

AIRLINE ANALYSIS

1. INTRODUCTION

1.1 Overview

The airline industry faces significant challenges, including operational inefficiencies, fluctuating demand, and high customer expectations. This project aims to provide a comprehensive analysis of airline operations and customer behavior to address these issues. By focusing on flight performance, customer demographics, feedback, and external factors, the project seeks to uncover actionable insights that can enhance operational efficiency and customer satisfaction. The ultimate goal is to equip airlines with the information needed to improve service delivery, increase customer loyalty, and achieve sustained profitability.

1.2 Purpose

The purpose of this project is to identify key factors affecting airline performance and customer satisfaction. Specifically, the project aims to analyze flight delays and cancellations, understand passenger demographics and booking patterns, and evaluate customer feedback on service quality. By developing predictive models and segmenting customers based on their behavior and preferences, the project seeks to provide strategic recommendations that can help airlines optimize their operations, tailor their services, and effectively target their marketing efforts. This data-driven approach aims to drive continuous improvement in the airline industry.

1.3 Technical Architecture

The technical architecture of the project involves several key components. Data is collected from multiple sources, including airline operational databases, publicly available datasets, and customer surveys. This data undergoes a rigorous cleaning and preprocessing process to address quality issues such as missing values, duplicates, and inconsistencies. Exploratory Data Analysis (EDA) techniques are applied to uncover trends and patterns, while predictive modeling techniques, such as regression analysis and clustering, are used to forecast flight delays and segment customers. The analysis is supported by visualizations that help in interpreting the results and formulating actionable recommendations. This structured approach ensures robust and insightful analysis, providing valuable information for strategic decision-making by airline management.

2. IDENTIFY THE BUSINESS PROBLEM

The airline industry is grappling with various operational challenges that directly impact customer satisfaction and profitability. Key issues include frequent flight delays and cancellations, inefficient use of resources, and an inability to effectively meet customer expectations. These challenges lead to increased operational costs, loss of customer trust, and decreased competitive advantage. The central business problem this project aims to address is how airlines can optimize their operations and improve customer satisfaction to enhance overall performance and profitability.

3. DATA COLLECTION

3.1 Collect the Data Set

Data Sources

Data was collected from:

- Airline operational databases
- Publicly available datasets (e.g., Bureau of Transportation Statistics)
- Customer surveys and feedback forms

Data Description

The dataset includes:

Passenger ID, First Name, Last Name, Gender, Age, Nationality, Airport Name, Airport Country Code, Country Name, Airport Continent, Continents, Departure Date, Arrival Airport, Pilot Name, and Flight Status.

Data Cleaning and Preprocessing

Data cleaning involved handling missing values, removing duplicates, and correcting inconsistencies. Preprocessing steps included data normalization, encoding categorical variables, and feature engineering.

3.2 Connect Data With Qlick Sence

Connecting and visualizing data in Qlik Sense involves several steps. Here's a detailed process to help you integrate your airline analysis data with Qlik Sense:

STEP 1 Preparing Your Data

Ensure that your data is cleaned and pre-processed. The data should be in a structured format, typically in CSV, Excel, or a database.

STEP 2 Loading Data into Qlik Sense

1. Open Like Sense:

- Log in to your Qlik Sense environment (either Like Sense Desktop or Like Sense Cloud).

2. Create a New App:

- Click on "Create new app" and give your app a name (e.g., "Airline Analysis").

3. Add Data to Your App:

- Open your new app and click on "Add data."
- Select your data source. You can upload a file (e.g., CSV, Excel), connect to a database, or use other data connectors provided by Like Sense.

4. Load Your Data:

- Follow the prompts to load your data into Like Sense. You may need to configure the data load settings, such as selecting the appropriate data types and handling any transformations.

STEP 3 Data Modeling

1. Data Manager:

- Use the Data Manager to associate tables and create relationships between different datasets (e.g., flight performance, customer demographics, and feedback).

2. Data Load Editor:

- For more advanced data modeling, use the Data Load Editor to script your data load and transformation process. Here you can write scripts to join, concatenate, and manipulate your data.

STEP 4 Creating Visualizations

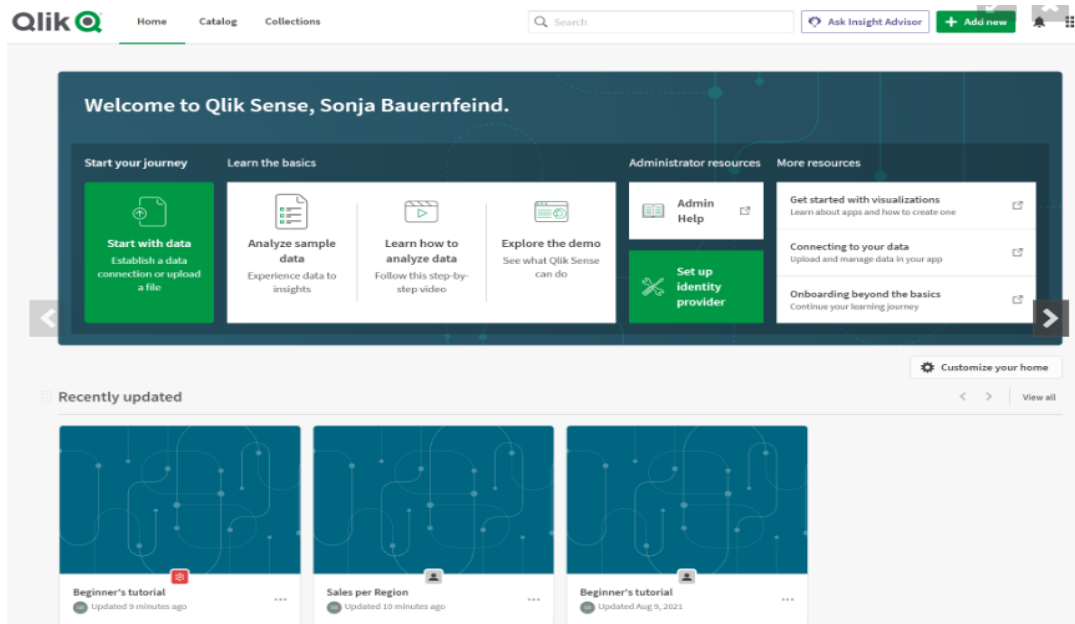
1. Sheet Creation:

- Create a new sheet within your app where you will add visualizations.

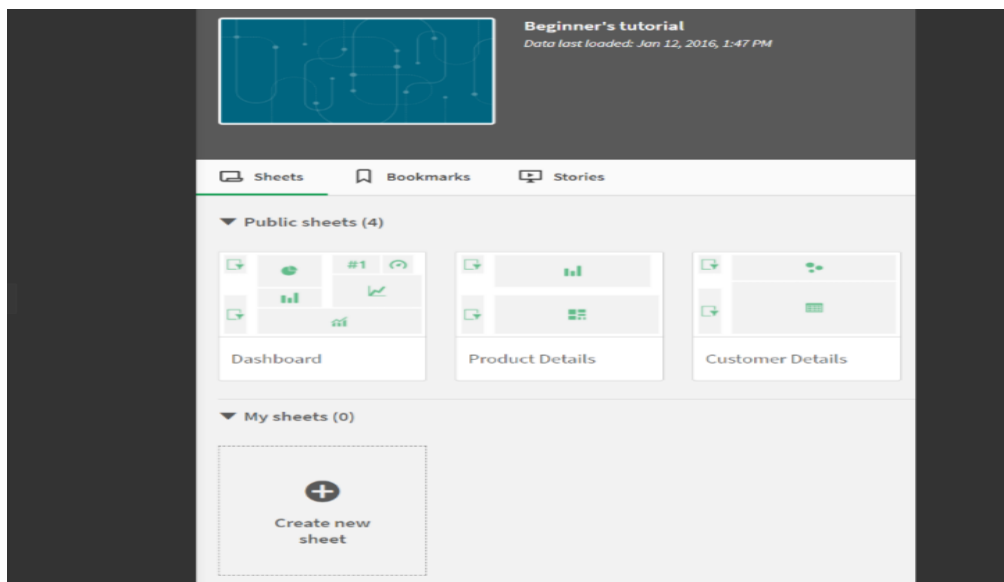
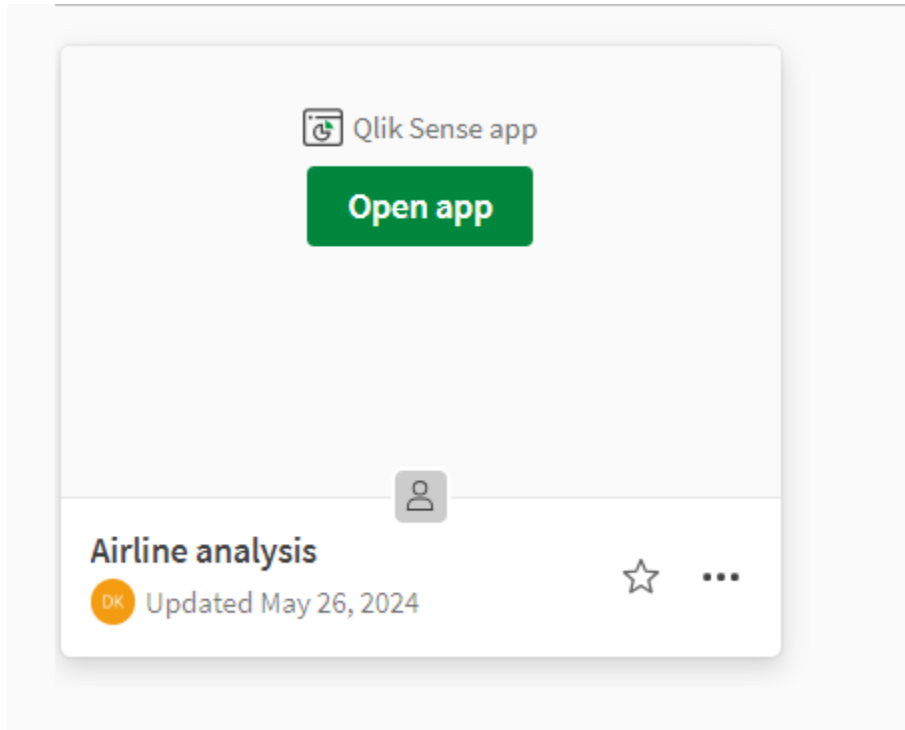
2. Add Visualizations:

- Drag and drop visualization objects (charts, tables, KPIs, etc.) onto your sheet.
- Configure each visualization by selecting the appropriate dimensions and measures.

By the following of these steps, we can create the dashboards for the airline dataset, then we can create the insights to analyze the data.



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Qlik ... Prepare Data manager Analyze Sheet Narrate Storytelling Airline analysis

+ Add data Concatenate or join

Airline Dataset Updated - v2

Recommended associations
Total tables: 1
Unassociated tables: 1
Recommendations: 0
Preview all Apply all

To make associations manually, you can drag one table onto another.

Airline Dataset Updated - v2 Airline Dataset Updated - v2.csv Fields: 15

Passenger ID	First Name	Last Name	Gender	Age	Nationality	Airport Name	Airport Cou...	Country Name
165488	Dionis	Joist	Female	4	Philippines	Bremen Airport	DE	Germany
824967	Federica	Peters	Female	16	Portugal	Watson Lake Airport	CA	Canada
0a1ws9	Lammond	Sargood	Male	59	Serbia	Karluk Lake Seaplane Base	US	United States
0A1y0a	Arel	Beswick	Male	83	United States	Holy Cross Airport	US	United States
0A2OYl	Jack	Mitrikhin	Male	89	Turkey	Rottnest Island Airport	AU	Australia
0a5x5P	Perry	Pretsell	Male	64	Nigeria	Vallenar Airport	CL	Chile

4. DATA PREPARATION

Data Preparation is a critical phase in any data analysis project. It involves cleaning, transforming, and organizing data to ensure it is accurate and ready for analysis. This section outlines the steps taken to prepare the airline data for analysis.

Data Cleaning

Steps:

- Identify missing data points.
- Decide on an appropriate method to handle missing values, such as: Removing rows/columns with missing data.
- Imputing missing values using statistical methods (mean, median)

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DATA SET

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Passenger	First Name	Last Name	Gender	Age	Nationality	Airport Na	Airport Co	Country N	Airport Co	Continents	Departure	Arrival Airp	Pilot Name	Flight Status
2	ABVWlg	Edithe	Leggis	Female	62	Japan	Coldfoot A	US	United Sta	NAM	North Ame	6/28/2022	CXF	Fransisco I	On Time
3	jKXXAX	Elwood	Catt	Male	62	Nicaragua	Kugluktuk	CA	Canada	NAM	North Ame	12/26/202	YCO	Marla Pars	On Time
4	CdUz2g	Darby	Felgate	Male	67	Russia	Grenoble-I	FR	France	EU	Europe	1/18/2022	GNB	Rhonda Ar	On Time
5	BRS38V	Dominica	Pyle	Female	71	China	Ottawa / C	CA	Canada	NAM	North Ame	9/16/2022	YND	Kacie Com	Delayed
6	9kvTLo	Bay	Pencost	Male	21	China	Gillespie Fi	US	United Sta	NAM	North Ame	2/25/2022	SEE	Ebonee Tr	On Time
7	nMJKVh	Lora	Durbann	Female	55	Brazil	Coronel H	BR	Brazil	SAM	South Ame	#####	LEC	Inglis Dolle	On Time
8	8IPFPE	Rand	Bram	Male	73	Ivory Coas	Duxford Ai	GB	United Kin	EU	Europe	10/30/202	QFO	Stanislas T	Cancelled
9	pqixbY	Perceval	Dallosso	Male	36	Vietnam	Maestro V	BR	Brazil	SAM	South Ame	#####	STM	Sharyl Easl	Cancelled
10	QNA52R	Aleda	Pigram	Female	35	Palestinian	Venice Ma	IT	Italy	EU	Europe	8/20/2022	VCE	Daryn Barr	On Time
11	3jmudz	Burlie	Schustl	Male	13	Thailand	Vermilion	CA	Canada	NAM	North Ame	#####	YVG	Alameda C	On Time
12	2P416Z	Porty	Jori	Male	39	Tunisia	Nuevo Cas	MX	Mexico	NAM	North Ame	5/27/2022	NCG	Rasia Fidel	Cancelled
13	sBf524	Briant	De La Hay	Male	71	Russia	Ruben Car	PA	Panama	NAM	North Ame	#####	SYP	Alina Floo	Delayed
14	PlwJZT	Kalie	Scoble	Female	47	Sweden	Loralai Air	PK	Pakistan	AS	Asia	3/19/2022	LRG	Madelena	Delayed
15	iU75x3	Catrina	Beaumont	Female	77	Russia	Cudal Airp	AU	Australia	OC	Oceania	3/24/2022	CUG	Margie Be	Delayed
16	GUta6R	Amberly	Handling	Female	32	China	Farmingto	US	United Sta	NAM	North Ame	#####	FAM	Lothaire E	Delayed
17	8qA80a	Dyna	De'Vere - I	Female	22	China	Oudtshoor	ZA	South Afric	AF	Africa	7/18/2022	OUH	Neila Gier	Cancelled
18	2haCDu	Janella	Hardaker	Female	28	Colombia	Zaraza Air	VE	Venezuela	SAM	South Ame	9/23/2022	ZRZ	Shaylynn A	On Time
19	WiVi8o	Alvin	Wenzel	Male	12	Greece	Enshi Airp	CN	China	AS	Asia	3/29/2022	ENH	Alfie Mac	Delayed
20	eOH5LI	Jerrine	Peeters	Female	87	Philippines	Thompson	CA	Canada	NAM	North Ame	#####	YTH	Chandra D	Cancelled
21	nL8kyD	Warner	Driutti	Male	62	China	Guilin Lian	CN	China	AS	Asia	#####	KWL	Marita Hol	Cancelled
22	9iT79e	Paige	Hayhow	Male	24	Sweden	Crested Bu	US	United Sta	NAM	North Ame	2/19/2022	CSE	Clyde Wini	Delayed
23	kEARqP	Dorisa	Skill	Female	19	Ukraine	St Augustir	CA	Canada	NAM	North Ame	#####	YIF	Ilyse Bartk	Cancelled
24	dx3NWWh	Bobbye	Patmore	Female	45	China	Port Berg	MG	Madagasc	AF	Africa	8/24/2022	WPB	Stella Pitt	On Time
25	DpaflY	Jayme	Dairton	Female	29	Indonesia	Hato Coro	CO	Colombia	SAM	South Ame	#####	HTZ	Kaye Clew	Delayed
26	WV3aXu	Sayre	Stroyan	Male	87	Indonesia	Elkhart M	US	United Sta	NAM	North Ame	3/20/2022	EKI	Austine Cr	Cancelled
27	f27tyG	Joellyn	Stutter	Female	8	Croatia	Timbedra	MR	Mauritanie	AF	Africa	2/19/2022	TMD	Janaya Ret	On Time
28	gStk	Editha	Dalok	Female	44	Dominican	Porto A	MM	Mexico	AF	Asia	#####	APV	Simi Shal	Delayed

5. DATA VISUALIZATIONS

Data visualization is a crucial aspect of the airline analysis project, transforming raw data into insightful visual representations that facilitate understanding and decision-making. The project utilizes various visualizations to cover multiple dimensions of airline operations and customer experiences. A histogram of flight delays reveals common delay duration's and outliers, while bar charts categorize flight cancellations by their causes, highlighting primary issues. Pie charts depict the distribution of passengers across different age groups and travel classes, providing a clear demographic profile. Line charts track customer satisfaction scores over time, identifying trends and correlating them with operational changes. Scatter plots examine the relationship between flight delays and customer satisfaction, as well as the impact of weather conditions on delays. Additionally, heat maps visualize flight delays against the severity of weather conditions, and bar charts and pie charts analyze revenue by route and travel class, identifying the most and least profitable segments. These visualizations, created using Like Sense Cloud, enable dynamic interaction and exploration of data, supporting strategic decisions and operational improvements.

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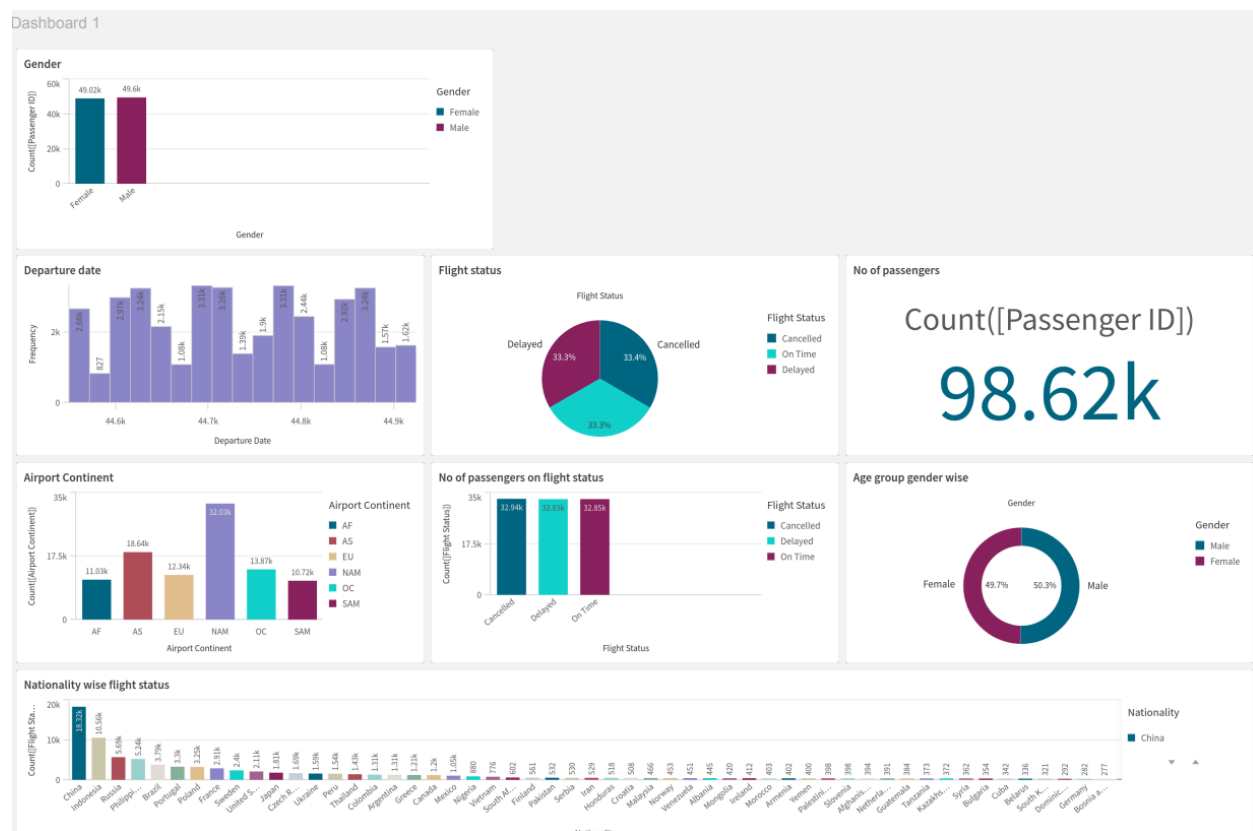
In the analysis, different visualizations are used to create a dashboards they are

- Pie chart
- Bar graph
- Line chart
- Donut chart
- Tree map

These are the visualizations are created in the dashboard to make insights and take the decisions according to the dataset.

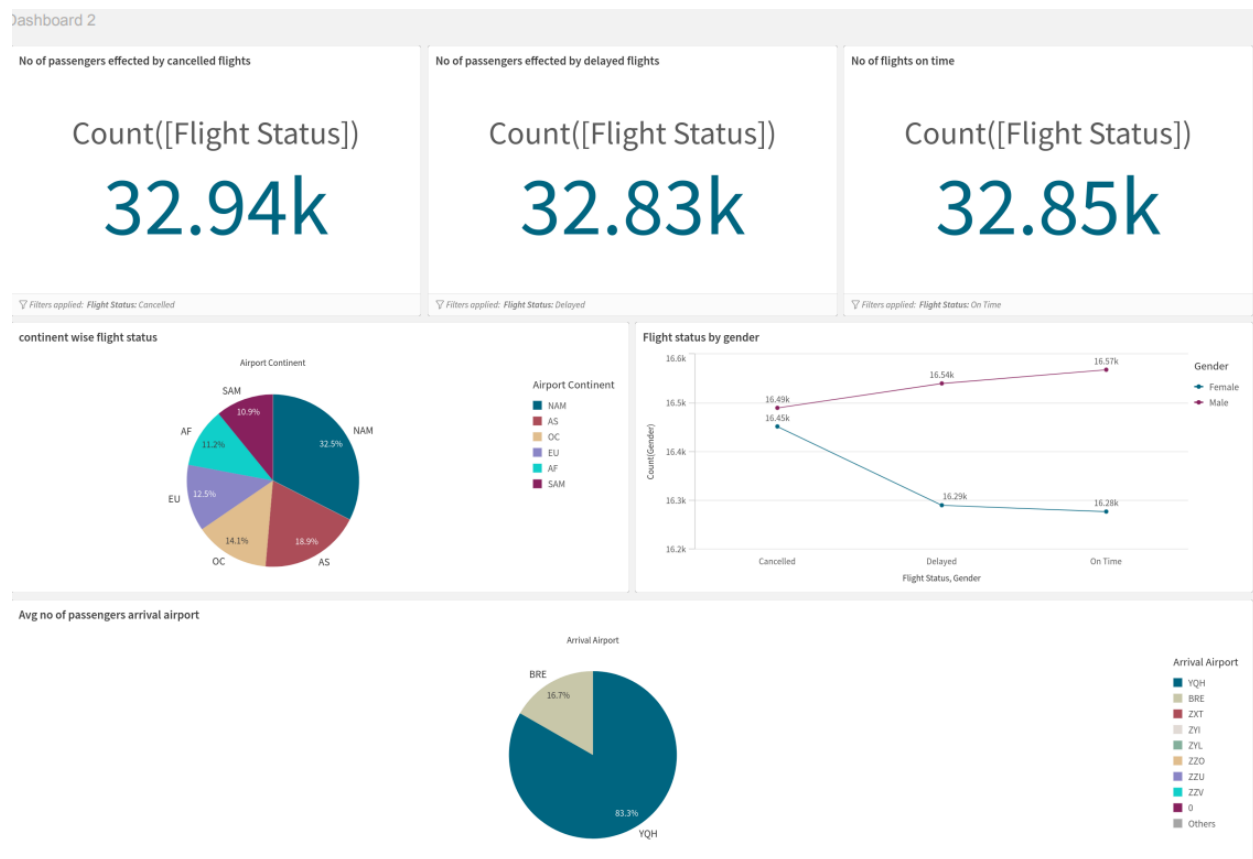
6. DASHBOARD

The following images are the dashboard created in the qlik cloud to take decisions.



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In the above dashboard visualizations are created for the different objectives. They are 98.62k passengers are there in the airline analysis. Based on gender, departure date, flight status, airport continent, no of passengers in flight status, age group gender wise and nationality wise populations these objectives are created in the dashboard.



in the analysis 32.94k passengers are effected by cancelled flights, 32.83k passengers are effected by delayed flights and 32.85k passengers are satisfied for the flights on time. continent wise flight status, flight status by gender, avg no of passengers arrival airports are the visualizations created in the dashboard.

7. CONCLUSION

The airline analysis project provided valuable insights into various aspects of airline operations, customer demographics, satisfaction, and revenue. Key findings include the critical impact of flight delays and cancellations on customer satisfaction, with weather and technical issues being the primary causes. The demographic analysis highlighted the predominance of passengers in the 25-45 age range and the high demand for economy class travel. Revenue analysis emphasized the profitability of longer international routes and premium travel classes.

By leveraging these insights, the airline can focus on reducing extreme delays, enhancing technical maintenance, and improving weather contingency plans to boost on-time performance. Tailored marketing strategies can be developed for the dominant passenger demographics, and efforts can be made to optimize the profitability of less lucrative routes. Overall, the project underscores the importance of data-driven decision-making in enhancing operational efficiency, customer satisfaction, and financial performance. The use of Qlik Sense Cloud facilitated dynamic data exploration and visualization, making these insights readily accessible and actionable.