ICAO Air Connectivity and Competition

Sijia Chen
Economic Development
Air Transport Bureau, ICAO
Connectivity Concept

Capacity of the transport value chain to move passengers, mail or cargo from one point to another, with minimum transit points.

- Which makes trip as shortest as possible
- With optimal user satisfaction
- At the minimum price possible
Improved connectivity leads to economic growth

Connectivity directly impacts UN Sustainable Development Goals (SDGs)

Passenger:
54% of international tourists arrive by air

- Policy framework for opening air transport markets
- Improved air transport connectivity
- Better tourist experience
- Traffic growth
- Sustainable tourism growth through increased arrivals by air

Growth potential for airports, hotels, shopping, dining etc.

Cargo-Freight:
35% of the value of world trade shipped by air

- Improved air transport connectivity
- Investments into infrastructure
- Improved supply chain/better end-user experience
- Global market access & traffic growth
- Improved flow of goods/products
- Opportunities for import/export
- Sustainable economic growth & poverty alleviation
Airline Competition

- Airline competition has evolved from an era of economic regulation and intervention to an increasing trend towards liberalization.

- This in turn has resulted in the global air transport network transiting from simple networks structures with limited competition and connectivity options of the past to complex structures of today responding dynamically to the changes in regulations and the business opportunities offered by liberalization.
Air Transport Network Characteristics

• The global air transport network is characterized by more connectivity options to customers with a variety of competitive network strategies pursued by the major aviation stakeholders.

• Some of these strategies include decisions related to
  • point to point versus hub and spoke systems
  • yield management to respond effectively to demand through pricing and product differentiation and
  • alliances and mergers.

• These strategies are invariably a trade-off between the most economically efficient path to transport passengers through the various nodes available in the network constrained by real time factors that prevent the network from being the most optimized or efficient
Factors Impacting Route Network

- Size of the market (existing demand) and pricing strategies of existing competitors
- Policy factors – air carrier ownership and control, liberalization and regulation of traffic rights to fly (market access), cross ownerships of aviation verticals, taxation and charging policies.
- Slot availability and other restrictions like lack of infrastructure, night and noise curfews
- Presence of alternative models on a route i.e. low cost carriers versus legacy carriers
Web of bilateral air services agreements

Source: ICAO WASA Map Tool

2015 data
States which signed open skies agreements with both the US and third countries

States which signed open skies agreements with the US only

States which signed open skies agreements with the third countries only

Over 400 Open Skies Agreements involving 146 States
Comparing the number of markets made available by air transport liberalization ("available" or "reserved" connectivity) with the number of those markets having actual air services ("real" connectivity).

About 60% of available connectivity opportunities do not have direct flights.

Source: ICAO
Air Transport Diagnostics Project
Introduction

• ICAO and the Interdisciplinary Centre for Mathematical and Computational Modelling (ICM) of the University of Warsaw have initiated a joint air transport diagnostics project.

• The project aims to better understand the complex dynamics and interlinkages between the various policy factors and market realities that influence the competitive strategies of the aviation stakeholders and the optimization of the global air transport network.

• Outcome of this study could assist policymakers in optimizing connectivity and maintaining sustainable growth of air transport.
Concept of the Project

Decision Support Systems for Informed Policy Making

• A visual interactive decision support system (DSS) to ICAO Member States and other stakeholders.

• Indicates areas where the market forces provide potential opportunities to States to further increase connectivity and optimization of the air transport network through appropriate policy initiatives and addresses of constraining factors.
ICAO and ICM have initially analyzed as a prerequisite for this project, the two major existing factors namely demand and price that influence competitive strategies of the aviation stakeholders and the optimization of the global air transport network.

A segment of the preliminary analysis based on most recently available data for the year 2015 is presented.
Worldwide Figures

Number of **Total** Passengers: 1.3 billion
Number of **Direct** Passengers: 880.2 million
Number of **Indirect** Passengers: 391.8 million

69% of passenger took **direct** flights while 31% chose **indirect** flights to reach final destinations.

*Source: ICAO, ICM University of Warsaw*
Passengers Flow by Region of Departure 2015

- Europe
- Asia/Pacific
- Middle East
- Africa
- Latin America/Caribbean
- North America

Passengers (millions)

Direct Flights Passengers
Connecting Flights Passengers
### Regional Passenger Flow

#### Region Pair Passenger Flow (Africa)

- **Africa > Europe**
- **Middle East > Africa**
- **Africa > Africa**
- **Africa > Asia/Pacific**
- **North America > Africa**
- **Africa > Middle East**
- **Asia/Pacific > Africa**
- **Africa > North America**
- **Africa > Latin America/Caribbean**
- **Latin America/Caribbean > Africa**

**Passengers (millions)**

#### Region Pair Passenger Flow (Asia/Pacific)

- **Asia/Pacific > Asia/Pacific**
- **Middle East > Asia/Pacific**
- **Europe > Asia/Pacific**
- **North America > Asia/Pacific**
- **Asia/Pacific > Europe**
- **Asia/Pacific > North America**
- **Asia/Pacific > Middle East**
- **Africa > Asia/Pacific**
- **Asia/Pacific > Africa**
- **Asia/Pacific > Latin America/Caribbean**
- **Latin America/Caribbean > Asia/Pacific**

**Passengers (millions)**
Regional Passenger Flow (Europe)

- Europe > Europe
- North America > Europe
- Europe > Asia/Pacific
- Asia/Pacific > Europe
- Europe > Africa
- Africa > Europe
- Europe > Latin America/Caribbean
- Europe > Middle East
- Middle East > Europe
- Europe > North America
- Latin America/Caribbean > Europe

Passengers (millions)

Direct Flights
Indirect Flights

Region Pair Passenger Flow (Middle East)

- Middle East > Asia/Pacific
- Middle East > Middle East
- Europe > Middle East
- Middle East > Africa
- Middle East > Europe
- North America > Middle East
- Asia/Pacific > Middle East
- Africa > Middle East
- Middle East > North America
- Middle East > Latin America/Caribbean
- Latin America/Caribbean > Middle East

Passengers (millions)

Direct Flights
Indirect Flights
Route Group Connectivity (Inclusive of Domestic Connections in International Trips)

Route Group Average Fare (Inclusive of Domestic Connections in International Trips)

<table>
<thead>
<tr>
<th>Route Group</th>
<th>% of Total Passengers</th>
<th>Average Fare (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe - South West Asia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central America/Caribbean - South America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central South West Asia - Europe</td>
<td></td>
<td></td>
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<tr>
<td>Europe - North Asia</td>
<td></td>
<td></td>
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<tr>
<td>Europe - North America</td>
<td></td>
<td></td>
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<tr>
<td>North America - South America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe - Sub Saharan Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle East - North America</td>
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<td></td>
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<tr>
<td>Europe - South America</td>
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<td></td>
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<tr>
<td>Africa &amp; Middle East - South America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe - Pacific South East Asia</td>
<td></td>
<td></td>
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<tr>
<td>North America - Pacific South East Asia</td>
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<td></td>
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<tr>
<td>Africa - Asia/Pacific</td>
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<tr>
<td>Africa - North America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America - South West Asia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America/Caribbean - North Asia &amp; Pacific South East Asia</td>
<td></td>
<td></td>
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<tr>
<td>Latin America/Caribbean - Central South West Asia</td>
<td></td>
<td></td>
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<tr>
<td>Africa &amp; Middle East - Central America/Caribbean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America/Southwest Asia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% Direct Passengers | % Indirect Passengers | Average All Flights Fare | Average Direct Fare | Average Indirect Fare
Observations of Preliminary Analysis

- The results of the preliminary analysis encompassing the entire big data set leads to the following overarching observations—
  - With the inclusion of domestic legs on international trips 69% of the passengers in 2015 flew direct to their destination and 31% flew through connecting nodes in the air transport network. Around half of indirect passengers include domestic connections on the international trip.
  - There exists differences in the direct and indirect connectivity at the country pair level which when summarized is reflected at the region pair or route group pair level.
  - Inclusion of domestic legs on the international trip results in higher average indirect fares compared to average direct fares.
Direct vs indirect flights (The Bahamas)

Major air traffic originating from The Bahamas in 2015

- 103 direct non-stop routes from The Bahamas
- 2,907 O&D city pairs with 773 different connections

Source: ICAO, ICM University of Warsaw
Future: Traffic Forecasts
Projected Top 10 Routes 2040

<table>
<thead>
<tr>
<th>Rank 2040</th>
<th>Rank 2015</th>
<th>Long Term Forecast Route Group</th>
<th>Share 2040</th>
<th>Share 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Central Southwest Asia - Pacific South East Asia</td>
<td>11.9%</td>
<td>5.4%</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>8</td>
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<td>11.3%</td>
<td>3.9%</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Europe - North America</td>
<td>9.0%</td>
<td>11.8%</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Central Southwest Asia - Europe</td>
<td>7.3%</td>
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<tr>
<td>6</td>
<td>5</td>
<td>Intra Pacific South East Asia</td>
<td>6.1%</td>
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<tr>
<td>7</td>
<td>7</td>
<td>Central Southwest Asia - North America</td>
<td>5.9%</td>
<td>4.1%</td>
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<tr>
<td>8</td>
<td>18</td>
<td>Central Southwest Asia- North Asia</td>
<td>4.6%</td>
<td>1.9%</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>Europe - Middle East</td>
<td>3.6%</td>
<td>4.5%</td>
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<tr>
<td>10</td>
<td>9</td>
<td>Europe - Pacific South East Asia</td>
<td>3.5%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

*Scheduled Services  **Compound Average Annual Growth Rate

**Revenue Passenger Kilometres* (billions)

Historical

- 6.0% CAGR**

Forecasts

- 4.2% CAGR**

60% of total traffic

63% of total traffic


12,000 10,000 8,000 6,000 4,000 2,000 0

Long-term air traffic forecasts
Scheduled international passenger traffic

*Scheduled Services  **Compound Average Annual Growth Rate
Long-term air traffic forecasts
Scheduled international freight traffic

Projected International Freight Traffic Breakdown by AOC 2040

- **Africa, 1%**
- **Asia and Pacific, 42%**
- **Latin America/Caribbean, 2%**
- **Europe, 17%**
- **North America, 13%**
- **Middle East, 23%**

Revenue Passenger Kilometres (billions)

- **Historical**
  - 4.5% CAGR**

- **Forecasts**
  - 4.2% CAGR**

*Scheduled Services  **Compound Average Annual Growth Rate

Historical Forecasts
- Africa, 1%
- Asia and Pacific, 42%
- Europe, 17%
- Latin America/Caribbean, 2%
- Middle East, 23%
- North America, 13%

Projected International Freight Traffic Breakdown by AOC 2040

2040

**Scheduled Services  **Compound Average Annual Growth Rate
Top route groups in 2032 out of Latin America/Caribbean

Revenue Passenger-Kilometres (RPK) (billion)

- South America Domestic
- Central America/Caribbean - North America
- Europe - South America
- North America - South America
- Central America/Caribbean - Europe
- Central America/Caribbean Domestic
- Intra South America
- Central America/Caribbean - South America
- Intra Central America/Caribbean
- Africa & Middle East - South America
- Latin America/Caribbean - North Asia & Pacific...
- Latin America/Caribbean - Central South West Asia
- Africa & Middle East - Central America/Caribbean

CAGR*

<table>
<thead>
<tr>
<th>Route Group</th>
<th>2012-2032</th>
<th>2012-2042</th>
<th>1995-2012</th>
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<tbody>
<tr>
<td>South America Domestic</td>
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<tr>
<td>Central America/Caribbean - North America</td>
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<td>3.7%</td>
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<td>Europe - South America</td>
<td>6.8%</td>
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<td>6.1%</td>
</tr>
<tr>
<td>North America - South America</td>
<td>3.7%</td>
<td>4.4%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Central America/Caribbean - Europe</td>
<td>7.2%</td>
<td>7.2%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Central America/Caribbean Domestic</td>
<td>5.1%</td>
<td>4.2%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Intra South America</td>
<td>6.8%</td>
<td>6.8%</td>
<td>10.6%</td>
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<td>Central America/Caribbean - South America</td>
<td>6.8%</td>
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<td>10.6%</td>
</tr>
<tr>
<td>Intra Central America/Caribbean</td>
<td>4.1%</td>
<td>4.2%</td>
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<td>3.8%</td>
<td>4.2%</td>
<td>12.2%</td>
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<tr>
<td>Latin America/Caribbean - North Asia &amp; Pacific...</td>
<td>7.7%</td>
<td>6.7%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Latin America/Caribbean - Central South West Asia</td>
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<td>6.7%</td>
<td>11.2%</td>
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<tr>
<td>Africa &amp; Middle East - Central America/Caribbean</td>
<td>19.2%</td>
<td>19.2%</td>
<td>11.2%</td>
</tr>
</tbody>
</table>

Source: ICAO
THANK YOU