



Creating a top logistics hub

Aerotropolis concept creator, Dr John Kasarda, explains why certain hubs prosper and describes what it takes to become a world-class air logistics hub.

A frequent question asked by executives of larger commercial airports and their surrounding jurisdictions is, what can we do to become a major air logistics hub?

They ask this question because air logistics serves as the go-to mobility resource for today's high-tech and advanced manufacturing value chains and to meet the expanding demands of our must-have-it-now e-consumer population.

Their desire reflects reality: Airport regions anchored by major air logistics hubs are more economically competitive and often the preferred location for firms in modern industrial growth sectors such as aerospace, biopharmaceuticals and medical devices, cross-border e-commerce, new energy and intelligent vehicle components, and smart electronics along with premium fresh foods and other high-value perishables.

Aerotropolis Institute China fellows Michael Canon, Ram Menen, and I have been studying the aviation networks, multimodal surface infrastructure, cargo handling facilities and operations, new technology applications, Customs, regulatory environments, regional industry mix, and related factors underlying the growth and competitive advantages of many of the most prosperous global air logistics hubs.

These include, among others, Hong Kong (HKG), Singapore Changi (SIN), Memphis (MEM), Dubai (DXB and DWC), Amsterdam Schiphol (AMS), Frankfurt (FRA), and Paris Charles de Gaulle (CDG), as well as European mid-sized airports that have evolved into thriving

international logistics centres such as Brussels (BRU), Liege (LGG), Leipzig/Halle (LEJ), and Luxembourg (LUX).

While each of these successful hubs has unique features, I synthesise below common characteristics that make them flourish.

Air network power

The primary engine of a global air logistics hub is not the airport per se, but its aviation network including the types of aircraft utilised.

The ideal hub possesses the right mix of widebody passenger and all-cargo aircraft operations bolstered by an international hub airline that provides it with expansive, high-density routes often supported by regional road feeder services (RFS).

All major air logistics hubs possess extensive international air routes with Hong Kong, Singapore Changi, Dubai, Amsterdam, Frankfurt, and Paris CDG relying heavily on daily scheduled widebody passenger aircraft whose bellies carry over 50 % of the airport's cargo.

International widebody passenger aircraft not only generate considerable direct cargo lift on a more frequent schedule than air freighters; they also offer the airport's cargo and express airlines additional on-demand capacity, agility, and market reach by providing them with belly space options through inter-airline agreements.

Greater volumes of belly cargo, in turn, make more international passenger aircraft flights financially feasible by providing them with a



margin of profitability, thus contributing to airport route expansion. Traditionally averaging 13% of major international passenger airline revenues, cargo revenues were double that percentage in COVID-impacted 2021 and 2022.

Belly cargo likewise contributes to the competitiveness of the airport and its outlying regions by offering more economical rates.

Total air logistics costs are lowest at global gateways with extensive non-stop routes served by widebody aircraft, enabling freight forwarders to consolidate broader regional cargo for lower unit shipping rates while minimising temporal and other costs of further cargo transfers among aircraft.

International route expansion at some hubs has been accelerated by an 'Open Skies' policy, with Dubai the exemplar. Open Skies essentially allow a foreign airline to serve the airport, as long as appropriate slots are available, and the market sustains the flight.

Since most hub airports are dominated by national flag carriers which tend to be highly protective of their passenger market, commencing with Open Skies for cargo-only aircraft, as India demonstrates, can be a fruitful first step.

Acquiring international 'Freedoms of the Air' through bilateral and multilateral agreements has proven essential to the success of many of the largest global air logistics hubs. These include 5th, 7th, 8th and 9th Freedom Rights, the last three being particularly important for international air express airlines such as FedEx, UPS and DHL to establish a foreign regional hub at the airport.

Several of the top global air logistics hubs offer international express and cargo airlines 7th Freedom Rights which have proven instrumental to their establishment of foreign regional hubs. These 7th Freedom Rights permit airlines serving a foreign airport to feed cargo to and from it via other foreign countries without having to connect to their home countries.

For airports in large, geographically expansive countries, extending 9th Freedom Rights to an international express airline to further connect its aircraft to other domestic airports increases the appeal of the airport to become a foreign regional hub by the likes of FedEx, UPS or DHL.

To operate a foreign hub, these express airlines usually require 'change of gauge rights', as well, in order to transfer cargo between their long-haul widebody and short-haul narrowbody aircraft for smaller, more dispersed shipments. Even here, though, national regulations can impact logistics system efficiency by requiring international air express operators to subcontract with local firms such as ASL in Europe and Blue Dart in India for first and last-mile delivery.

Many hubs permit airline ownership and operation of cargo terminals. For example, all the freight terminals at HKG, the world's busiest cargo airport, are privately owned and operated while self-handling of cargo is desired (or required) by integrator express and some general cargo airlines.

Winning on the ground

Whereas aviation networks are the primary driver of air logistics hubs, the battle for air cargo is ultimately won on the ground. Even in the fast-paced integrator/air express sector, on average less than 15% of the time consumed in door-to-door air cargo shipments is airborne, while international general air cargo still takes an average of six days from shipper to consignee.

Top global air logistics hubs are distinguished by the speed, agility, security, and predictability of cargo ground handling. They feature state-of-the-art, fully automated freight terminals, the highest quality cool chain, and other temperature control facilities and equipment.

They also boast express Customs clearance including preclearance of cargo prior to aircraft landing, minimum dwell time for RFS and in-transit cargo, expertise in handling out-size cargo, live animals, and



consumer valuables, have a cloud-based air cargo community systems that provide for the real-time secure exchange of information and data to all stakeholders along the entire air cargo chain, and paperless single-window electronic declaration of imports and exports that go instantly to all pertinent government agencies.

The most innovative air logistics hubs are taking digitisation a revolutionary leap forward by introducing AI technologies and predictive analytics for real-time space and pricing optimisation and to reduce the risk of cargo facility overbooking or underutilisation.

AI further allows logistics operators to move well beyond track and trace cargo chain visibility into the realm of simulation and control of the entire cargo chain, providing solutions for any forecasted cargo chain disruption and even preventing the disruption from occurring.

Well-trained airport technical staff service these functions. This includes monitoring digitised sensors that provide a central control unit with the status and conditions of the airport's cargo 24/7.

Not surprisingly, all leading air logistics hubs score high on World Bank Logistics Performance Index measures (see the World Bank's Connecting to Compete report for 2023). This is especially so for Customs performance, which exhibits a strong positive correlation with on-time delivery of international shipments. Logistics hub performance is typically best where Customs officers and border control agents act as facilitators of trade rather than as policemen.

Leveraging multimodality

Fast and seamless intermodal cargo transfers are likewise features of top air logistics hubs. Some such as AMS, HKG, SIN, DXB, MEM and LGG are quadrimodal, meaning that they effectively integrate air, highway, rail, and waterborne transit modes for competitive advantage.

Dubai provides a rich lesson on how to enhance air cargo flows across different modal infrastructures. The emirate's government established bonded highway freight corridors among its two airports (DXB and DWC), Jebel Ali seaport, and its land ports creating multimodal efficiencies that accelerated logistics hub growth.

Most of the world's leading air logistics hubs are efficiently linked to thriving inland ports that receive and ship substantial cargo via rail and truck. Several of these provide the complete set of 'freight village' features including rail/truck intermodal interfaces, warehouses,

fulfilment centres, parts distribution, light manufacturing and assembly, free-trade zones, Customs operations, truck maintenance, hotels, restaurants, and leisure/rest venues.

The most effective global air logistics hubs speed up international commerce and trade through Fintech and the free movement of major international currencies. They also provide an attractive business environment for freight forwarders and third-party logistics providers (3PLs).

While the beneficial owners of cargo are the shippers (e.g. manufacturers) and consignees, forwarders and 3PLs are instrumental in connecting them, including selecting the airport and airline for payload transit. This selection plays a critical role in an airport region's air cargo leakage via trucking to more distant competitor airports.

Looking to the near future, specialised high-speed cargo trains are on the horizon. China, for example, has already developed a prototype high-speed cargo train that it said to be capable of carrying up to 110 tonnes of goods while traveling at speeds of around 350 kilometres per hour.

An express package and e-commerce logistics park is being designed adjacent to the large high-speed rail station in the Zhengzhou Airport Economy Zone, which will be connected to the airport's cargo areas six kilometres away. Plans are also underway for a 400 square-kilometre 'Oriental Aerotropolis' in Shanghai, the project being driven by Shanghai Pudong Airport (PVG) and the new high-speed rail station under construction nearby.

In Europe, airport high-speed rail cargo synergies are being pursued at Paris CDG. Known as EuroCarex, France's TGV system will be connected to those of other Western Europe nations to carry air pallets/containers to main European airports and express hubs on distances between 300km and 800km. Opportunities and challenges to be overcome are part of ongoing feasibility studies.

The future is already here for drone cargo delivery. Airport management must consider thinking about the safe and efficient integration of drones into their air cargo areas and providing locations for next-generation aircraft such as eVTOL, avoiding any conflicts with the airport's crew-operated commercial aircraft.

New modes of air transport plus rapidly evolving AI call for fresh thinking and proactive agility by management to capitalise on these and yet-to-be-imagined innovations that will transform today's airports into tomorrow's.



The way forward

Let me summarise with 15 succinct suggestions on how to create a world-class air logistics hub.

- Because international aviation networks power global air logistics hubs, expanding international cargo and widebody passenger services through incentives to airlines, regulatory liberalisation, and improving airport operations must be a priority.
- Work diligently with regional leaders to grow and diversify the airport region's aviation-oriented industrial base to improve the prospects and reduce the risks for international cargo airlines operating and expanding at the airport while boosting regional economic output.
- Acquire 5th, 7th, and 8th Freedom Rights and, where appropriate, explore 9th Freedom Rights to appeal to a major foreign air express airline to establish a regional hub at the airport.
- Regularly upgrade the airport's aeronautical infrastructure and cargo facilities for receiving, handling, and shipping freight, but don't outrun demand-driven headlamps.
- Allow general air cargo and air express airlines that are willing to establish a significant presence at the airport, at their own expense, to construct and manage their facilities, including self-handling of cargo should they desire, with any added costs to the airport or Customs paid by the airlines.
- Assess and pursue optimal ways to accommodate air cargo drones and eVTOL aircraft at the airport and nearby areas in a non-conflicting way with crewed commercial carrier operations, putting safety first.
- Aggressively recruit more international freight forwarders and 3PLs who are frequently the primary decision-makers for large shippers and consignees regarding which airport and which airline their products will be transported internationally.
- Determine the amount of air cargo originating in the airport region that is trucked to competing airports for international transport and work to minimise cargo leakage. Capturing a good portion of this leakage may support more international cargo routes and make new international passenger aircraft routes financially feasible.
- Create a paperless cargo environment by going fully digital, implementing single-window electronic Customs declarations for all imports and exports, and utilising the latest application programme

interface (API) and air cargo community system software for real-time secure access to cargo status by pertinent stakeholders.

- Recognise that AI will be a major disruptor of the air cargo sector as it already is in many other commercial and societal sectors. Make plans to fully leverage AI including bringing on board the technical talent to implement it.
- Accelerate the development of intermodal inland ports and freight villages, as well as e-commerce and time-critical packages logistics parks adjacent to high-speed rail stations where they are operational in airport regions, and efficiently connect them to the airport's cargo area through freight corridors including bonded corridors if necessary.
- Develop free trade zones that will allow the layering of ancillary light manufacturing and assembly facilities, fulfilment centres, spare parts distribution bases, and other inventory-holding activities along with providing Fintech and a liberalised monetary environment that fosters free currency movement to accelerate transactions and trade.
- Regularly benchmark the logistics performance of the airport and its extended aerotropolis using the seven basic indicators of the World Bank's 2023 Logistics Performance Index.
- Conduct a complete audit of all nodes impacting the airport's average time to clear cargo from a flight focusing on where and why delays are occurring. Is it ground handling, security, Customs, taxation agencies, health ministries, etc, and are the problems regulatory, document or operations-related? If the airport's shippers, freight forwarders, ground handlers, and cargo-carrying airlines are interviewed, it should become apparent where the problems lie that should be addressed.
- Establish a Global Logistics Hub Task Force made up of airlines, airport executives, freight forwarders, 3PLs, manufacturers/distributors, logistics training institutions, metropolitan region business and government leaders, and other key stakeholders to promote and advance the air logistics hub on multiple fronts.

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About the author

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