. To compete and protect market share, they have to operate in a *hybrid* environment. From an inventory control perspective, to operate in a hybrid environment, a cabin on a flight can be viewed as consisting of a virtual partition to accommodate the optimal mix of customers on the traditional fare structure in the first partition and the optimal mix of passengers who purchase unrestricted fares at various price points in the second partition.

Table 1: Single-dimensional restriction-free tariff structure

Booking class	*Fare*	*Advance purchase*	*Minimum stay*	*Cancellation penalty (%)*	*Description*
Y	\$279	—	—	100	• Fare classes are not independent
B	\$249	—	—	100	• Lower fare differential
M	\$209	—	—	100	• Multiple fares are filed, but with the same identical restrictions
H	\$179	—	—	100	• Promotes 100% sell-down to the open fare class due to the absence of restrictions
V	\$159	—	—	100	
Z	\$139	—	—	100	
Q	\$109	—	—	100	

Table 2: Hybrid restriction-free tariff structure

Booking class	*Fare*	*Advance purchase*	*Minimum stay*	*Cancellation penalty (%)*	*Description*
Y	$279	—	—	25	• Products (fare classes) with identical restrictions are not independent. • Multiple fares are filed with identical restrictions • Promotes less than 100% sell-down as multiple classes with different restrictions may be open
B	$249	—	—	25	
M	$209	—	—	25	
H	$189	7AP	3	50	
V	$169	7AP	3	50	
Z	$149	7AP	3	50	
Q	$129	21AP	7	100	
R	$109	21AP	7	100	
W	$99	21AP	7	100	

The revenue management process should therefore have demand models for forecasting traditional fare classes (independent demand) and restriction-free fare classes (dependent demand). The network optimisation model uses the two types of demand forecasts as input along with the associated uncertainty in demand to determine the optimal inventory controls for independent and dependent demand fare classes subject to business rules that encapsulate business constraints and boundary conditions.

Alternate segmentation

Getting closer to the customer requires an understanding of the data and an investment in a data warehouse. With an investment in the storage and analysis of passenger name record and ticket data, airlines are interested in segmentation of customers beyond the traditional booking class that is used for inventory control and distribution of availability through the Global Distribution Systems. Figure 3 illustrates a typical enterprise data management infrastructure.

Creation of a data management infrastructure supports a deeper understanding of the customer base and prevents customers from leaving through the revolving door. For example, an important statistic that can be monitored is the churn rate of the customer base over a specific time period t, defined by

$$\text{Customer Churn Rate}_t = \frac{\text{Customers Lost}_t}{\text{Customers Gained}_t}$$

A value of 1 for the *Customer Churn Rate* is the breakeven point. A value greater than 1 is not desirable and a value less than 1 is acceptable. A lower value of this measure is a good indicator of the strength of the customer base.

The creation of alternate segments beyond the traditional booking class is typically accomplished based on a desired marketing objective. For example, displaying availability to an end consumer based on value score may be a desired marketing objective. In this scenario, the customer lifetime value (CLV) is a measure of the present value of the likely future revenue stream generated by a customer. Hence,

$$\text{Customer Lifetime Value} = -\text{CTA} + \text{VTD} + \sum_{t=1}^{t=T} \frac{R_t - C_t}{(1 + i_t)^t}$$

where CTA is the *cost toward acquisition* of the customer and VTD is the *value to date* from inception up to the current time period. R_t is the revenue in period t, C_t is the direct variable cost in period t and i is the cost of capital.

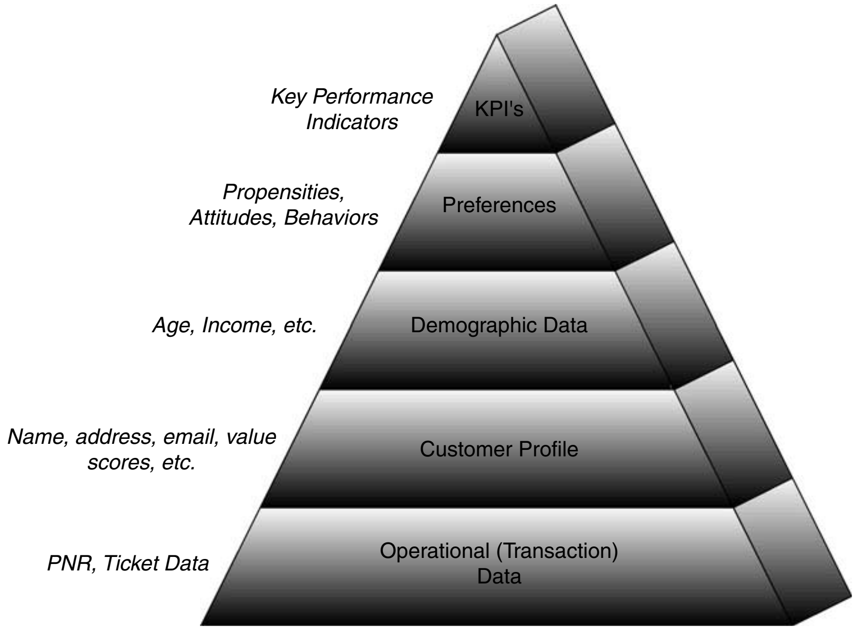

Figure 3: Data management infrastructure

The *Remaining CLV* is the more important statistic given by

$$\text{Remaining Customer Lifetime Value} = \sum_{t=1}^{t=T} \frac{R_t - C_t}{(1+i_t)^t}$$

By sorting the CLV's or *Remaining CLV*'s in descending order, the individual measures can be grouped to create target segments for various marketing programmes. An example of the usage of CLV for an airline's direct channel is customer-centric availability based on the value tier that a customer is mapped into. In the corporate customer scenario, if an airline has a corporate booking portal, when a corporate customer enters the relevant information such as corporate ID or frequent flyer number through the corporate direct website of the airline, the tier of the corporate customer can be passed into the airline's reservations inventory control environment to determine preferential availability based on corporate value tier. Figure 4 illustrates customer-centric availability in the context of corporate customers that make reservations through an airline's corporate booking portal.

A second application of CLV is to execute a promotion for frequent flyer customers who have not flown on an airline for a specified period of time. In this scenario, the data are first segmented to only include frequent flyers who have not flown for a specific time period; for example 12 months. Next, these customers can be clustered by CLV and specific CLV tiers can be selected for the promotional campaign to achieve the desired marketing objective of generating incremental bookings by providing incentives for these target customers to fly.

Branded products are another example of alternate segmentation beyond the booking class. In an effort to overcome the perception of an airline seat as a commodity, a key initiative in the airline community is to focus on the brand, describe the uniqueness of the products offered for sale and communicate the product offering to the customer. This is based on the fundamental premise that the airline seat is not a pure commodity as it is currently perceived. Table 3 illustrates examples of

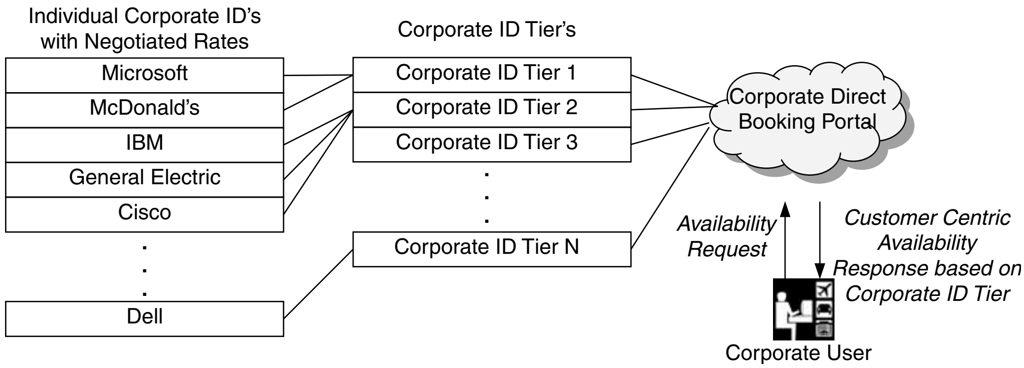

Figure 4: Customer-centric availability

Table 3: Examples of branded products

Airline	*Branded products*
Air Canada	Tango, Tango Plus, Latitude, Executive
bmi	Tiny, Economy, Premium Economy, Business
Avianca	Promo (Promotion), Econo (Tourist), Flexi (Flexible), Plena (Full Rate), Ejecutiva (business)

branded products adopted by some airlines. Each branded product has unique traits that are essentially *soft qualifiers* bundled into the product definition such as access to pre-reserved seats, frequent flyer miles credit percentage, lounge access, baggage count allowed at no charge, etc.

The standard segmentation of customers for revenue management is based on the booking class. Up to 26 booking classes can be used, which can be distributed through GDSs. This paradigm does not change with branded products as booking classes are still mapped to the branded products. It, however, spawns several new requirements for reservations processing, revenue management and distribution. They are

(i) Ability to maintain booking counts by branded products in real time to display availability by branded product.
(ii) Support the display of availability by branded product through both the consumer direct website and the GDS. The marketing objective of airlines is to have a travel agent on a self-service online booking engine describe the branded products to customers when a selection is being made.
(iii) While individual booking classes are still mapped to a branded product, the display of availability should indicate whether the branded product (eg premium economy) is available and at what price.
(iv) Demand forecasting that models the actual demand process requires a top-down approach to first forecasting demand for the branded products, followed by a forecast for classes mapped to the branded product.

Product unbundling

It is a well-known fact that for typical consumer purchases such as toothpaste to deodorant to automobiles, one-third of all customers purchase based on price, one-third based on quality and one-third based on brand recognition (Gottfredson, 2007). Airlines have, however, always been an anomaly. Leisure passengers are notoriously price sensitive and business passengers base their decision on price and schedule. Brand loyalty is minimal unless the prices of the competing itineraries are very close. In an effort to differentiate their brand and create brand loyalty, airlines are experimenting with offering a no-frills base fare and adding back services that customers are truly willing to pay for.

With the growing emphasis on ancillary products as a revenue stream that can augment the bottom line, airlines require the capability to sell, distribute and settle ancillary services across all channels of distribution. This implies that a capability is required to set the prices for ancillary services, distribute products with differentiated content and conduct financial settlement across all channels. This has significant impacts on the capabilities of current airline reservations systems, Global Distribution Systems and revenue accounting.

In a recent study, ATPCO estimated the opportunity value of a global industry solution to exceed $9bn in revenue. The ticket transaction fee types available today are YQ and YR, which represent fuel and insurance surcharges, respectively, which are settled within the airline ticket invoicing process. A fee type for ticketing ('OB') was launched in the first quarter of 2007. This allows the airline to pass on to the purchaser a merchant fee imposed by a credit card, recoup costs associated with airport or call centre ticketing or to exempt high-revenue passengers from normal ticketing fees by ticket designator or account code. Fee types for optional service fees ('OC') are planned for 2008 and beyond. Ryanair recently reported that its ancillary revenue increased 31 per cent in the quarter ended 30th June, 2006, outpacing its 20 per cent increase in traffic. At EasyJet, ancillary revenue accounts for 8 per cent of the global revenue for the first half of 2006. An independent survey conducted by Leflein Associates in January 2006 (Alexander, 2006) showed that many travellers would pay for extra perks such as more frequent flyer miles, more overhead bin space and the ability to sit in a child-free section of the aircraft. Other ancillary items promoted by airlines include in-flight internet access, pre-reserved seats, access to the frequent flyer lounge and ground transportation. The two primary trends that have been identified in the unbundling of airline products at the time of booking are:

(i) Some airlines experiment in the distribution of a variety of in-flight products and services (ie pre-paid seats, baggage check, meals, entertainment, etc).
(ii) Other airlines focus on selling optional flexibility with the use of their fares (upsell/rule buster).

In today's environment, the pricing of ancillary services, frequently referred to as *attribute pricing*, typically has the same value across the airline network. The future evolution of attribute pricing, however, will vary by market for some of the ancillary services such as pre-reserved seats based on prevailing competitive market conditions. Ancillary pricing can be determined by market or market entity using predictive analytics in conjunction with consumer preferences gathered from the booking process and survey data.

Promoting ancillary services also has an impact on revenue management. If certain customer segments are more likely than others to consume ancillary services, this should be factored into the decision-making process when discount allocation controls are established on an airline's reservations inventory system. Hence, the average passenger revenue for a booking class can be augmented with the ancillary revenue forecast before allocations are determined to ensure that seats protected for booking classes with an ancillary revenue upside receive additional seats. This requires a forecast of expected ancillary revenues by customer segment based on historic consumption, which can then be added to the average fare value of the booking class to get a true representation of contribution when the network is optimised. Current revenue accounting systems do not aggregate ancillary services consumed by a flight segment. Hence, the challenge is to enhance the existing revenue accounting systems to track the usage of ancillary revenues by flight segment.

Intelligent pro-active tactical and strategic fares management

Tactical and strategic price leadership in a market is increasingly being viewed as a competitive weapon. Tactical pricing is the traditional fare management process of responding to a fare action taken on a specific fare in a market by a competitor. Strategic pricing has a longer term view and is the process of promoting an entirely new tariff structure for a market.

Traditional airline pricing has relied on reactive fare matching to respond to competitor actions. Sometimes, the reaction ripples through other markets or differs from the original change, inducing a sequence of changes. The objective of reactive fare changes is often to match a competitor's fare to *preserve* market share. Traditional tactical fare matching can be *replaced* by determining the right response based on the quality of service offered by the competitor that initiated the fare action. Hence, the tactical fare response to a specific fare action by a competitor can be an intelligent response as a function of the quality of service. If the quality of service offered by a competitor that initiated the action is inferior, a fare match response may not be the desired alternative. Figures 5 and 6 illustrates the traditional and proposed tactical fare management process.

While tactical pricing is focused on a response to a specific fare action by a competitor, strategic pricing is a pro-active approach to filing a new tariff structure for a market based on the desired pricing objectives and business constraints. The first step in the strategic pricing process is to define the pricing strategy by market or market entity (group of markets). The objectives and goals *almost always* vary by market or market entity, which represents a group of markets where the fares are related. A strategy for one market or a group of markets may be very different from an alternate market or market entity. For example, a specific market may have an overriding goal of maximising market share because there are dominant competitors and to be a player requires revenue volume. Likewise, for a different market, the airline may have the dominant lift and hence the objective of maximising margins instead of volume may be more appropriate. In some situations, a market may be experiencing very low bookings and hence improving the booked load factor on the pertinent segments may be a primary objective. The market strategy objective should

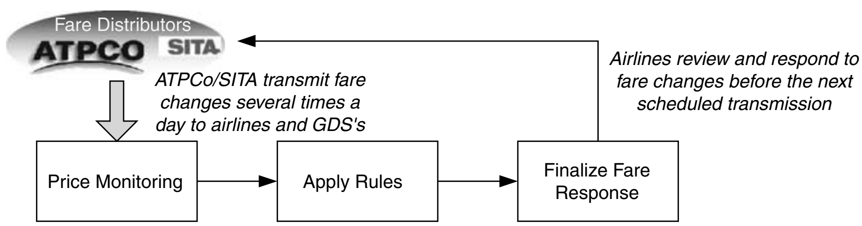

Figure 5: Traditional tactical fare management process

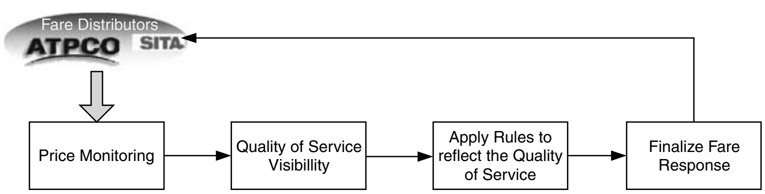

Figure 6: Proposed tactical fare management process

satisfy the business constraints that need to be imposed before a tariff structure is generated for the market. Typical examples of business constraints are the price relationships that need to be maintained between the different tariffs and competitor response to a fare action. Besides the potential increase in revenues with a fare action, a secondary advantage of using a strategic fare optimisation model is the introduction of price consistency in a market over time.

The decision variable used in the strategic fare optimisation process is the fare category, which represent the broader *customer segments*, where each product is defined based on a combination of one or more of the associated restrictions. Typical attributes that make up a fare category are

- Fare Type (Adult Economy — 'ECO', Military — 'MIL', Government — 'GOV', Child — 'CHD', Seniors — 'AGE', Student — 'STU', Bereavement — 'BRV')
- Advance purchase restriction (3AP — '03', 7AP — '07', 14AP — '14', 21AP — '21')
- Minimum stay restriction (Saturday Night Stay — 'S', MIN 3 — '03', MIN 7 — '07')
- One-way versus round-trip fare ('X'/'R')
- Day of week indicator (mid week ('X')/ weekend ('W') or DOW ('S', 'M', 'T', 'W', 'R', 'F', 'J')
- Channel designator (published, off-tariff or web).

Associated with each fare category are multiple fare basis codes that can afford subtle variations in restrictions and prices. One or more fare categories are associated with a fare class, which is the level at which inventory is controlled. The status of a fare class (available for sale or not available for sale) is then determined by revenue management, updates are established in the host CRS and then distributed to all the sales channels.

For pricing analysts to initiate an intelligent fare action is a multidimensional problem. For example, setting prices too high may create an undesirable price image with respect to the competition, and setting them too low may result in lost margins, price wars and eventual brand erosion. The objective is to set and manage prices based on the strategic goals for the market or market entity where fares are related between markets, while simultaneously maintaining price consistency and price-image targets. An important consideration is also the current market share for the specific market or market entity and the assumptions made on competitor response, which is the percentage of other airline (OA) market share that will match the pricing initiative.

Figure 7 illustrates the fare action dilemma faced by a pricing analyst. Given the historical data on average fares and traffic distribution by fare category for a specific period (eg Summer

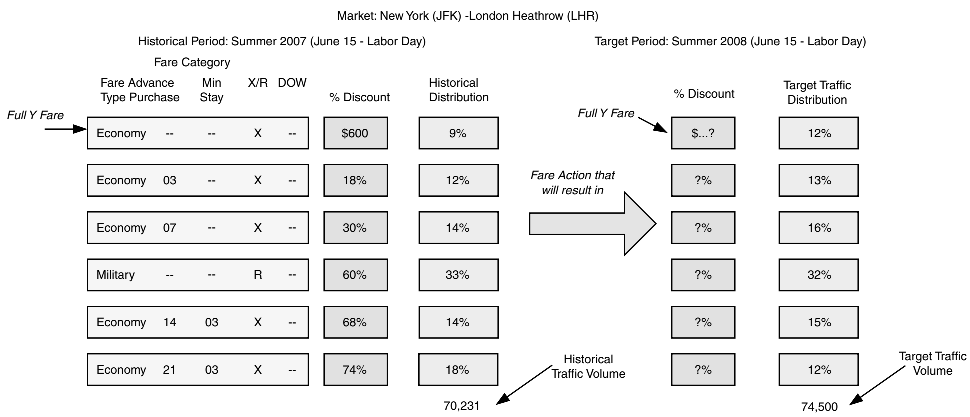

Figure 7: The pro-active fare action dilemma

2007), the pricing analyst has to determine price levels for the target (Summer 2008) period. Specifically,

(i) *What is the initial price for full Y (economy fare with no restrictions) for the target period?*
(ii) *What are the discounts off full Y fare category that should be established to achieve a desired traffic distribution across all fare categories?*

Once the price discounts at the fare category level and the value of full *Y* are known, the pricing analyst can introduce multiple variations at the fare basis code level and determine the value of the fare based on the historic traffic flow from the calibration period. The simple rule of thumb is to ensure that the selling fare basis codes associated with a fare category average out to the recommended discount at the fare category level.

Accurate availability

The exponential growth in online bookings over the past decade has provided customers with instant access and visibility into competing schedules and fares through the web supermarkets like Travelocity and Expedia. This unparalleled transparency of schedules and fares over the internet has propagated a bargain-hunting mentality among leisure online travellers, resulting in a disproportionate growth in availability processing due to the increased shopping activity. As a result, the need for greater revenue and inventory control has not been greater. Owing to the growth in online shopping coupled with the use of robotics for comparison shopping across websites, it is estimated that the look-to-book ratio from online channels can vary from 100:1 to well over 1,000:1 in certain markets. If these individual shopping requests were submitted to an airline's host CRS, it is a well-known fact that the legacy mainframe systems cannot cost-effectively scale to meet current or future shopping demands. Further, online web supermarkets resort to cached availability for two reasons: reduction in transaction costs associated with querying an airline's host CRS for true last seat availability and faster response times from availability data that are readily available in the cache. The cache is periodically refreshed based on the age and usage of the availability data. When an item is not found in the cache, the response to an end consumer can be based on pre-stored AVS or a direct query to the host CRS of the airline to refresh the cache.

Cached inventory unfortunately is often not accurate as online channels typically store this information by segment class, and so operational business rules are not reflected in the cache. Further, for airlines that manage their inventory by origin and destination (O&D) (Vinod, 1995), the segment class cache does not reflect true O&D class availability. To address this problem, Sabre was the first to deploy cached availability by O&D, class and country point of sale. This was an industry first and constituted a step improvement in the accuracy of availability displays over cached availability by segment class. While O&D cache was a vast improvement over segment cache, however, it was still at a *higher level of aggregation* than the level of detail at which inventory needs to be controlled on the host CRS, and therefore can result in availability errors.

There are two types of availability errors that occur when the cache does not reflect the true availability. They are referred to as Type 1 and Type 2 errors.

A *Type 1 Error* occurs when the cached availability for a booking class is *open* while the class is truly *closed* in the host CRS. A type 1 error can also result in the customer experiencing a price jump, which implies that the minimum available fare displayed is lower when only a higher fare is truly available.

A *Type 2 Error* occurs when the cached availability for a booking class is *closed* while the class is truly *open* in the host CRS

These errors result in higher UCs (Unable to Confirm at sell), which in turn results in lost demand and loss of customer goodwill. The deployment of an Availability Proxy is a step improvement to determine true last seat

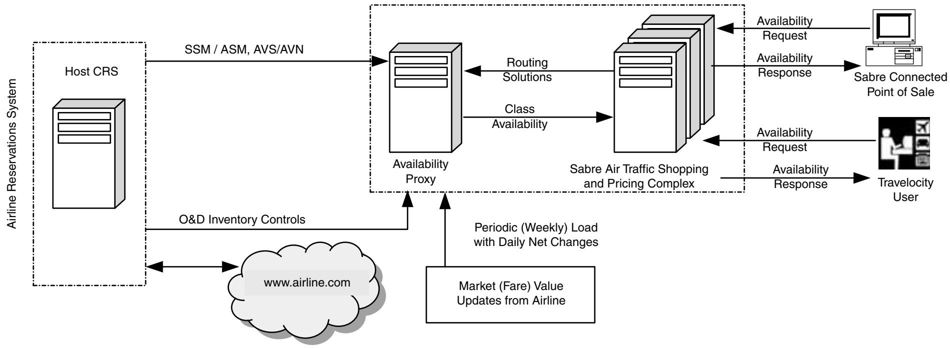

Figure 8: Availability proxy deployment for an O&D carrier

availability by replicating an airline's availability and business logic resident in the host CRS without submitting the availability requests directly to the host CRS. The solution also serves as an availability offload or by-pass for the host CRS without losing accuracy in availability responses.

For airlines that manage seat inventory by origin and destination, the value proposition of deploying an availability proxy for Sabre-connected points of sale is the reduction in UCs, which results in incremental bookings and improvement in customer goodwill as the first choice selected by the customer is rarely rejected (Vinod, 2007a, b). From a Sabre GDS perspective, with the deployment of an Availability Proxy, all availability and shopping transactions from Sabre-connected points of sale will be processed directly by the availability proxy for true last seat availability.

Figure 8 illustrates the high-level deployment schematic for an airline that operates with O&D controls. As shown in the figure, the host CRS sends standard and *ad hoc* schedule change messages (SSM/ASM) and availability status (AVS/AVN) to the Availability Proxy environment. In addition, the host CRS also sends current O&D controls (eg bid prices) every time there is a change in bookings by flight leg and date. The market values required for the O&D availability evaluation are updated by the airline typically once a week and net changes are processed daily by market on an exception basis.

CONCLUSIONS

This paper discussed the evolving trend toward customer-centric revenue management. While focus on the customer has begun in earnest, the key components of customer-centric revenue management are still in their early stages of evolution. As the evolving trend suggests, revenue management, CRM and how products are distributed are converging with strong inter-dependencies that require a holistic view to understand business impacts and how the various customer touch points need to be managed. The continuing evolution of pricing and revenue management is a winning proposition for both the airline and the customer.

A key driver for the migration are the more sophisticated demands from airlines based on advances in pricing, revenue management and customer retention initiatives in CRM to effectively manage customer touch points to build lifetime relationships with the valued customer base.

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