Airport X Customer Experience Analysis and Recommendations

A Case Study submitted by

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Introduction

Airline Industry Trends:

Excerpt from PwC Strategy&

The airline industry is hampered by slim profit margins, forcing carriers to focus on both cost reduction and revenue growth through better customer interactions.

The global airline industry continues to grow rapidly, but consistent and robust profitability is elusive. Measured by revenue, the industry has doubled over the past decade, from US$369 billion in 2004 to a projected $746 billion in 2014, according to the International Air Transport Association (IATA).

Much of that growth has been driven by low-cost carriers (LCCs), which now control some 25 percent of the worldwide market and which have been expanding rapidly in emerging markets; growth also came from continued gains by carriers in developed markets, the IATA reported. Yet profit margins are razor thin, less than 3 percent overall.

In the commercial aviation sector, just about every player in the value chain — airports, airplane manufacturers, jet engine makers, travel agents, and service companies, to name a few — turns a tidy profit. Yet it's one of the enduring ironies of the industry that the companies that actually move passengers from one place to another, the most crucial link in the chain, struggle to break even.

That is largely due to the complex nature of the business, manifested in part by the significant degree of regulation (which minimizes consolidation), and the vulnerability of airlines to exogenous events that happen with great regularity, such as security concerns, volcanic eruptions (independent.co.uk), and infectious diseases (reuters.com). But ongoing price pressure is also a factor; the airline industry is one of the few sectors that have seen prices fall for decades. Since the 1950s, airline yields (defined as the average fare paid by a passenger per kilometer) have consistently dropped.

Given these unique circumstances, airlines must continue to focus on top-line growth because their limited profitability depends almost solely on revenue gains, while increasing productivity in order to shore up and perhaps even increase margins. The way individual commercial airlines react to and navigate several trends playing out across the globe will determine carrier performance in the coming years.

The trends include:

- Increasing consumer expectations
- Growing pressure to reduce costs and improve operational efficiency
- Shifting airline landscape

Increasing consumer expectations

People have grown accustomed to seeing significant improvements in their experiences with things they buy. Large and small products are more reliable and more user-friendly than ever before. Consider how cars have progressed even in the past decade, with upgraded safety and

entertainment features, and far better handling and fuel consumption. Yet air travel has not followed this pattern. It remains for many a disappointing, grumble-worthy experience.

Consumer disaffection is challenging for carriers to address because upgrading the “hard product” — the aircraft — is an expensive way for airlines to differentiate themselves, and the payback could be long in coming. Enhancing the “soft product” — through a welcoming and seamless customer experience across all aspects of air travel, from reservation to touchdown — is cheaper, but often more difficult to implement. Typically, such enhancements entail a wholesale behavioral and cultural shift within the organization, particularly for frontline, customer-facing employee.

Growing pressure to reduce costs and improve operational efficiency

Airlines need to make large and ongoing improvements to operate more efficiently. With few exceptions, the most successful airlines are those with the strictest cost controls. The biggest (albeit cash-intensive) lever to reduce costs lies in fuel efficiency, as jet fuel typically accounts for 40 to 55 percent of operating expenses.

Carriers with sufficient funds have been gradually modernizing their fleet to incorporate more fuel-efficient aircraft. Yet, because planes are so expensive, this approach has real value only if it is thoughtfully implemented in line with the carrier’s long-term plans for the configuration of its network, such as the programmatic expansion of certain routes over a period of years.

Cost reduction can also be achieved through enhancements in organizational structure, operating model, and work practices. In particular, legacy airlines have often built up complex processes over decades that cost far more than the streamlined processes of the LCCs.

For example, the systems that legacy carriers have in place to handle transfer passengers — how to price connections, how to handle baggage between the two flights, whether to hold a connecting flight for a few late passengers or simply rebook them, and so on — were designed when their networks were far smaller. Today, those systems have layers and layers of complexity built in, making them cumbersome and costly in many cases.

Shifting airline landscape

The rapid growth of air travel in developing markets, such as Latin America and especially Asia, is shifting the industry’s center of gravity. Middle East–based carriers such as Emirates, Etihad Airways, and Qatar Airways are taking a large slice of the formerly profitable Europe–Asia traffic from those continents’ legacy airlines.

The Middle East carriers are highly dependent on connecting traffic, because their home markets are limited by the smaller population of their region. Yet their unique geographic positioning — most of the world’s population is within eight hours’ flying time — means they are able to capture a disproportionate share of long-haul market growth.

Similarly, LCCs continue to experience above-average growth rates for the industry, particularly in emerging economies with many first-time fliers. Worth noting, however, is that LCCs also increasingly face rising customer expectations, especially in mature markets. These carriers will need to find the right balance between making investments to improve the experience they offer and maintaining their cost advantage.

And consolidation will play a role in the industry as well. To a large degree, the industry's low margins are driven by its fragmentation, and the resulting overcapacity in many markets. Still, U.S. carriers have been able to improve their financial performance dramatically, primarily through bankruptcy restructuring and a series of major mergers.

Airport X's Strategic Plan

In response to these trends, Airport X strategy is focused on several specific measures to remain competitive.

- Get to know your customers better
- Use digitization to reduce operating costs
- Cut the fat, not the muscle
- Partner strategically

The focus of this case study is on the strategic initiative: Get to know your customers better.

Get to know your customers better. As is true in other industries, understanding individual customers' preferences and consumer-related activities is essential to delivering personalized service and targeted offerings. However, airlines must evolve beyond their reliance on existing loyalty programs, which can generate significant customer data (such as spending patterns through an airline-branded credit card) but don't automatically lead to real insights about travel behavior and choices.

In most cases, carriers need to invest in more advanced customer analytics. And technology alone is not enough; airlines must also rewire their organization and processes to embed customer service into their organizational ethos. For example, at each point of interaction between the passenger and the airline — looking up flights, booking, check-in, boarding, and in-flight experiences — airlines can capture richer data about customers' preferences, and constantly seek to exceed their expectations.

The benefits of greater customer knowledge and, hence, intimacy are an improved passenger experience and targeted offerings, such as proactive recommended flights to a passenger's preferred destinations. As a result of such an approach, airlines gain a greater chance to generate ancillary revenue, and — through loyal customers — a higher percentage of sales coming through direct channels (rather than through online travel sites, which take a cut of revenue). This approach will also allow full-service carriers to unbundle existing products and charge fees for specific aspects of the trip, such as fast-tracking security lines or advance boarding, without alienating customers and putting their premium positioning at risk.

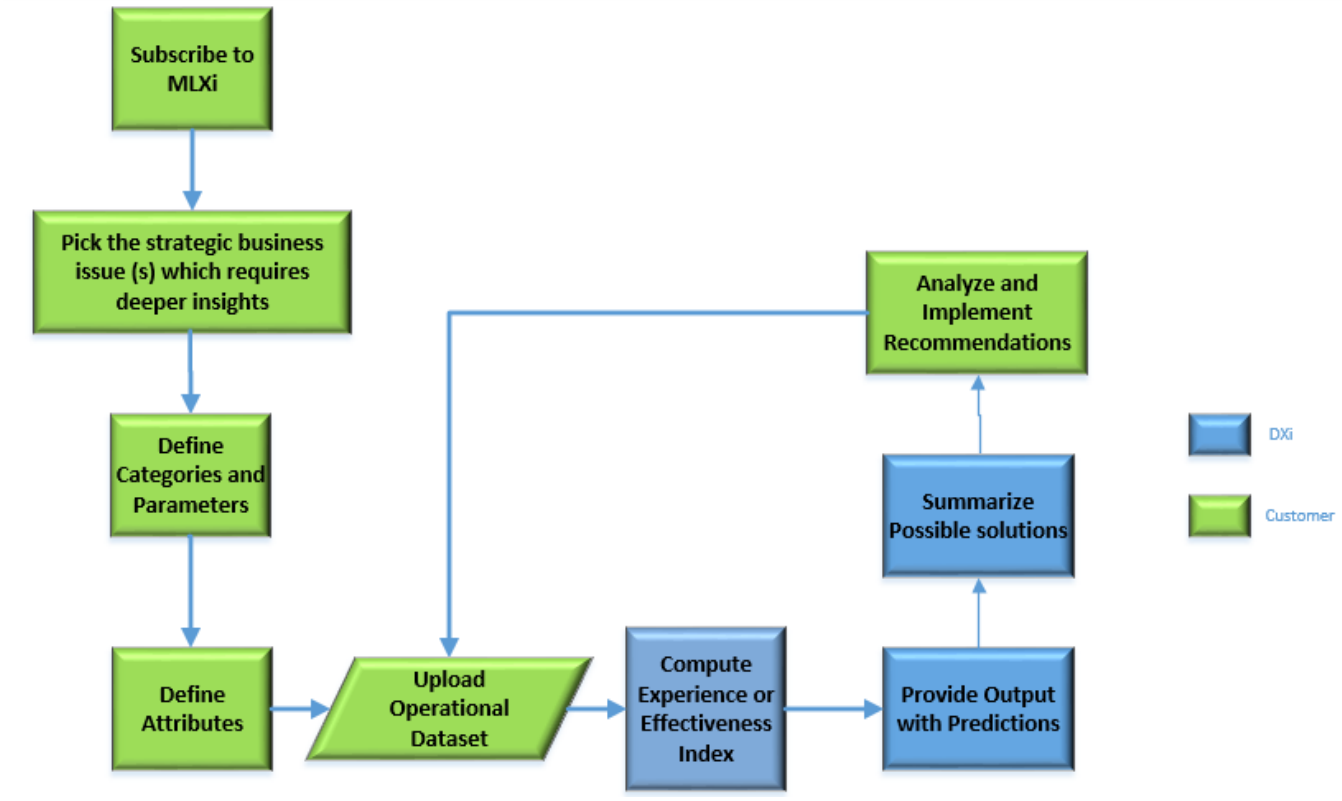
Conclusion

The Airport X has long struggled with margins, but realize the current growth phase in most markets, coupled with evolving technology and customer preferences, offers a real opportunity. By adopting the measures described here, Airport X can forge better relationships with customers, cut costs selectively, and improve their financial performance in a sustainable way — either alone or with the right set of partners.

The following identifies the steps followed to provide significant strategic insights into Airport X customer experience.

Process Steps:

- Pick the strategic business issue (s) which requires deeper insights
- Identify Categories and the supporting Parameters within each category that contribute to each issue (make sure that corresponding data exists for the Parameter)
- Define attributes
- Provide an Operational Dataset (Data File)
- Feed the Operational Dataset into MLXi Engine
- MLXi Engine generate the Root Cause Analysis and Prediction outputs
- Analyze the output to generate the possible solutions



1) Pick the strategic business issue (s) which requires deeper insights:

A major Airport in the Western US (Airport X) wanted to analyze the effectiveness of its programs implemented to provide a better customer experience. Millions of dollars were being spent in this area, however airport officials desired a “deeper level of intelligence” to understand how this program was impacting the overall customer experience at Airport X. They desired data that would provide insights in to getting to know its customers better. This actionable information would identify contributing factors enabling them to make the appropriate improvements with the aim of achieving customer experience benefits, optimizing resources and minimizing risks.

2) Identify Categories and Parameters:

Working with airport domain experts it was determined customer experience could best be categorized into:

- Visual
- Pedestrian
- Safety
- Cleanliness

The domain experts based on their experience determined the following parameters would be good measurements of each category.

	Category	Parameters
1	Visual	
		Art Work
		Signs and Directions
		Information Displays
		Shops and Concessions
		Website
2	Safety	
		Personal Safety
		Security Screening
3	Pedestrian	
		Escalators and Elevators
		Ease of personal navigation
4	Cleanliness	
		Restroom Cleanliness
		Restaurant Cleanliness
		Information Booth Cleanliness

3) Define Behavior Groups Attributes:

Optionally, the domain experts decided they want to do understand the behavior pattern of two groups of customers. The table below shows the behavior groups [Convenience and Facility] along with the attributes which contribute to a customer being assigned to a specific group.

Group No.	Group Name	Group Attributes
1	Convenience	
		Ramps
		Commute
2	Facility	
		Parking
		Locker

4) Provide Operational Dataset:

Data was capture through a survey of 236 randomly selected passengers. The data was transposed from the survey into a csv file (Comma Separated Values).

The parameter-based question required a 0 (Bad) to 5 (Good) answer. Where as the group-attributes required a “Good” or “Bad” answer.

5) Feed the data into MLXi Engine and Obtain Predictions

Operational Data file is uploaded to the cloud-based MLXi Platform.

6) MLXi Engine generate the Analysis and Prediction output:

MLXi Engine computes the overall Customer Experience Index.

It also provides this index at the Category level to identify which categories need improvement.

In this case the Overall Customer Experience Index is computed as 66.15%

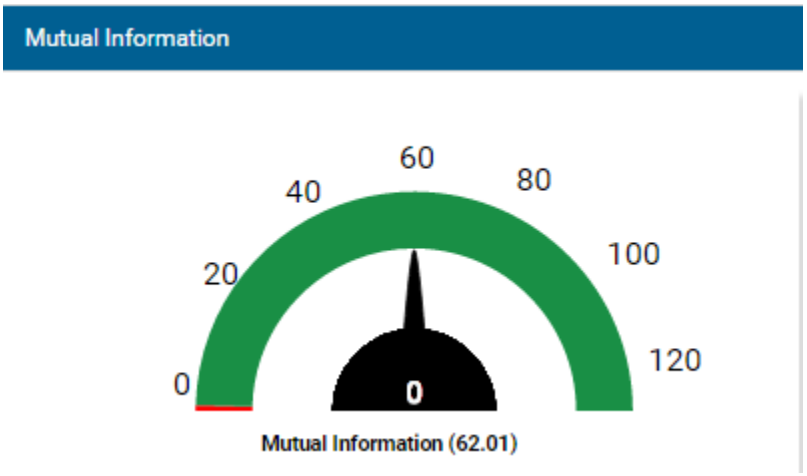
Selected Date : 03-17-2016

Total DXi+	VISUAL	PEDESTRIAN	CLEANLINESS	SAFETY	Total Data Points
66.15	31.72	9.03	16.46	8.95	236.0

Top contributing Factors for Customer Experience Index:

All the Feature selection algorithms identified the following key parameters:

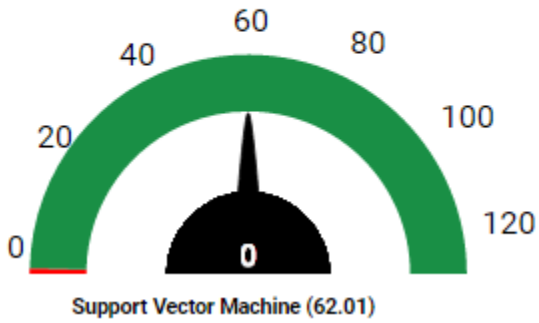
Mutual Information:



Parameter Name	Contibution Factor(%)
Ease of personal navigation	18.13
Information Booth Cleanliness	10.4
Restroom Cleanliness	10.14
Restaurants	9.34
Escalators AND Elevators	9.05

Support Vector Machine:

Support Vector Machine

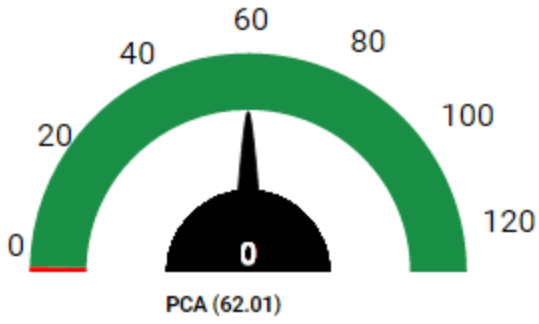


Support Vector Machine (62.01)

Parameter Name	Contribution Factor(%)
Restroom Cleanliness	10.58
Security Screening	9.91
Restaurant Cleanliness	9.89
Escalators AND Elevators	9.18
Shops AND Concessions	8.73

PCA (Principal Component Analysis)

PCA



PCA (62.01)

Parameter Name	Contribution Factor(%)
Restaurant Cleanliness	14.50
Signs AND Directions	10.78
Website	6.77
Ease of personal navigation	6.55
Restaurants	6.55

Summary:

Cleanliness is identified as a key area where Airports should focus on. This is highlighted by priority given to both Restroom, Restaurant and Information Booth Cleanliness.

Pedestrian Category with the following Parameters were also ranked as the priority.

Ease of Personal Navigation

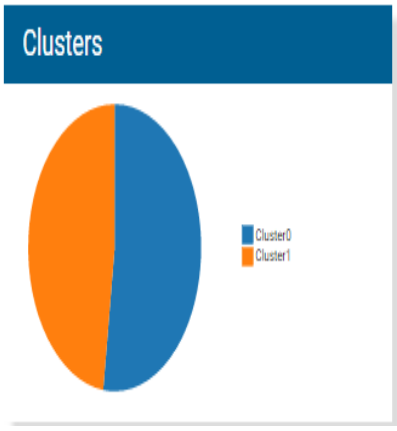
Signs and Directions

Escalators and Elevators.

Advanced Machine Learning algorithms have identified 2 key groups of Data.

Number of Clusters: 2
Number of points: 236
sum of squared errors: 165.65

Cluster Number	Number Of Points	% Of Total Points	DXi+
0	123	52.12	61.83
1	113	47.88	61.53



Behavior Analysis of Cluster 0:

This group of people clearly exhibited a leisure pattern within the Airport Area as they took enough time to enjoy the Art work, Do shopping and used the utilities like Rest Room.

	Cluster 0
Dimension	**Contribution Factor(%)**
Restroom Cleanliness	19.13
Art Work	11.87
Shops AND Concessions	11.16

Again this finding is corroborated by the fact that the following 2 attributes played a key role.

They had enough time to utilize the Lockers and Ramps (instead of using elevators) and were more specific on the quality of these attributes.

Parameters	Cluster 0
Significant Parameters	CONVENIENCE--Ramps FACILITY--Locker

Behavior Analysis of Cluster 1:

This group did not spend much time on Art work and were keener on moving faster. This is explained by their priority for the Escalators / Elevators and Ease of Personal Navigation both of which facilitates the faster movement of the Passengers within the Airport.

	Cluster 1
Dimension	**Contribution Factor(%)**
Escalators AND Elevators	17.32
Shops AND Concessions	15.07
Ease of personal navigation	14.04

This group gave higher priority to Commute and Parking. Faster Parking access and proper and frequent commutation facilities are very critical to move faster within the Airport.

Parameters	Cluster 1
Significant Parameters	CONVENIENCE--Commute FACILITY--Parking

Advanced ML Ensemble Algorithms

1.0 Boosting Algorithm Findings:

Here the regular ML algorithms get boosted by repeat runs to give more accurate results and hence the results of Boosting and Stacking algorithms have greater importance than the results of SVM or Clustering

Class distributions

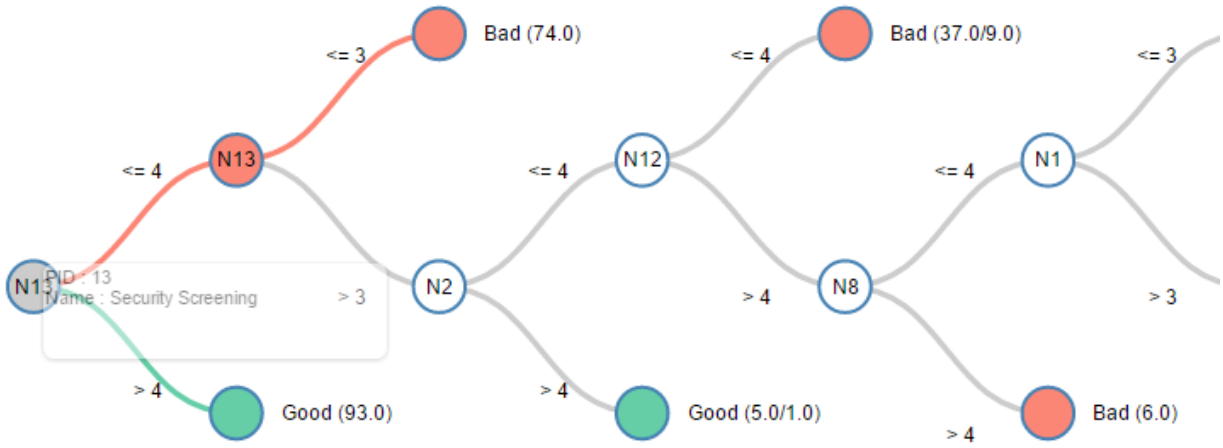
```
Security Screening <= 4.5
Good    Bad
0.17    0.83
-----------------------------------------------
Security Screening > 4.5
Good    Bad
1.0     0.0
```

2.0 Stacking Algorithm Findings:

The optimal path to improve Customer Experience was identified as below

Security Screening > 4

The above resulted in 93 out of 93 Customers having a good Experience. As you can see this is near 98+% accuracy which is why this gains importance



3.0 Simple Cart Algorithm:

SimpleCart Classifier

Correctly classifier	InCorrectly classifier	Mean absolute error	Root mean square error
212.0	24.0	0.0	0.29

```
        CART Decision Tree

Security Screening < 4.5: Bad(119.0/24.0)
Security Screening >= 4.5: Good(93.0/0.0)

Number of Leaf Nodes: 2

Size of the Tree: 3
```

4.0 Farthest First Clustering:

Farthest First Cluster

Dimension	Cluster 0	Cluster 1
Art Work	4	5
Restaurants	4	5
Shops AND Concessions	3	5
Signs AND Directions	2	5
Escalators AND Elevators	4	5
Information Displays	4	5
Information Booth Cleanliness	3	5
Restaurant Cleanliness	4	5
Restroom Cleanliness	3	5
Personal Safety	3	5
Website	3	5
Ease of personal navigation	3	5
Security Screening	Bad	Good

7) Analyze the output to generate the possible solutions:

Sl. No	Inference	Recommendation
1	Cleanliness identified as a top factor contributing to good Customer Experience	Focus on Cleanliness: Information Booth Cleanliness Restaurant Cleanliness Restroom Cleanliness
2	Pedestrian Convenience was identified as second key Factor for Customer Experience.	Improve ease of personal navigation with Signs and Directions and improved Escalators and Elevators,
3	From the Facility perspective the key expectations differ between the leisure travelers Vs the travelers who are in the rush. **Leisure Travelers:** Ramps and Locker **Travelers in Rush:** Parking and Commute There is almost same number of Travelers in these 2 groups.	Improve the Facility / Convenience for below : **Ramps, Locker, Parking, Commute**
4	All the advanced ML Algorithms identified one critical factor contributing to the Customer Experience. **Security Screening** For Example by having a Securing Screening value above 4 results in 93 customers having a good Experience.	Focus on the quality of the “Security Screening”. As both groups of customers (leisure as well as the non-leisure) gave weightage to this factor by - Reducing the wait time for Screen Screening - Improve the security screening methods using advanced auto techniques instead of manual checks.