

# Aspects and development of cargo transportation by air, new solutions and structural changes in response to the crisis

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**Abstract.** The demand for air cargo transportation is increasing due to such obvious advantages as the speed of transportation, geography of supplies, constant control during transportation, reliability and safety, being rather vital for the development of the whole human society. It is necessary to determine the category of cargo and its transport characteristics to determine further conditions of transportation, loading and storage technology, which is an integral part of the transportation process. It is also impossible not to notice the contribution of ICAO to world freight transport, which seeks to analyze the economic significance of air freight and international trade. It should be noted that air transportation is economically profitable, which is important for the implementation of advanced international business practices, but the increased demand for goods, considered global economic trends, as well as the impact of economic disasters, such as the 2000s crisis, COVID force air carriers to adapt, show flexibility and invent new ways of delivering. Air freight is part of a chain that helps integrate the global economy.

## 1. Introduction

Air cargo (or freight) refers to any property, other than mail, stores and passenger baggage, carried on aircraft. The term air cargo is also used in a broader sense by the airline industry to mean any property (freight, express and mail) transported by air except baggage. An all-cargo service is an air service that carries only cargo, whether scheduled or non-scheduled. [8]

The main categories of air cargo include dangerous goods, live animals, and humanitarian aid, as well as perishable, temperature-sensitive pharmaceuticals, chemicals, food and ornamental plants.

It has its own properties, determining the conditions of their transportation technologies, loading and storing procedures called transport characteristics of cargo. [2]

Demand on aviation cargo transportation is annually increasing because of its obvious advantages: high speed of transportation; wide geography of deliveries; permanent control under cargo transportation; high reliability and safety of cargo transportation.

ICAO is committed to air cargo and *urges Member States to give due regard to the distinct features of air cargo services when exchanging market access rights in the framework of air service agreements and grant appropriate rights and operational flexibility so as to promote the development of these services.*[4]

Cargo transportation by air is indispensable in such cases:

1. Tight schedule. There is no faster way than by air. Mostly needed for the transportation of perishable goods, medicine, plants and animals, and any other goods requiring fast delivery for some reasons.
2. High value of content. The goods loaded on board of the aircraft are protected from theft or damage much more than on the highway or at the sea.
3. Lack of infrastructure at the point of arrival for other types of transport. Sometimes it is possible to overcome mountain ranges, abysses or water only by air, and the option of "multimodal transportation " will cost more than direct air transportation of goods.

Difficulties during cargo transportation by air:

1. High cost. Due to the limited space in the cargo compartments, accommodation will be much more expensive than, for example, on a ship or in a wagon.
2. Not all localities have airports of the corresponding class. It is necessary to plan a route based on the logistics infrastructure, and this sometimes causes certain inconveniences and increases the overall cost.
3. Delivery of goods to the client's hands, by analogy with the door-to-door service, is not practiced. This means that there will be additional transport costs. This drawback is inherent in other types of transportation, with the exception of road transport. [11]

### Economic Development

The industry growth depends on fuel prices and world trade imbalances, and is highly affected by economic disturbances such as the economic crisis in the late 2000s, that make it difficult for operators to fill cargo space. The rise in fuel expenses as well as the costs of meeting security requirements are also important challenges. It's limited by constrained resources like limited number of aircrafts and pilots.

The air transport industry is not only a vital engine of global socio-economic growth but is also of vital importance as a catalyst for economic development, creating direct and indirect employment, supporting tourism and local businesses, and stimulating foreign investment and international trade.

Since 1995, the world economy, measured in terms of gross domestic product (GDP), grew at 2.8 per cent annually while the world passenger air traffic (expressed in Revenue Passenger-Kilometers) increased at an average annual growth rate of 5.0 per cent.

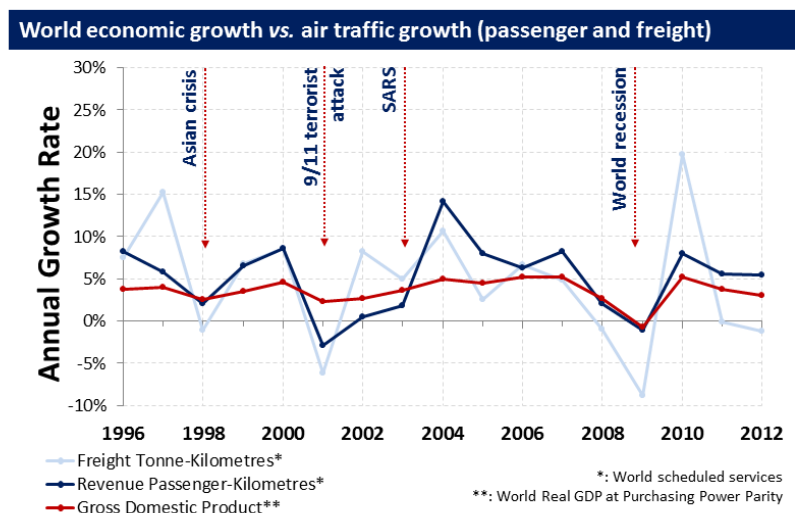
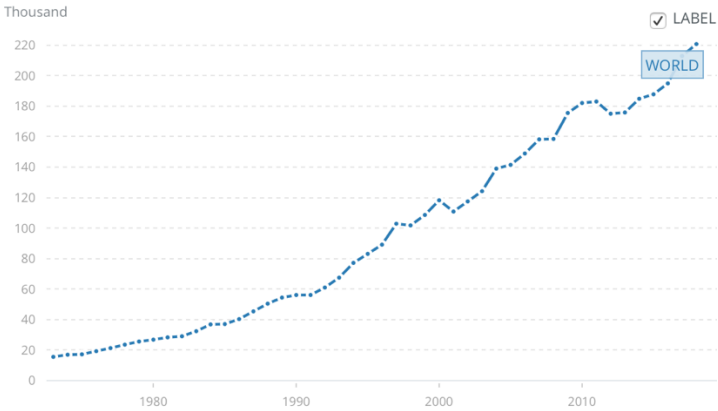
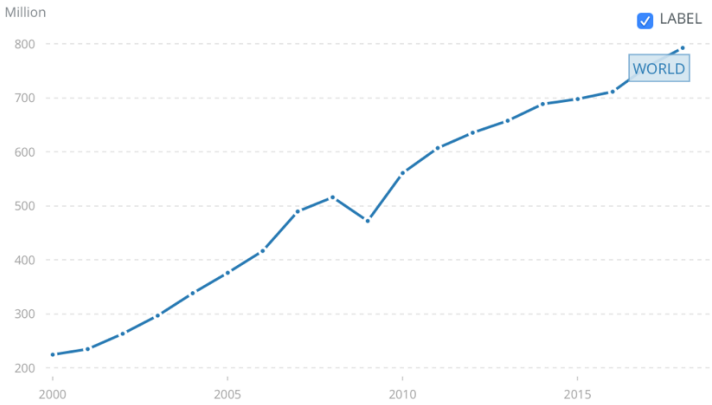


Figure 1. Air traffic growth (passenger and freight) [9]

**Comparison of the air cargo volume to other means of transportation.**



**Figure 2.** Air transport, freight (million ton-km) [10]



**Figure 3.** Container port traffic (TEU: 20 foot equivalent units) [10]

Air cargo represents roughly 1 percent of the overall freight movements by weight, and the demand for air cargo is primarily constrained by the costs, as air cargo services can be up to five times the cost of transporting the goods by road, and up to 16 times the cost of sea transport. The aviation sector only contributes 2 percent of all anthropogenic emissions, but is projected to be 70 percent higher than 2005 levels by 2020, even if fuel efficiency improves by 2 percent per year.

**Economic benefits of air cargo transportation**

Regardless of the geographic location of states, air cargo transportation allows them to have a fast and reliable access to remote markets and global supply chains. This is critical to the implementation of international best business practices, including operational inventory management and product-to-order production.

Air freight is an effective driver of economic progress in developing countries as it connects markets on different continents. High-value electronic equipment and perishable goods such as food and flowers are transported around the world, helping to preserve jobs and ensure sustainable economic growth in regions that benefit from such trade.

Air transport is essential for Small Island Developing States (SIDS), Landlocked Developing Countries (LLDC) and Least Developed Countries (LDC), as it helps them solve the problem of lack

of regular shipping and underdeveloped land transport infrastructure. In such areas, air cargo transportation plays the role of the most important regional link in life support.

Aviation's inherent speed and reliability are also of paramount importance in emergency response operations during emergencies such as natural disasters, epidemics and war. In dealing with the aftermath of humanitarian disasters, aid organizations rely primarily on-air freight. The role of air cargo transportation is also great in the prompt worldwide delivery of medicines and necessary for organ transplantation.

According to the Air Transport Action Group (ATAG), the greatest economic benefits of a developed air freight network are associated with broad long-term economic benefits from overall productivity gains. New markets are opening up, export volumes are increasing, and competition in the domestic market is growing and the choice of goods produced abroad is growing.

### **Current industry trends**

2019 hasn't been a particularly good year for air cargo. The industry is left with the hope that the past 12 months have been the worst period and that things will get better next year.

In 2020 the impact of the Covid-19 pandemic on the aviation industry can be seen in many forms - from a sharp decline in passenger traffic, to an increasing dependence of the world on air cargo transportation. Due to the continued risk of infection at airports around the world, large-scale cancellation of scheduled flights and, accordingly, due to the inability to load the luggage compartments of aircraft, carriers have lost almost 50 percent of their carrying capacity. Air carriers have to rush to invent new ways of delivering to meet the increased demand for the goods they need to fight the coronavirus crisis. And those who have adapted to the challenges of the new era are confidently moving forward, helping numerous victims.

The air cargo segment is estimated at US \$ 6 trillion in value terms. In these challenging times, global trade is mainly focused on the supply of goods needed to fight Covid-19, in particular pharmaceuticals and medical equipment.

The emergency and growing demand for these products has led to an enormous demand for air freight. However, with a decrease in the volume of cargo transportation due to the inability to use the luggage compartments of passenger aircraft for the transportation of goods, the growth in demand affected the delivery time. In addition, according to a report by the International Air Transport Association (IATA), compared to 2019, the total cargo turnover in 2020 will decrease by 10.3 million tons - to 51 million tons.

While the air cargo sector continues to face crises and capacity constraints, charter flights have become an effective response to the need for the seamless fulfillment of global supply chains.

“With travel bans and quarantine restrictions, supply chains have been challenging, especially with extra urgent supplies of medicines and PPE. Charters were the only option as scheduled commercial flights were suspended and the need to deliver emergency cargo was urgent,” Jacob Matthew, President and Board Member of National Air Cargo, told The STAT Trade Times.

2020 can already be called the worst year in the history of the aviation industry and supply chains in general. Airlines will lose \$ 84.3 billion in 2020, according to IATA. “On average, each day of this year will generate US \$ 230 million in losses for the industry,” said Alexander de Junac, CEO of IATA.

In 2020, total cargo turnover could drop to 51 million tons, but freight revenue could rise to \$110.8 billion from 2019, according to IATA.

The increased excitement over air freight and the reduction in cargo capacity are expected to enlarge freight tariffs 30 percent up. Freight revenues could nearly reach a record \$110.8 billion in 2020, up from \$ 102.4 billion in 2019, according to IATA.

The carrier community has shown amazing flexibility in responding to the crisis, introducing new solutions, mainly related to structural changes, such as the carriage of goods in passenger seats, flights of passenger aircraft operated exclusively for the transport of goods, and, finally, the most custom solution of all: dismantling of passenger seats in the cabin, necessary in order to free up space

for cargo.

For example, KLM Cargo and Virgin Atlantic aircraft carry cargo in passenger seats in the cabin, while in the cabins of Swiss World Cargo and Finnair aircraft, cargo is stored in place of dismantled passenger seats.

These unorthodox methods have borne fruit in increasing air cargo volumes during the crisis, but they have not been without inconvenience. Passenger aircraft cargo flights are cost-effective, most likely due to high fares and low fuel prices, which could change at any time. Removing passenger seats is a time-consuming technical procedure that increases airlines' costs, and in-cabin loading and unloading are tedious and complex tasks that increase the time spent on loading and unloading. In addition, cargo on such aircraft travels through passenger doors, making them impractical for the transport of bulky equipment.

The demand for air freight is now largely driven by a shortage of medical supplies - personal protective equipment (PPE), drugs, etc., mainly from Asian markets, and the above structural and operational changes are a bold response from carriers carrying capacity in a crisis.

Nevertheless, according to the latest data from the TAC Index (operational analytical information on air transportation tariffs), the demand for PPE all over the world is gradually falling, which may adversely affect the stability of cargo flights of passenger aircraft. Shanghai to North America tariffs fell 12.8 percent in first week of June; from Hong Kong to North America - by 12.3 percent; from Shanghai to Europe - by 12.8 percent; from Hong Kong to Europe - by 9.8 percent.

### Air Cargo Sustainable Development

Air cargo is a key driver towards the achievement of United Nations Agenda 2030 Sustainable Development Goals (SDGs). Air cargo plays a role as a trade facilitator for small island developing states (SIDS), landlocked developing countries (LLDCs) and least developed countries (LDCs), offering an opportunity to link remote markets and to connect them across continents as well as to the global supply chain.

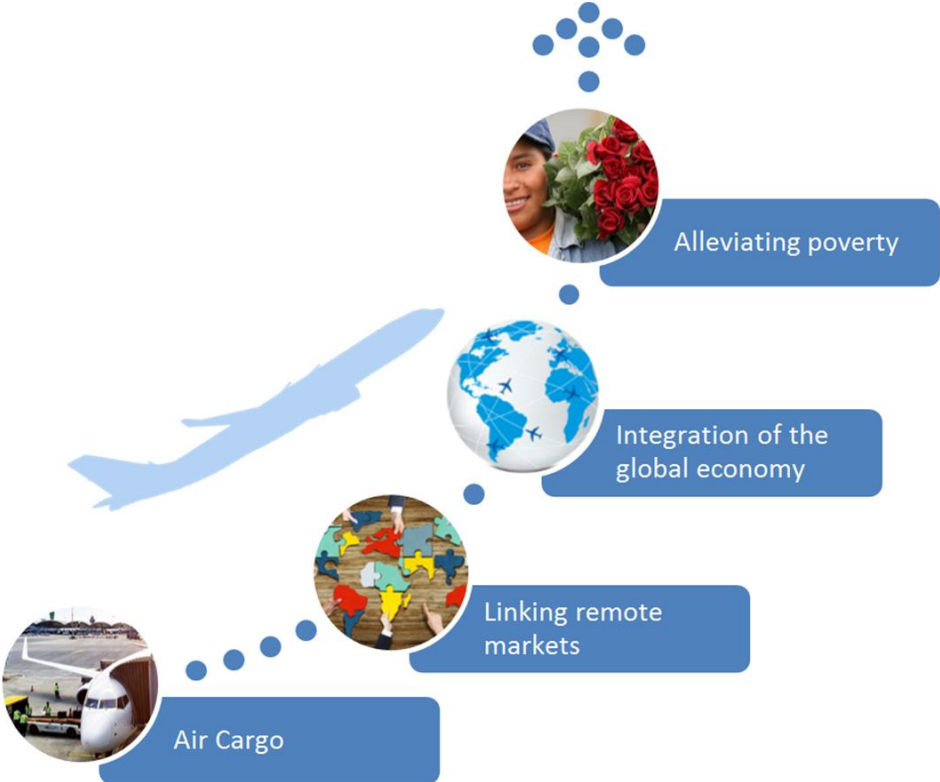


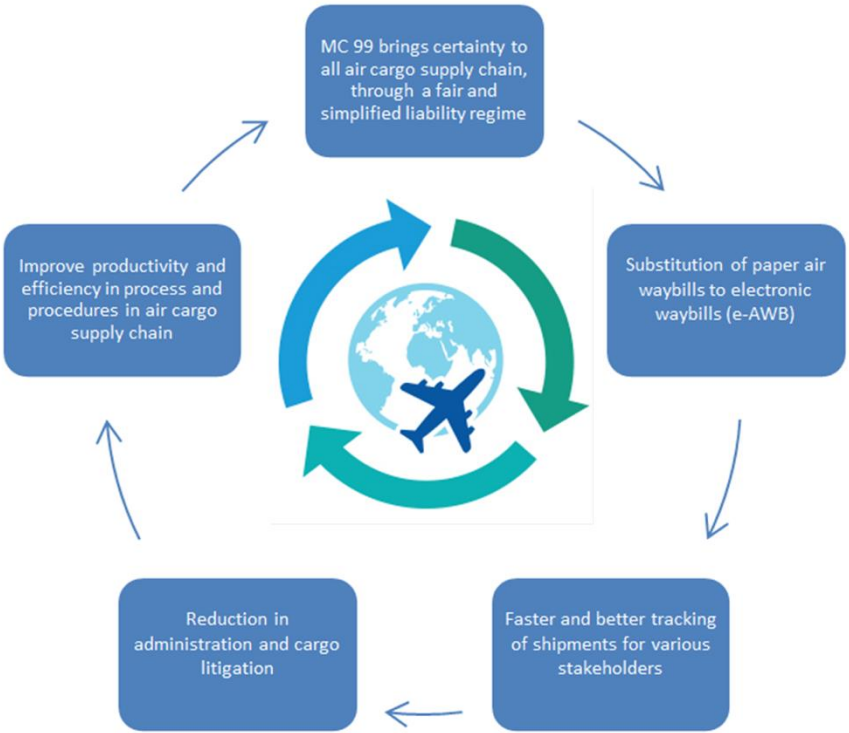
Figure 4. Air Cargo Development opportunities [9]

The tangible benefits of international trade in poverty reduction, as well as in the informal economy, are widely acknowledged. According to both the World Trade Organization and the World Bank, trade contributes directly to poverty reduction by opening up new employment opportunities. For example, international trade benefits agricultural producers by expanding export sectors and by bringing about structural changes in the economy that increase employment of low-skilled, poor workers in the informal sector. Trade also provides better access to external markets for the goods that the poor produce. Here is where air cargo plays a significant role in battling poverty.

Air cargo has been part of the chain that facilitates integration of the global economy. By increasing the facilitation of both international trade and air cargo specifically, trade costs may decrease and, therefore, the competitiveness of the goods and services produced by these kinds of economies may increase. As a lifeline and healthcare link for many remote communities, air cargo sometimes provides the only—let alone fastest and most reliable—means of transportation to deliver urgent humanitarian aid during emergencies caused by natural disasters, famine and war. ICAO is committed to analysis of the economic importance of air cargo and international trade. [4,5,6,7,8]

**MC99.** ICAO contributes to the efficiency of cargo operations by promoting adherence and/or ratification to the Montreal Convention 1999 (MC99).

MC99 provides a simplified liability regime for the destruction or loss of or damage to cargo. It also provides the legal certainty for the use of electronic air waybills (e-AWB) to replace paper as a record of carriage. MC99 is seeking to eradicate paper documentation from the air cargo supply chain. This initiative may bring significant efficiencies to all stakeholders, such as faster and more accurate document processing, improved productivity, security, accelerated shipment times and better customs compliance. Finally, MC99 provides certainty to the air cargo stakeholders who can truly ensure that a modern and fair liability regime would apply to cargo claims, regardless the final destination of the shipments.



**Figure 5.** MC99 general meaning [9]

## Conclusions

History has showed, however, that world aviation recovers from crisis: the stake is not to know if the traffic will recover, but when it will recover. Economic growth, technological change, market liberalization, the growth of low cost carriers, airport congestion, oil prices and other trends will continue to affect commercial aviation throughout the world.

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