



Establishing an Airline Network based on HUB

By Sandeep Bahl, Executive Program Director, ACP

The word "hub" is derived from the structure of a wheel, where the hub is the central point from which spokes radiate forth to the edge. An airline hub, also known as a hub airport, is a city or airport where the airline has a larger presence. These cities frequently serve as regional gateway towns or host the airline's corporate headquarters and administrative offices. It is typically referred to as a focus city or a secondary hub if an airline has a sizable presence in a city without offices.

Inbound and outgoing flight prices from airlines with hubs in particular locations are frequently among the most affordable for that city and nation.

Since travellers can be directed into a few hubs rather than serving their whole itinerary with direct flights from every airport, the hub-and-spoke system enables airlines to serve more cities with fewer aircraft. In USA large airlines have multiple hub airports and each of these hubs serve a distinct purpose in the overall network of airline. United Airlines' hub in Chicago has approximately 792 flights (738 domestic destinations and 54 international) and another hub in Denver has 625 flights (25 international destinations and 600 domestic). United runs multiple daily flights between these hubs. Along with hubs, airlines occasionally increase service in "focus cities." Focus cities are best understood as smaller hubs that often serve more constrained routes within an area.



As air transportation systems are hierarchical in structure, there are various categories of aviation hubs that are currently in use. Federal Aviation Administration (FAA) classifies commercial air-transportation hubs as large, medium, and small hubs based solely on the percentage of annual passenger enplanements. Hub categories for Primary Airports are defined as a percentage of total passenger boardings within the United States in the most current calendar year ending before the start of the current fiscal year. The categories are as follows: [Airport Categories | Federal Aviation Administration \(faa.gov\)](#)

1. Small hub primary - airports with 0.05–0.25% of the country's annual passenger boardings
2. Medium hub primary - airports handling 0.25–1% of the country's annual passenger boardings
3. Large Hub Primary - airports handling over 1% of the country's annual passenger boardings

These straightforward divisions provide a challenge for two reasons. The first is that, depending on the criterion used, hub network systems may include numerous levels in a hierarchy, meaning that airport classifications are likely to go deeper than two or three categories. For instance, based on geographic coverage, hubs may be divided into national hubs, regional hubs, tiny nodes, or central hubs, hubs, and non-hub nodes. The second argument is that the FAA classification based solely on passengers ignores how hubs are run, the consequent relationships among hubs, as well as those factors that are related to how hubs are operated.

Airlines can transfer flows while lowering operating costs thanks to hub network structure's economies of scale, which in turn increases profitability. As a result, the hub sites and linkage assignments are strategically chosen

Airline Hubs vs Point to Point Flying



AIRLINE HUBS

Airline hubs are airports that serve as a central connecting point for multiple airlines and flights.



POINT TO POINT FLYING

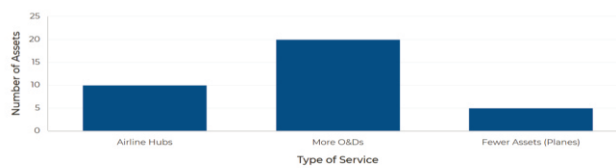
Point to point flying is a type of air travel where passengers fly directly from one destination to another without having to change planes.



PROS AND CONS

The pros and cons of airline hubs versus point to point flying include cost, convenience, and time.

Maximizing Efficiency: Airline Hubs Serve More O&Ds With Fewer Assets



Airline hubs serve more O&Ds with fewer assets (planes)

*Data from the International Air Transport Association

0

Several Factors Contribute To A Sustainable Hub

- 1 **Local Demand** Sizeable local demand with high propensity to travel (*large city such as Delhi or Mumbai*)
- 2 **Hub Geography** Geography conducive to connecting passengers in an efficient manner with access to a large number of markets (*low circuitry and high coverage – Nagpur, Hyderabad or Bangalore*)
- 3 **Management & Operations** Hub structure and management consistent with hub's mission relative to other hubs in the network
- 4 **Infrastructure** Scaleable landside and airside infrastructure with relatively low operating costs
- 5 **Hub Strategy** Strategy to defend hub over the long-term

1



taking into account operational regional coverage and rivalry with other carriers.

Several things must be in place for an airport to become a major airline hub. Here are some typical concerns, while specific requirements may vary depending on area rules and industry dynamics:

1. Geographical Location: For an airport to function as a hub, its location is essential. The ideal location would be at a convenient geographic halfway point between two important cities, allowing for quick connections and shorter travel times.

2. Air Traffic Demand: There should be a sizable amount of passenger traffic at the airport, with passengers travelling to and from different local and international places. Strong local economic activity, a thriving tourism sector, and a sizable local population can all support long-term passenger demand.

3. Infrastructure and Capacity: An airline hub needs sufficient infrastructure, including runways, taxiways, terminal buildings, and parking lots, to support increasing flight operations. To avoid traffic and guarantee efficient operations, there must be enough room for extra planes and passengers.

4. Connectivity: It's important to have excellent transportation connections to the hub airport. Passengers from nearby regions may readily access the airport because to the availability of adequate road and rail networks. Accessibility can be further improved by intermodal connections like high-speed rail or specialised airport express services.

5. Runway Length and Configuration: The runway(s) at the airport should have sufficient length to support a

variety of aircraft types, including long-haul wide-body jets. Additionally significant considerations include the layout and number of runways, which have an impact on the airport's capacity and capability to manage simultaneous takeoffs and landings.

6. Airline Partnerships: A successful hub must have the capacity to draw in and forge alliances with significant airlines. The hub airport can provide a wide range of destination alternatives and effortlessly link travellers to various regions thanks to partnerships with numerous carriers.

7. Facilities for Customs and Immigration: To handle international passenger traffic, adequate facilities for Customs and Immigration are required. Passport checkpoints, designated customs areas, and facilities for luggage handling and security screening should all be present at the hub airport.

8. Passenger facilities: An airline hub should provide a variety of facilities for passengers, including pleasant waiting rooms, dining and shopping options, lounges, and effective security and baggage handling procedures, in order to ensure a favourable travel experience.

9. Airline Support Services: For airlines using the hub as their base of operations, the presence of maintenance, repair, and overhaul (MRO) facilities, cargo handling capabilities, and ground handling services is essential. These services guarantee the effective handling of cargo and baggage as well as the smooth operation and maintenance of aeroplanes.

10. Government cooperation: The establishment of an airline hub is significantly aided by government cooperation. Attracting airlines, fostering competition, and investing in infrastructure development can all be

Successful Hubs Are Supported By Strong Demand

Key Factors For Hub Development	Important Attributes To Consider	Optimal Conditions For Success
1. Local Demand	<ul style="list-style-type: none"> Current regional population and predicted growth High propensity to consume air travel Alternative airports 	<ul style="list-style-type: none"> Large local populations with significant growth projected Affluent, strong economic center with limited alternatives to air travel No competing airports
2. Connecting Demand	<ul style="list-style-type: none"> O&D circuitry O&D coverage 	<ul style="list-style-type: none"> Geographic location with the most direct line-of-flight for the highest number of O&Ds Service to large number of spoke cities reaching a high percentage of connecting O&D passengers

Demand identifies which hubs are the most desirable, the most scalable and have the potential for the greatest revenue production

3

Hubs Serve More O&Ds With Fewer Assets

- Hubs allow airlines to connect more cities with fewer flights, aircraft and equipment than a point-to-point model
- New spokes produce geometric increases in number of markets served
- Adding new spokes to a hub is less expensive than a new point-to-point market, however unit costs may be higher due to decreased utilization

Hub and Spoke (Demand collection)

- A hub connects the same six cities with only five round-trip flights
- Adding one spoke (7) increases the number of markets served from 15 to 21



Point-to-Point (Random collection)

- Connecting six cities on a point-to-point basis requires 15 round-trip flights
- Only a few large cities have a population base sizable enough to enable point-to-point service



2



made easier by supportive laws, incentives, and regulations.

It's crucial to keep in mind that converting an airport into an airline hub is a challenging and intricate process that frequently calls for extensive forethought, funding, and cooperation between airport officials, airlines, and numerous stakeholders.

The growth of an airline hub is significantly influenced by an airport's geographic location for a number of reasons.

1. A hub airport serves as a hub for connecting flights, which leads to efficient connections. The airport can reduce the distance travelled by passengers during their connections by being situated at a convenient geographic midway between important destinations. This shortens trip times and improves the hub's general effectiveness.

2. Geographical Reach: A well placed hub can act as a doorway to numerous areas or continents. It enables airlines to streamline their operations and provide connectivity to several locations. Regardless of the direction they are travelling, passengers can converge at the hub and quickly connect to their intended destinations.

3. Lower Fuel Consumption: By situating themselves at a midpoint, airlines are able to optimise their flight paths and lower fuel usage. More direct flight paths can be utilised by aircraft, reducing detours and conserving fuel. This helps airlines cut costs while simultaneously lessening the impact of air travel on the environment.

4. Time Zone Considerations: Strategically placed airline hubs that span many time zones can ease connections

between flights that operate in various regions. Airlines are able to offer convenient departure and arrival times as a result, accommodating customers who are travelling across time zones. Additionally, it lessens the effects of jet lag for those taking lengthy flights.

5. Market Demand and Catchment Area: An airline hub's location should take into account both the market's needs and the catchment area it intends to service. The airport can access a sizable pool of potential customers and entice airlines to commence operations there by carefully placing the hub in a location with a high population density, vibrant commercial activity, or well-liked tourist destinations.

6. Competitive Advantage: In terms of accessibility and travel ease, a strategically placed airline hub can provide competitive benefits over other airports. The hub's lower travel distances and more effective connections may be preferred by passengers, making the airport a desirable option for airlines trying to increase their market share.

At their hubs, airlines may run banks of flights, where numerous flights arrive and depart quickly. The non-banks could be thought of as the "valleys" and the banks as the "peaks" of activity at the hubs. Passengers benefit from quick connections because of banking. Although having multiple planes on the ground at once might cause congestion and delays, an airline must combine a lot of resources to handle the surge in flight requests during a bank. Additionally, banking could lead to wasteful aircraft usage, with aircraft waiting for the next bank in spoke cities.

As a substitute, some airlines such as Southwest have de-banked their hubs and implemented a "rolling hub" where flight arrivals and departures are spaced out throughout the day and hence doesn't use the

Sufficient Capacity Required To Support A Major Hub

	Key Factors For Hub Development	Important Attributes To Consider	Optimal Conditions For Success
Airside	<ol style="list-style-type: none"> 1. Current airspace capacity 2. Future airspace capacity 	<ul style="list-style-type: none"> • Arrival / departure flow rates under different weather conditions, airport delays, utilization of current infrastructure • Long-term runway construction 	<ul style="list-style-type: none"> • High-traffic handling capability, both airside and landside with existing infrastructure and minimal delays • Below maximum capacity to provide operational buffer and room for future growth
Landside	<ol style="list-style-type: none"> 3. Gate capacity 4. Gate utilization 	<ul style="list-style-type: none"> • Total number of gates and availability • Departures per gate 	<ul style="list-style-type: none"> • High number of gates with near-term availability to support growth • Lower utilization of existing gates to support growth within existing facility

Hubs with limited capacity for growth present revenue and operational challenges

How are minimum connection times determined?

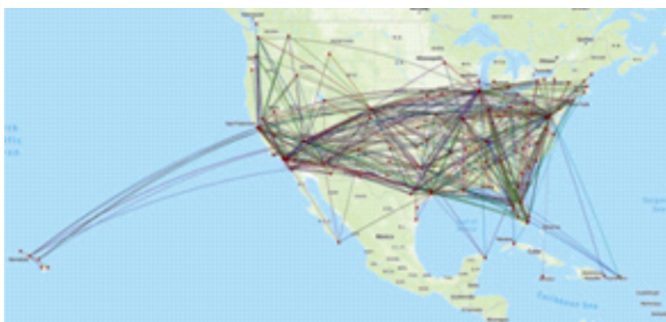
According to Airlines for America the trade association that represents most carriers in the U.S., airlines consider factors including airport layout, average boarding time and flight duration when considering their own minimum connection policies. Carriers have internal rules that are specific to each airport depending on terminal layout, concourses for inbound and connecting flights, and whether itinerary is domestic to international, international to domestic, international to international or domestic to domestic. Factors such as deplaning duration of an inbound flight and average time needed to board the connecting flight are considered as well. Carriers' reservation systems will not build an itinerary that violates its minimum connection times.

Multiple Hubs Provide Balance And Options

- A network of hubs has several benefits versus a single hub
 - Improved passenger convenience and additional itinerary options
 - Increased number of O&Ds served on single connections
 - Reduced circuitry on a larger number of markets
 - Increased efficiency of passenger routings and deployment of aircraft
- Geographically diverse hubs with complementary hub missions will increase system coverage while minimizing displacement
- Specialty hubs and focus cities serve unique purposes
 - Delhi's large local market offers point-to-point flying to domestic cities combined with connections to all across globe
 - Indigo's Istanbul operation enables connections throughout Europe with partner Turkish Airline
- Partner hubs offer a cost-efficient manner to increase presence in additional geographic regions



conventional hub-and-spoke network used by other significant airlines.



In its base cities, Southwest Airlines favours a point-to-point system along with a rolling-hub model. Southwest does not have hubs and does not want its operational sites to be referred to as hubs. By extension, this means

that Southwest serves major airports in Atlanta (ATL), Baltimore (BWI), Chicago (MDW), Dallas (DAL), Denver (DEN), Houston (HOU), Las Vegas (LAS), Los Angeles (LAX), Oakland (OAK), Orlando (MCO), and Phoenix (PHX).

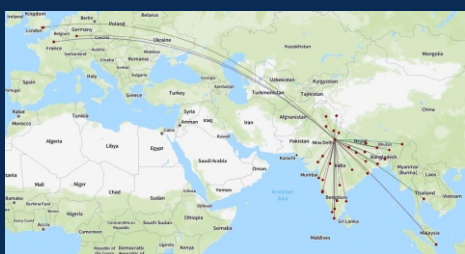
Airlines can transfer flows while lowering operating costs thanks to hub network structure's economies of scale, which in turn increases profitability. As a result, the hub sites and linkage assignments are strategically chosen taking into account operational regional coverage and rivalry with other carriers. Overall, the effectiveness, convenience, and market reach of an airline hub are influenced by the location of the airport. It enables airlines to provide better connections, enhance aircraft routes, and take advantage of market demand, increasing passenger flow and fostering hub expansion.





The Benefits of a Multi-Hub Airline Network

Airline networks often have multiple hubs to help facilitate efficient travel. These hubs are strategically located to provide the most efficient routes for passengers.

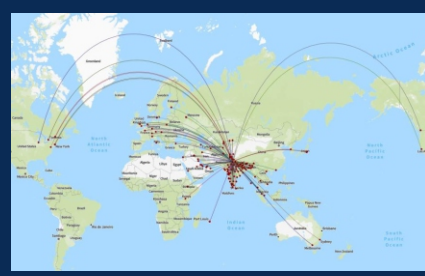


Vistara's flight from Delhi to Frankfurt, a codeshare partner Lufthansa's hub connects to 11 destinations in Europe. Arriving from Europe to Delhi on Vistara there are connections to India and to Vistara's South Asia network.

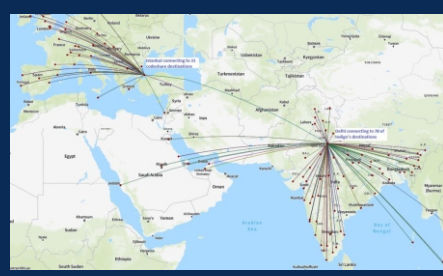
Content sourced from OAG ; Date 15th June 2023

Strong Hubs In India Can Be Connected To Network Of U.S. Hubs

- More connecting options in India and U.S. hubs increases likelihood of developing sustainable flights between India and U.S.
- Potential for new service to secondary India hubs and focus cities via North Asia or Europe. Indigo's Delhi hub connects to vast network of Turkish Airlines hub in Istanbul.

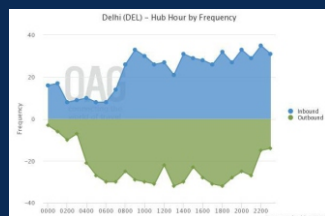


DELHI Airport total destinations served 123, domestic 69, International 54

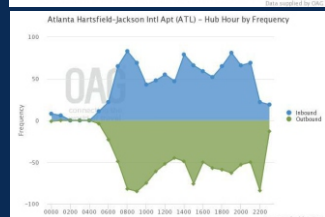


6E DEL-IST flight codeshare on 83 flights beyond IST connecting 40 destinations in Europe and USA.

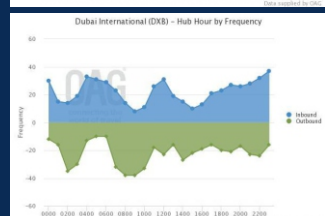
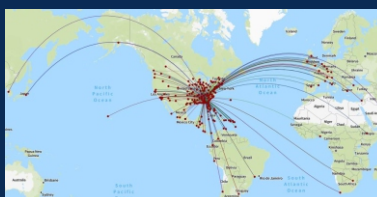
Content sourced from OAG ; Date 15th June 2023



Flights	DELHI
DOM	440
INT	138
Daily Total	578



Flights	ATLANTA
DOM	1324
INT	131
Daily Total	1455



Flights	DUBAI
DOM	537
INT	537
Daily Total	537



Content sourced from OAG ; Date 15th March 2023

Final Thoughts on the Model and Economic Importance of Airline Hubs

1. Preferred hubs will benefit structurally in the long run.
2. Location and demand: a solid local foundation strengthened by connecting traffic
3. Income premium: Gains from leadership role at hub for presence
4. Operations: the ability to expand airside and landside capacity to accommodate development at a cost that is comparably lower than that of comparable airports
5. Hubs are dynamic and need a lot of management attention to run profitably.
6. The foundation of hub economics is the generation of revenue premiums to pay for the costs of maintaining a hub operation.
7. By creating new O&D flows and raising RASM, effective revenue and yield management can increase revenue.
8. It's important to balance inbound and outgoing capacity with clearly defined connection possibilities.