

## ***EXECUTIVE SUMMARY***

To facilitate air freight, landlocked countries need to improve operations at their airports and liberalize access for foreign airlines. But until those countries become major exporters, it is unlikely that scheduled air cargo operators will have significant operations. Instead, most air cargo will move as belly cargo on passenger airlines, with some complementary use of chartered air freighters during shipment peaks. Landlocked countries should therefore provide greater access to foreign passenger airlines.

### **Potential markets**

The demand for air freight is limited by cost, typically priced 4–5 times that of road transport and 12–16 times that of sea transport. Air freight rates generally range from \$1.50–\$4.50 per kilogram, while the value of air cargo typically exceeds \$4.00 per kilogram. Commodities shipped by air thus have high values per unit or are very time-sensitive, such as documents, pharmaceuticals, fashion garments, production samples, electronics consumer goods, and perishable agricultural and seafood products. They also include some inputs to meet just-in-time production and emergency shipments of spare parts.

Demand for air freight exports has been limited from landlocked developing countries because most enterprises ship small volumes of low value goods. The main exports shipped by air from developing countries are cut flowers, electronic parts, and fresh fruits and vegetables. Imports by air typically include high value consumer goods. However, without a significant outbound flow, the inbound air freight rates are higher — reducing the types and quantities of goods transported by air.

### ***Gaining competitive advantage***

The use of air freight can create competitive advantages. For example, producers will agree to shorter order times if shipments possibly experiencing delays in production or cargo clearance can be shipped by air. Similarly, manufacturers of garments, electronics, and other goods will compete for larger orders by shipping the large initial order using ocean freight and then using air freight to replenish inventories if demand is greater than expected.

### ***Diversifying***

Air freight can also be used as part of a strategy for diversification — to introduce products with shorter shelf lives or to provide reliable delivery of smaller volumes in new markets. Once the market has been established and volumes increase, the manufacturer can reconstruct supply chains by using a less costly mode of transport.

These strategies are particularly important for landlocked countries that have unreliable land transportation or long and uncertain clearance procedures at their borders or foreign gateways. Finally, where exports require cold chains, air freight can present the only means for guaranteeing continuity.

### ***Shipping samples***

Air freight is critical in the shipment of product patterns, designs, and technical drawings. While this is not a major source of air cargo, it is critical for manufacturers who export manufactured products. More important is satisfying the need to exchange samples with potential buyers. For contract manufacturing, this includes the initial prototype sent for the buyer's approval so that the order can go ahead followed by a head of production run, which must be approved before starting full production. Samples may also be provided for testing or for promotion campaigns.

### **Types of service**

As the volume of air freight grows, there is a natural progression from passenger aircraft to chartered cargo planes of increasing size and ultimately to scheduled cargo services. The challenge with using passenger aircraft is capacity, since priority goes to passengers and their baggage. For narrow-body aircraft with a high load factor, the available capacity is typically less than two tons, or about 12 cubic meters. Although load factors vary from flight to flight, shippers usually have a fixed shipment schedule based on the minimum available. Tourism can generate substantial freight capacity, but its cargo space is available only during the tourist season.

Chartered aircraft provide the shipper with more reliable capacity, but the freight rates are higher, especially for smaller cargo aircraft or for high load factors in only one direction (on a round trip or a triangular route). Capacity may also be a problem during peak seasons when all exporters compete for the available fleet capacity.

Most international scheduled air freight services operate on global east-west routes. They serve airports that are major generators of air cargo, avoiding airports that already have a significant amount of wide-body passenger aircraft traffic. They maintain high load factors throughout the year by using a mix of aircraft sizes and by periodically reallocating their fleet to different sectors.

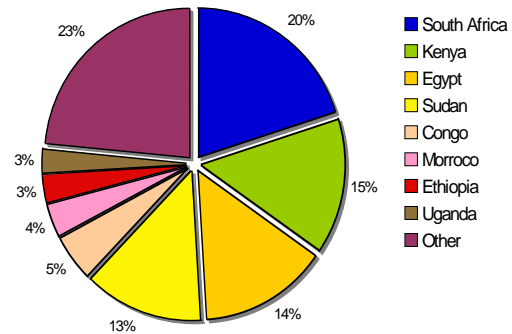
To meet the demands of shippers exporting small volumes or cargos of median value, three so called hybrid services have been developed:

- The first relies on consolidators, which combine shipments to generate enough volume to obtain reasonable freight rates. The consolidated shipments are then flown to the nearest major transshipment hub where they are re-consolidated for their final destinations.
- The second involves freight forwarders who arrange for road transport from the cargo origin to the nearest hub airport. This involves a one-day (or at most two-day) trip and includes a border crossing if the hub airport is in a neighboring country. This type of road-air service is increasingly provided as part of an airline road-freight service, with goods transported by truck under the airway master bill.
- The third involves air and sea freight. An air-sea combination is typically used where there are convenient flights to a hub airport that has a major seaport nearby (Singapore, Dubai). Exports move from the point of production to the gateway port using air transport. This arrangement is used when exports have missed their shipment date and need to be loaded on a specific cargo vessel or when land transport to the gateway port in another country is costly, unreliable, or involves a difficult border crossing. The sea-air combination offers a lower freight rate than for an air shipment. For landlocked countries, this intermodal movement would be combined with initial movement by road.

### Box A. Africa-Europe round trips

Europe is the primary destination for African air cargo accounting for about 2/3 of the total. African exports are typically counter-seasonal cut flowers and other perishables to Europe, but there is relatively little return cargo. More than half of the shipments are cut flowers and other refrigerated goods. The Netherlands are a major recipient of cut flowers, and Kenya is a major exporter. Manufactured goods are shipped primarily from South Africa, which accounts for almost 1/3 of the northbound air cargo. The southbound trade, the fastest growing, is primarily capital equipment, intermediate products and transport equipment. Together, these account for over half the shipments.

**Distribution of Cargo in Africa**



Tons loaded and unloaded at major airports  
Source: Airports Council International

Kenya, South Africa, and Egypt handle about half the air cargo (see figure on the right). Sub-Saharan

Africa has two airports with significant cargo operations, Johannesburg and Nairobi.<sup>1</sup> Johannesburg benefits from a strong local economy and a distance that requires air transport compulsory for most perishables exports to Europe. Nairobi has a relatively strong domestic demand for imports shipped by air as well as exports of cut flowers. It has leveraged this scale to become one of Africa's gateways. Nigeria benefits from the demand associated with its oil industry and other natural resources as well as relatively higher consumer demand. Cargo carriers have demonstrated an interest in serving this market despite problems with infrastructure and governance. Other countries with significant potential for agricultural exports by air, such as Uganda and Ghana, have difficulties with landside access and transport services, especially cold chains.

South African Airways, Kenya Airways, and Ethiopian Airways provide high quality air cargo services, often in cooperation with major international operators. However, most of the international gateways continue to rely on traditional European carriers that operate since the colonial period and have established regular routes.

### Cargo airports

The main cargo-handling activities at the airport are receiving and delivering cargo, building cargo pallets, X-ray scanning of outbound cargo, clearing import and export cargo, and loading and unloading aircraft. Consolidation and short-term storage of cargo are generally performed on-airport by the airlines or cargo-handling agents or off-airport by forwarders. Recently, there has been an effort to consolidate these activities on airports through larger cargo terminals or cargo villages with multiple warehouses.

Airlines select an airport for major cargo operations based on the potential traffic. Nevertheless, little consideration is given to the physical characteristics of the airport other than length of the runway and approach control. The landside facilities are less important because they can be adapted to meet the traffic.

<sup>1</sup> Lagos in Nigeria has significant imports, and Khartoum in Sudan, had well in excess of 100,000 metric tons but much of this is attributable to relief supplies flown under contract by commercial carriers and charter operators.

Most landlocked developing countries have gateway airports that have a relatively simple configuration with small warehouses. Opportunities for improving the cargo facilities are often limited by the space available on the airport. However, as passenger traffic increases, many of these airports move to larger sites, allowing for modern cargo facilities. Even if they remain in the same place, it is often feasible to introduce multi-storey facilities with open cargo handling areas on the ground floor and office space for officials, airlines, and forwarders on the other floors.

### **Moving cargo quickly**

Since the advantage of air freight is much shorter transit times, cargo must move quickly through an airport. The time for cargo operations depends on four factors: customs clearance procedures, cargo inspection procedures, the efficiency of cargo handlers, and the layout of storage facilities.

### ***Customs clearing***

For imports the customs procedures are critical. The clearance requires both the airway master bill, sent at the time the flight departs, and the customs declaration, filed by the brokers after the cargo had been shipped. In some countries the customs authority at the airport uses the same procedures and systems as at other international gateways, and inbound cargo can take up to a day to be cleared. In others the procedures are adapted to the requirements of air cargo, with all transactions conducted electronically and cargo cleared within one or two hours on a 24/7 basis.

### ***Inspection equipment***

For exports the documents are filed at the time cargo arrives at the airport, and the inspection is done at the same time so that cargo can be loaded within a few hours of arrival. Before X-ray scanners, a 24-hour cooling period was typically added to the transit time, but this has been eliminated. Most of the scanners are for baggage and small packages, so the cargo must be unloaded from the truck in loose form and scanned before being built into palettes. At larger airports with significant cargo traffic, full palette scanners allow shippers to build their palettes off-airport and to load them on the aircraft within a few hours.

### ***Cargo handling***

Cargo handlers at the airport should ensure efficient and secure handling of the cargo allowing airlines to compete with each other. Where the cargo volumes are fairly small, an exclusive contract is used, and the contractor must provide appropriate equipment for unloading the different types of aircraft.

In many developing countries the national carrier enjoys a monopoly, which presents a problem if the carrier is an inefficient state owned enterprise. This situation also introduces opportunities for discriminatory behavior in handling competitor's cargo. In some other airports a private contractor maintains a monopoly, but performance is often regulated through productivity incentives. Since the possibility for discriminatory behavior remains, competition must be introduced as soon as there is enough cargo, or carriers should be allowed to handle their own cargo.

### ***Warehousing***

Many storage facilities at smaller and older airports are fairly basic. This has little impact on cargo storage since most cargo does not stay at airports. Generally exports are time-sensitive, and the imports are high-value, fast-moving goods.

Modern warehouses have loading docks to speed truck turnarounds and minimize vertical movements of cargo. Export facilities for exports have large areas for scanning, inspection, building pallets, and gathering the cargo for specific flights. Separate facilities for imports have offices and inspection areas to facilitate customs clearance procedures and to allow for segregation of cargo into truckloads. For perishable cargo, these warehouses have temperature-controlled rooms for maintaining the cold chain between the truck and the aircraft. These warehouses also provide some bonded storage for high-value cargo.

Where there is enough traffic and space, airlines or larger forwarders will invest in such facilities. Where there is a lack of space or each airline handles a small amount of freight, the airport has to invest in a multiuser facility. In both cases, the airport must finance the construction of the complementary taxiways and the aircraft parking area.

Where these four elements, customs procedures, inspection equipment, cargo handling services, and warehousing are integrated into an efficient operation, most cargo will pass through the airport within a few hours. This minimizes dwell time and substantially reduces the space required to handle a specific volume.

### **Costs**

As a result of the recent spike in oil price, fuel now accounts for about half the annual cost of operating an aircraft, whether for cargo and passengers. Because fuel consumption is roughly proportional to the aircraft weight and the distance flown, the marginal cost for carrying cargo is computed based on weight and destination. For belly cargo the space is offered "as available," since priority goes to passengers and their luggage. Because the rate is usually set based on marginal cost and then adjusted for the level of service. For charter services the rates are usually higher, reflecting the incremental distance flown, including the empty legs, and the balance between demand and available capacity.

For shorter distances air freight rates per kilometer are higher because a greater part of the trip is spent both on the ground and more time in the air is spent climbing and descending. It is therefore often preferable to use road transport on the leg between the domestic source or destination and the transshipment hub.

### **Future air freight in landlocked countries**

The main difficulty for landlocked developing countries is to generate enough traffic to attract air freight services that are both frequent and competitively priced. Permitting free competition, or "open skies," for air cargo services can be significant but not sufficient if most cargo is transported as small shipments in passenger aircraft. Liberalizing passenger services to include fifth freedoms has been a greater challenge, especially in countries with a national carrier and limited passenger volumes. Also important is expanding the role of consolidators, especially the large integrators such as UPS, and the international freight forwarders specializing in air cargo such as Kelly Logistics, as well as local forwarders with international connections.

In the short run, higher fuel prices are expected to result in slower growth of air cargo traffic or even in a possible downturn. Over the longer run, traffic should continue to grow, but air freight will increasingly be integrated into multimodal supply chains that provide a better balance between cost and time.

Air freight will also open new markets by providing fast and reliable service for initial deliveries of product. Air freight will continue to support production activities, especially the exchange of samples and delivery of critical spare parts and high-value inputs. Finally, air freight will increase in importance in supporting reverse logistics, including repair and warranty work for electronics and other high-end consumer goods.

Nevertheless, air cargo is expected to decline as a mechanism for minimizing inventories and supporting just-in-time production. For these activities the higher cost of transport offsets the benefits of minimizing inventories in the supply chain. While it is important for potential exporters to have access to air freight services, they also must manage their supply chains to provide a competitive balance for the cost, speed, and reliability of shipments.