

The Value of a PNR Data Warehouse

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Table of Contents

<i>Executive Summary</i>	2
<i>Introduction</i>	2
<i>PNR Data Warehouse</i>	3
<i>Business Benefits</i>	4
<i>PNR Data Warehouse Helps Your Business Grow</i>	8

Executive Summary

Very few airlines have the ability to view and analyze every aspect of the entire current and historic Passenger Name Record (PNR) from a single system. However, those with the ability to access fully-versioned PNRs are provided with a competitive advantage over other airlines. By being able to analyze the complete, current, and historic PNR data, these airlines are provided with a tool that provides them with information that supports a broad range of capabilities, with revenue management and customer management identified as two key areas.

Introduction

Most airlines typically parse data from the Passenger Name Record (PNR) into separate files to populate operational and analytical data marts based on departmental needs. For example, revenue management receives the number of bookings per flight, revenue accounting receives ticketing data, frequent flyer receives flown data at the segment level, and so on. However, as most departments evolve, they find that access to more information from the PNR would be useful. Modifying the file transfers and retrofitting the systems to accommodate this additional data is often consuming and expensive.

However, airlines with access to an analytical platform that essentially recreates the reservations system and integrates this information with other relevant information not only have insight into booking, ticketing, and frequent flyer behavior, but are also provided with the ability to analyze the behavior of all customers and understand how customer behavior ultimately impacts product delivery and profitability. This capability allows them to make better and more complete decisions, in a shorter timeframe, with added confidence based on better and more complete information.

The Value of a PNR Data Warehouse

Additionally, supplying complete PNR data about all customers to all departments provides the ability to discover additional relationships in the data that were previously unexplored. Cross-functional departments that benefit from a PNR data warehouse include:

- > Yield Management
- > Pricing
- > Planning
- > Network Management
- > Scheduling
- > Cargo
- > Sales
- > Marketing
- > Finance
- > Revenue Accounting
- > Airport Operations
- > Revenue Control/Revenue Integrity/Fraud

PNR Data Warehouse

PNR Decode

The creation of a fully-versioned PNR data warehouse begins with the PNR decode process. The complexity of this process is not to be discounted. The main objective is to derive business information from the PNR (passenger name record containing details of a reservation/booking for a passenger or group of passengers). This is done using the PNR image, which typically consists of several record types, some of which are formatted and others

freeform text. There are two major functions to be developed. The first is to keep track of all changes made to the PNR. This provides the capability to reproduce the image of the PNR at any particular point in time. The second is to decode/derive information from PNR data, the most difficult being from freeform text.

The information can be divided into a few general categories:

- > Flight Bookings Information, including when the booking was made, the status of the booking, revenue versus non-revenue, seat requests, special meal requests, identifying and capturing all changes to the bookings
- > Sales Information, including channel, travel agency, travel agent, campaign, promotions, and sales commission
- > Ticket Information, including ticket number, fare basis, and taxes
- > Passenger Information, including name, salutation, age, occupation, loyalty card and contact details, and preliminary householding
- > Itinerary Information, including flight segments, legs, O&D, turnaround point, connection point, and journey
- > Non-Flight Bookings Information, including hotel, car rental, and tour details
- > Miscellaneous Information, including person who makes the booking (the secretary perhaps), organization name, and other preferences

The process to derive the above information will include:

- > An edit and verify process to identify errors before the decode process begins.
- > A closed loop process to reprocess the identified errors.
- > The creation and maintenance of the booking record (including recording the history of all the changes), it may also include the need to track PNR divides (the process whereby a PNR is divided/split into child PNRs). This booking record will be in the form of a relational data model, which will allow for the representation of the booking across several E-R tables.
- > A rule-based interpretation process, for example, to determine if a booking is a revenue or non-revenue booking.
- > A decoding process to obtain details, such as ticket numbers, salutations, telephone numbers, and special meal requests.
- > A process to purge (based on business rules) obsolete PNRs.

The process is expected to be hosted in Windows® 2000 environment using the C++ programming language and would use the standard TPF image dump file (BEV file). In this way, it is expected that there will be no major impact on the TPF to produce the PNR image.

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Business Benefits

Enhanced Analytics Based on Journey Information

Most airlines today extract summarized PNR data from their reservation systems. Typically the summary is by flight/leg and does not include any of the important characteristics of the booking and travel. This information is thrown away as useless. The major limitation of parsed and summarized data is that they do not reflect accurately the product that a customer purchases.

Journey

A customer purchases a journey going from A to B and frequently from A to B to C to D, with stopovers, transit, combination of business and leisure travel, and all other variations.

To fully understand a market and customer behavior, it is vital to be able to analyze a journey. In this way, an airline can optimize its entire network and not just a flight leg (from A to B).

Typically, airlines optimize yield based on a flight leg, but with PNR journey data, they can optimize yield based on the entire journey. For example, clearing the waitlist on a low yield class from A to B results in a high yield fare from B to C.

Examples of the types of analysis that can be enabled/supported include In/On carriage, Path/Flow, and Origin and Destination analysis.

Origin and Destination (O and D)

Most airlines today operate using flight/leg information, which does not fully reflect the actual flow of passengers. With the PNR data, O and D information can be very easily generated.

This will enable an airline to change their operations to do the following:

- > Yield Management, creation of a pseudo OD booking class
- > Forecasting traffic and revenue
- > Market Analysis
- > Network Optimization, adjustment of the schedule by matching OD advance booking versus forecast
- > Pricing, forecast by OD/fare basis

Interline Travel, In/On Carriage Analysis

In and On carriage tells where a passenger intends to travel, for example, Canberra to Sydney to Los Angeles to Chicago. In carriage is from Canberra to Sydney and On carriage is from Los Angeles to Chicago. By undertaking In/On carriage analysis, airlines are better able to understand their true market. In this example, if the airline finds that a significant number of its passengers travel on to Chicago from Los Angeles; it may consider flying direct to Chicago.

Some airlines have used this information to help determine alliance, code share, or special prorated arrangements (negotiated code share deal from Los Angeles to Chicago) and to negotiate a better fare structure with partner airlines.

Path/Flow Analysis

Similarly, with journey data, an airline can create simulations or what-if analyses for demand impacts to schedule changes. By determining the downstream impacts of schedule changes based on the full itinerary, the airline can better manage capacity, demand, and network impacts.

MIDT

Many GDS, such as Sabre and Amadeus, make a business out of selling MIDT data. With PNR data, it will be possible for airlines to create their own version of their MIDT data. Some airlines must purchase MIDT data and applications that report on MIDT data, by generating their own version of MIDT so they can integrate their data into the MIDT reports and determine changes in their market share.

Enhanced Analytics Based on Booking Information

Most airlines today extract summarized PNR data from their reservation systems. Typically, the summary is by flight/leg. This summary typically removes the booking information, for example, there is no information on the number of bookings per flight (only number of passengers booked).

Information, such as the number of passengers per booking, can help refine the yield management process. Passenger behavior and the probability that a booking will result in flown travel may vary based on the number of passengers in a booking. For example, the revenue

The Value of a PNR Data Warehouse

management process generally operates based on counts; however, the behavior of five Q bookings will vary based on whether it is one booking of five or five bookings of single passengers. The data can also help differentiate between leisure and business travel and helps with the segmentation process. The data can also be used to measure the effectiveness of marketing and sales programs and any dilutions resulting from these programs.

Additional information about bookings also allows for a more holistic analysis. For example, when deciding whether to discontinue giving out children's packs, rather than looking at the cost savings based on numbers, the analysis can extend to the impact on the main customer (e.g., the father), and the airline can understand the risk of making the father unhappy, especially if he is a valuable customer. This type of analysis is similar to householding in that distinctions between the passenger affected and the person who controls the travel decision are analyzed and understood in terms of decision making.

Costs can also be better managed as some of the charges are applied by bookings rather than by passenger; for example, a change to the itinerary.

Forward Bookings Analysis

With PNR data online, it will be possible to dynamically create booking curves (a booking curve is the number of passengers/bookings held over the period of time from when the flight is open for booking

until the time the flight departs. It can include intakes and cancellations) based on:

- > Route
- > Flight number
- > Date
- > Origin destination
- > Point of sales
- > Booking class
- > Cabin class
- > Fare Basis Code
- > Travel agents
- > Sales and Marketing programs
- > Channels
- > Special events
- > Business conditions (such as 9/11 and recessions)

This level of flexibility with the integration of all airline data in the data warehouse will allow for a quick analysis based on slicing and dicing techniques. For example, when demand is soft, the analyst can quickly drill down to the root cause.

This booking curve enables a very quick way to visualize the state of the business in terms of demand. This ability allows for an efficient way to validate:

- > The effectiveness of the yield management system.
- > The impact of a promotion/pricing policy – not just on a market but some surrounding markets. For example, what was the impact of a drop in price? Did the demand pick up? Did it take business away from a surrounding market?

If historical PNRs are kept, it will be possible to compare this year against previous years. By better understanding the historical data, airlines can better distinguish between trends and anomalies in activity, thus empowering better price, route, and customer decision-making. This will add another dimension to the analysis.

Customer Behavior

PNR data also captures individual customer behavior including:

- > How far in advance does the customer book?
- > What is the probability of a booking turning into a ticket and resulting in revenue?
- > Which channel does the customer use most frequently (travel agents, direct, web)? Is there opportunity to direct them to a lower cost channel?
- > How far in advance does the customer ticket? Does he more frequently use electronic or paper tickets?
- > How often does he change his travel dates? Does this occur before or after ticketing?
- > How often does he cancel?
- > How often does he rebook the travel?
- > When does he typically cancel?
- > Could his seat have been sold to a higher yielding passenger based on his cancel date?

The Value of a PNR Data Warehouse

- > How often does he make requests for special meals? Check baggage? Use kiosks? Volunteer for denied boarding compensation?
- > When and how often does he reissue and refund?
- > What other passengers have similar behavioral characteristics that can be grouped for campaigns, communications, and insight?

This information will allow for a deeper understanding of the customer and allow the airline to understand the cost of servicing that individual customer. For example, a customer who buys full fare through a travel agency but always cancels at the last minute may not be good customer.

It will also allow analytical models to be built that will predict the likelihood of a last minute cancellation based on the composition of the booking details for each flight. This will help ensure better inventory control and airport operational efficiency.

Improved Operations

Overbooking Profile

Knowing who is booked on a particular flight and that person's behavior allows for a more accurate booking profile. For example, if there are many passengers who regularly cancel (or no show) at the last minute, it may be possible to tolerate a higher overbooking profile. You may not want to treat a flight based on a single

individual, but if 40% of a flight's passengers are profiled as high no-show, the airline may want to reevaluate the authorization levels for that flight. Additionally, this information can be used to determine that customer's true value to the airline and may want to reconsider any future waivers or favors for that passenger based on no-show rates and other PNR cost characteristics.

Additionally, segmenting the passengers on a flight based on their PNR data can influence overbooking practices to ensure that flights depart with the maximum number of passengers to support the demand for that market. For example, if the division of passengers in market A, from a Point-of-Sale B, with booking profiles that show travel booked/ticketed within seven days of departure and show that x% of passengers are on the outbound portion of travel, y% are return, and z% are through passengers, there are different probabilities for passengers showing for a flight.

Knowing when the booking was made, when it was ticketed, if there were hotel and car hire bookings included, the number of passengers, and whether it is leisure or business travel, will help determine the likelihood of a cancellation or no show.

Based on these probabilities and characteristics, the overbooking levels for a flight/market might be adjusted. It may then be possible to tolerate a higher overbooking profile for that flight.

Analysis of the customer behavior will also allow for proactive resolution of potential overbooking situations and training opportunities for consistent booking rule anomalies.

Airport Operations

With ready access to PNR data, it will be possible to know how many people will be checking in and plan for the optimum number of check in agents. Knowing number of passengers who are in transit (as compared to getting off the plane) will help with the plan to optimize the number of ground handling crew.

Similarly, knowing the number of passengers who will use the airport lounge can help plan for seating and available food and amenities.

Whenever there are operational irregularities, such as delays and cancellations, having the PNR data will enable a faster and more optimal response to re-accommodations and customer requests for changes. It will allow for prioritizing of responses based on customer valuation.

Cargo On Board

Having ready access to the number of passengers on board, average number of pieces checked, and the corresponding weight for each passenger's checked baggage can help plan whether to carry more cargo and for sales opportunities to acquire more cargo on a timely basis.

The Value of a PNR Data Warehouse

Investigations and Security

Having PNR data in a database will allow for quick investigations on who is on board and when and how he booked and travelled. Listing passenger manifests and searching for all persons and individuals on board each flight can be performed very easily.

Being able to relate bookings by passenger names will also allow for an easy and quick way to investigate passenger bookings and travel patterns and identify potential risks. It will also allow for the identification and prevention of fraud and theft.

Revenue Assurance

Having detailed PNR data will allow the airline to validate their GDS charges against what actually took place. Some airlines have realized significant reduction in GDS charges. A similar exercise can also be conducted by validating BIDT charges.

Being able to compare what was booked against what was ticketed (after integrating PNR data with ticketing data) will help identify ticketing class abuse situations where a high yield booking was flown using a lower yield ticket. Some airlines have realized millions of dollars of savings from this type of analysis.

With the ability to match bookings by passenger, it is possible to identify practices, such as back-to-back or hidden city ticketing and, therefore, reduce revenue leakage.

By matching ticket numbers in bookings, it is possible to identify ticket number abuse where travel agents use the same ticket number to retain multiple bookings.

Having PNR data (point of sale, itinerary, booking date/time) will also allow for the identification of pseudo group bookings where travel agents break up the group bookings into smaller numbers to avoid the close scrutiny of the airlines and bypass the group booking requirements.

Integration with Seat Inventory, Flight Schedules, and Departure Control

With the integration of departure control data, it is possible to understand customer behavior in terms of:

- > How often he no shows and under what circumstances.
- > Does he have last minute requests (for seat and special meals)?

It will also be possible to tell how many bags are on board and help the destination airport plan for an optimum size ground handling crew.

Flight schedule gives information about what product is available; Seat Inventory tells what is available for sale; PNR tells

what was bought and by whom; and finally, Departure Control tells what was actually consumed.

Together, they provide a very powerful view of the business and allow for sophisticated and complex analysis.

Integration with Tickets

By integrating tickets with bookings, an airline can begin to analyze revenue of each booking. This will provide a new and invaluable dimension to managing the business based on actual revenue rather than yield class.

PNR is the heart of the airline and is the integrating information that ties frequent flyer, complaints, and tickets together. It is important to get PNR into the data warehouse.

Also, by integrating the bookings, tickets, and flown data, the recognition of revenue can be accelerated. Also, the revenue forecast accuracy will be improved.

Integration of data, such as complaints, will enable the airline to more appropriately tailor the response to a complaint to the total value of the customer. One would not have the same response to a complaint to a leisure traveler who only buys one or two discount tickets per year to a high-value customer who buys a full fare ticket every week.

The Value of a PNR Data Warehouse

PNR Data Warehouse Helps Your Business Grow

The integrated PNR data warehouse is a centralized data repository that provides enterprise-wide access to an airline's critical data. The fact that the data resides in one place on one platform allows quick access to the data to answer cross-functional questions that were not allowed in the past. The speed of decisions is critical in today's fast-moving marketplace.

And, while PNR data is a significant data source, it is profoundly more valuable when integrated with other system data that includes ticket, MIDT, departure control, check in, inventory, schedule, maintenance, customer relations, agency, and fraud information.

Relationships and trends can be analyzed, leading to better and more confident decisions. Also, users can get better insight into customer demand, improve confidence in tactical decisions, and influence the overall strategy of a company.

In summary, PNR data is a valuable data resource that provides empowerment for fact-based management. The value of integrating PNR data with customer and product data is immense; the most important and dramatic insights come from cross-functional access to the data. In today's competitive marketplace, airlines should view PNR data as a major asset and use it to their advantage.

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