**🎯 Current AmCharts Library (13 Chart Types Available)**

Based on the AmCharts folder analysis, you have the following chart types ready for implementation:

| **Chart Type** | **AmCharts Version** | **Data Structure** | **Airport Analytics Applicability** |
| --- | --- | --- | --- |
| **Chord Diagram** | v4 | Relationship flows | ✅ **High** - Airport-to-airport passenger flows, nationality connections |
| **Step Line Chart** | v5 | Time series | ✅ **High** - Passenger volume trends, revenue progression |
| **Column Chart with Images** | v4 | Categorical with media | ✅ **Medium** - Top airports with country flags/photos |
| **Heat Map** | v4 | 2D matrix | ✅ **Excellent** - Hour/day passenger patterns, seasonal analysis |
| **Sankey Diagram** | v4 | Flow visualization | ✅ **Excellent** - Revenue flows, passenger journey mapping |
| **Tree Map (Drill-down)** | v4 | Hierarchical data | ✅ **Excellent** - Country > Airport > Performance breakdown |
| **Pie Chart (Rounded)** | v4 | Part-to-whole | ✅ **High** - Market share, nationality distribution |
| **Rocket Chart** | v4 | Pie variant | ✅ **Medium** - Performance quadrant visualization |
| **Column + Pie Hybrid** | v4 | Multi-dimensional | ✅ **Excellent** - Airport performance with composition |
| **Draggable Column** | v4 | Interactive data | ✅ **Medium** - Scenario planning, ranking adjustments |
| **Variable Height 3D Pie** | v4 | 3D visualization | ✅ **Medium** - Revenue/volume relationships |
| **Network/Relations** | v4 | Network analysis | ✅ **High** - Hub airport connectivity |
| **Togglable Sankey** | v4 | Interactive flows | ✅ **Excellent** - Filter passenger/revenue flows |

**🚀 SPECIFIC USE CASES FOR YOUR AIRPORT DATA**

**1. Chord Diagram Applications**

**Data Source**: PAX\_FACT nationality flows + PNL\_FACT customer segments

javascript

*// Example: Nationality interconnections at hub airports*

{

from: "Indian", to: "DXB", value: 53513, *// PAX\_QUANTITY by nationality*

from: "British", to: "DXB", value: 40187,

from: "German", to: "DXB", value: 28562

}

**What we'd show**: Cross-nationality passenger flows, hub airport connections, customer segment relationships

**2. Heat Map Applications**

**Data Source**: PAX\_FACT temporal patterns + airports\_points performance

javascript

*// Example: Performance matrix by time/location*

{

weekday: "Monday", hour: "8am", value: paxQuantity,

country: "UAE", quarter: "Q1", value: revenuePerformance

}

**What we'd show**:

* **Temporal**: Hour-of-day vs day-of-week passenger patterns
* **Geographic**: Country vs performance metrics heatmap
* **Seasonal**: Month vs airport revenue intensity

**3. Sankey Diagram Applications**

**Data Source**: Combined PAX\_FACT + PNL\_FACT flows

javascript

*// Example: Revenue attribution flow*

{

from: "Indian Passengers", to: "Premium Products", value: 2340000, *// USD\_AMOUNT*

from: "Premium Products", to: "DXB Revenue", value: 2340000

}

**What we'd show**:

* **Revenue Flow**: Nationality → Product Category → Airport Revenue
* **Passenger Journey**: Origin → Hub → Destination → Spend
* **Market Flow**: Country → Customer Segment → Revenue Stream

**4. Tree Map Applications**

**Data Source**: Hierarchical airport performance data

javascript

*// Example: Drill-down performance*

{

name: "Middle East",

children: [

{

name: "UAE",

children: [

{ name: "DXB", value: 1615243981, count: 237814 }, *// Revenue, PAX*

{ name: "AUH", value: 845123456, count: 156432 }

]

}

]

}

**What we'd show**:

* **Geographic Hierarchy**: Region → Country → Airport → Performance
* **Product Hierarchy**: Category → Brand → SKU → Revenue
* **Performance Segmentation**: Size Category → Airport → Metrics

**5. Column + Pie Hybrid Applications**

**Data Source**: Airport performance + composition breakdown

javascript

*// Example: Airport revenue with nationality composition*

{

airport: "DXB",

revenue: 1615243981,

pie: [

{ value: 530000000, title: "Indian Passengers" }, *// 33% of revenue*

{ value: 270000000, title: "British Passengers" }, *// 17% of revenue*

{ value: 815243981, title: "Other Nationalities" } *// 50% of revenue*

]

}

**What we'd show**:

* **Airport Performance**: Total revenue (column) + nationality breakdown (pie)
* **Product Performance**: Category volume (column) + brand mix (pie)
* **Market Analysis**: Country totals (column) + airport distribution (pie)

**📈 EXISTING ANALYTICS INTEGRATION**

Your current analytics implementation already includes:

**✅ Available Capabilities:**

1. **Time Series Analytics** - Line charts with trend analysis
2. **Advanced Forecasting** - ARIMA, seasonal decomposition, anomaly detection
3. **Performance Benchmarking** - Percentile rankings, correlation analysis
4. **Statistical Analysis** - R², volatility, seasonality measures

**🔗 AmCharts Integration Opportunities:**

**Enhance existing panels with AmCharts:**

* Replace Chart.js line charts with **AmCharts Step Line** for better styling
* Add **Heat Maps** for temporal pattern analysis in TimeSeriesAnalytics
* Implement **Sankey Diagrams** for advanced forecasting flow visualization
* Use **Tree Maps** for drill-down analytics in performance benchmarking

**💡 RECOMMENDED IMPLEMENTATION PRIORITY**

**Phase 1: High-Impact Charts (Immediate)**

1. **Heat Map** - Seasonal passenger patterns, performance correlation matrix
2. **Tree Map** - Geographic performance drill-down (Region→Country→Airport)
3. **Sankey Diagram** - Revenue flow analysis (Nationality→Product→Revenue)

**Phase 2: Interactive Analytics (Short-term)**

1. **Chord Diagram** - Nationality interconnections at hub airports
2. **Column + Pie Hybrid** - Airport performance with composition analysis
3. **Step Line Chart** - Enhanced time series with better styling

**Phase 3: Advanced Visualizations (Medium-term)**

1. **Draggable Column** - Interactive scenario planning
2. **Network Diagram** - Hub connectivity analysis
3. **3D Pie Chart** - Multi-dimensional performance relationships

**📊 DATA AVAILABILITY CONFIRMED**

Based on your datasets, you can create **all proposed visualizations**:

✅ **PAX\_FACT** (500+ records): Detailed nationality distribution, temporal patterns ✅ **PNL\_FACT** (500+ records): Product performance, revenue attribution ✅ **airports\_points.json**: Complete airport performance metrics ✅ **Enhanced Analytics**: Geographic coordinates, performance classifications

**🎯 SPECIFIC CHART FUNCTIONS**

Each chart type would show:

| **Business Question** | **Best Chart Type** | **Data Sources** |
| --- | --- | --- |
| "Which nationalities drive revenue at each airport?" | **Column + Pie Hybrid** | PAX\_FACT + PNL\_FACT |
| "How do passenger flows connect airports?" | **Chord/Sankey Diagram** | PAX\_FACT flows |
| "What are the seasonal patterns by airport?" | **Heat Map** | PAX\_FACT temporal + performance |
| "How does performance cascade geographically?" | **Tree Map** | airports\_points hierarchy |
| "Which airports are most critical to the network?" | **Network Diagram** | PAX\_FACT connections |
| "How do customer segments contribute to revenue?" | **Sankey Diagram** | PNL\_FACT customer flows |