AIR CARGO: FUELING MOMENTUM

The trends impacting the air cargo, freight forwarding and freight consolidation industries

CIRIUM

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INTRODUCTION

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In past years, global airline executives have heralded their airline's new apps, "greening" of their fleets, or exciting in-flight entertainment offerings. These projects resonated with business and leisure travelers, on social media and with Wall Street.

In 2020, cargo muscled its way to the front of the line.

Airline executives have always known how vital cargo revenue is to their firms, but COVID-19 brought that to the fore. At the peak of the pandemic, passengers sitting in seats were replaced by cargo strapped into those same seats — initially, personal protective equipment or other healthcare-related goods. Indeed, Cirium tracked some 200 aircraft where their economy seats were removed entirely — along with the wiring for those which previously housed in-flight entertainment systems. In their place: cargo on the deck, above already chock-full bellies. Cargo presented an opportunity to earn precious revenue when passenger travel fell to historic lows.

The last year has also been a boom for cargo operators, which faced volume declines before the pandemic. I know those challenges well, as I was president of Aloha Air Cargo. The Hawaiian airline is a vital lifeline between the islands. We carried everything from bread to film crew equipment — even a water buffalo for the movie "Tropic Thunder". We did it all, although e-commerce wasn't prevalent then. Carriers like Aloha saw their fortunes improve in 2020 as volume surged compared to prior periods.

The pandemic showed how flexibly air cargo solutions came to the rescue, and our reliance on this mode of transport. As you'll read in the note below, IBM estimates that the pandemic accelerated the growth of e-commerce by some 5%. That systemic effect alone will provide a boost to air cargo carriers, aircraft manufacturers and lessors. Then, couple it with announced massive global investments in infrastructure and support for manufacturing. Air cargo is the most flexible, adaptable and reactive solution for the freight needed to complete those investments. The outlook for the sector is very bright post-pandemic.

What you'll find in this report are insights on the cargo market taken from the Cirium Core, the most comprehensive data set available in aviation. In addition, you'll find analysis from our team to help make sense of recent developments. Cirium experts identified eight digital transformation initiatives designed to build sustainable success, minimize risk and create growth in today's air cargo operating environment.

It's required reading for executives wanting to maximize the opportunity presented by the growth of air cargo.

Thanks for reading.

Air cargo's flexibility helping support aviation recovery

Cirium contributors: Tamara Johnson-Draper, Claire Geary, Kevin Murphy, Patrick Pittman, Herman Tse

Air cargo tends to be a more flexible shipping method, especially in times of disruption

In January 2020, Cirium reported that global air cargo volume fell for the 10th consecutive month. By January 2021, not only had it recovered, but was experiencing 3% growth month over month and recently saw a 9% jump from February to March according to IATA, despite limited schedules and fewer widebody aircraft in service.

Air cargo tends to be a more flexible shipping method, especially in times of disruption. Carriers have been able to adapt schedules and configurations and according to Airports Council International data, airports have maintained operations schedules despite having far fewer planes. Together, they've been able to mostly keep up with the resurgence in demand.

Carrier flexibility has also caused problems for freight forwarders and consolidators. Dynamic carrier schedules, which were often set months in advance and never changed, are changing regularly. Looking at the number of passenger flights alone, March 2021 saw a change in scheduled flights of 24%. Today's most successful freight forwarders and consolidators are the ones that can track schedule changes, equipment changes and route changes to create new efficiencies, and avoid risk and disruption.

As long as passenger aircraft remain a significant provider of air freight transport, well maintained and in-depth schedules data is key to maintaining uninterrupted service.

Recent changes in passenger fleet composition have also had significant impact on air cargo planning.

E-commerce is the fastest growing segment in the air-cargo sector with 27.6% year-on-year growth

On 6 April, 2020, Cirium recorded a total of 16,522 passenger jets worldwide as in-storage, whereas on 6 April, 2021 a total of 8,084 were classified as in-storage.

A significant amount of the global commercial passenger fleet remained in storage through May 2020, with more than 16,000 widebodies, narrowbodies and regional jets grounded. In June 2020, the airlines began putting aircraft back in service, the majority of these being single-aisle and narrowbody jets. And even though cargo capacity doesn't seem to be significantly constrained, the lack of widebody options limits what and how carriers can ship. Additionally, the smaller fleet limits the frequency in schedules.

In 2020, most of the freighter operators increased their utilization by more than 20% to make up for lost space in passenger aircraft. However, they are still unable to fill the large capacity gap as there are insufficient freighter aircraft available, especially for intercontinental routes. This is also why we have seen a surge of passenger-airliner freighter or "preighter" operations flown by passenger carriers.

In response, the industry is working to create efficiency by investing in technology and moving forward with digital transformation initiatives.

The overall outlook for air cargo continues to look good. The dependency on e-commerce is not likely to change. IBM estimates that COVID-19 accelerated e-commerce growth by five years. E-commerce is the fastest growing segment in the air-cargo sector with 27.6% year-on-year growth. Conditions in the manufacturing sector are robust despite the recent spike in COVID-19 outbreaks. Investment in road, rail and shipping infrastructure is outpaced by air infrastructure.

Supply chain disruptions from labor issues, weather and ageing infrastructure and the resulting delivery delays have led to long delivery times and higher risk, leading manufacturers to use air transport to recover time lost during the production process or switch to faster shipping to satisfy customers. Global manufacturing inventories remain low compared to sales volumes, resulting in businesses needing to refill their stocks quickly, driving demand for air cargo.

The airlines, the shippers, the forwarders and consolidators that will come out ahead are the ones that can eliminate data friction. Consistent and accurate schedule information and fleet data is the simplest path to optimization in the air cargo industry.

Staying ahead of disruptions, advantage: air cargo

Cirium contributors: Ben Freeman, Kevin Murphy, Simon Kirsch, Patrick Pittman

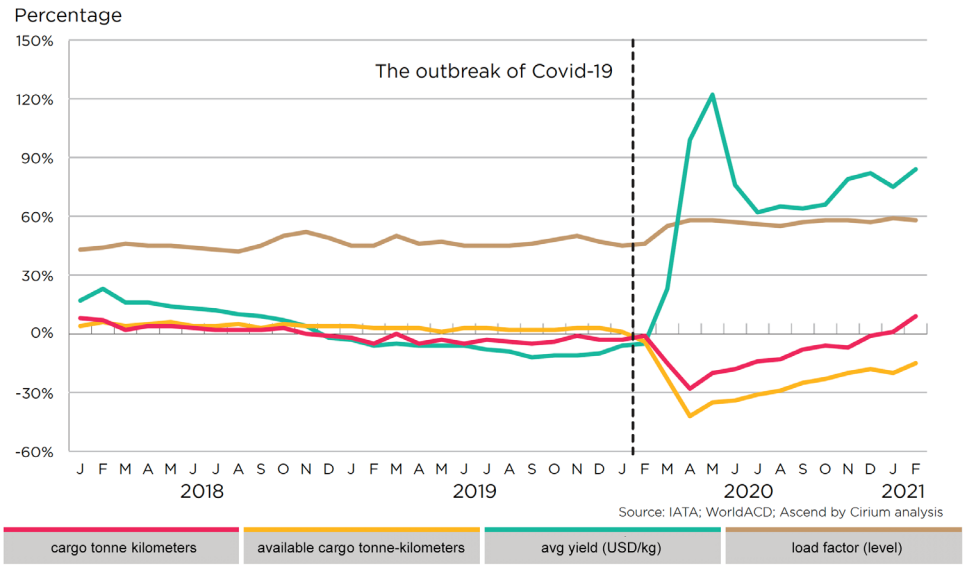
Adaptability is a direct contributor to air cargo's surging demand

The grounding of the Ever Given in the Suez canal in April 2021 impacted the delivery of more than 12% of global cargo, halting more than 350 ships. Disruptive weather events all over the world have impact on ground transportation. And the on-going impact of COVID-19 on the global passenger fleet continues to limit air cargo's available schedules and routes, driving up demand for the limited remaining capacity.

One of air cargo's strengths, and a direct contributor to its surging demand, is its ability to work around crises and minimize the impact of delays. Because of the flexibility inherent to moving cargo by aircraft, it is often the preferred transport method of critical and high-value items. Even with the speed and relative reliability of air freight, freight forwarders and consolidators still need to provide regular updates to their customer. Shippers of goods want to know where their materials are, and what time their goods are going to arrive. Often this cargo is perishable, or a critical component in a just-in-time production process.

For air cargo to retain this advantage and use it to grow the industry, knowledge of operational delays, cancellations and equipment changes are critical to remain flexible and keep rising customer expectations in sight. It enables shippers to prevent major delivery delays, identify alternative routes and communicate with context. Additionally, it meets the growing demand from their customers to have clear visibility to the status of their goods, a demand carried over from the high-touch experience of consumer online purchasing.

Global air cargo supply and demand trend 2018-2021



The industry has turned to sensors and radio-transmitting devices attached to packages to enable broadcasting of location information to track shipments and help communicate status and position, but without an integration of real-time flight data, these devices don't provide any context or actionable data. In the case of a delay or a disruption, shippers need to plan for alternatives, determine new routes or calculate new arrival times while communicating with shippers and recipients. Good data removes any fear, uncertainty or doubt among all stakeholders.

Contextually relevant flight status data can be applied to:

- Help the sender understand where their materials are, what's happening to them and their estimated arrival time. It enables them to communicate with their customer.
- As the freight forwarder, expediter or consolidator, understand the reason for the disruption. This enables not only richer communication and customer support, but the ability to find alternative routes.
- As the recipient, knowing what is happening is much better than not knowing. It enables plans to be adjusted and reset expectations before the absence of the package creates a larger problem.

The following flight status data is useful for tracking air cargo shipments on passenger aircraft. It's easily integrated in existing tracking and scheduling systems or can be set up to alert operations leads of a potential problem.

- Changes to departure times, arrival times, gate changes, flight cancellations and delays etc.
- Weather updates and changes.
- NOTAMs impacting a flight path or schedule.

By staying ahead of disruptions and delays and by communicating seamlessly with customers, air cargo companies will continue to take advantage of recent growth in the industry and continue to expand revenues and volume.

The Ever Given running aground in the Suez Canal impacted the delivery of more than **12%** of global cargo, halting more than **350** ships.

Cabin cargo: the trend continues

By **James Mello**n, senior aviation data research analyst for interiors and passenger experience at Cirium, reports on the passenger aircraft without seats in the cabin, with additional research from **Nigel Fisher** and **Bin He**

In 2020, Cirium released analysis which showcased the new trend of passenger aircraft turning into temporary freighters. In this updated Data Insight, we have continued to observe what has happened with the aircraft we have researched, and found that even more aircraft have adopted this role.

The instability brought about by the COVID-19 pandemic created an increased need for air cargo, however as most industries saw some disruption, so did air cargo, with mass cancellations of passenger flights, changes in schedules and the uncertainty of crew quarantines.

As a result of this operating environment and the growing need to transport more freight by air, some airlines have been able to maximize the cargo-carrying capabilities of their aircraft. In this Data Insight, we look at the small global fleet of aircraft which have had their seats removed, creating space for cargo to be transported in the cabin.

Cirium's Passenger Experience research team has identified 200 aircraft that have had most if not all of their passenger seats removed in order to transport cargo in the cabin. This Data Insight does not account for any aircraft or flights operated where cargo has been placed into the passenger seats for carriage, or for any aircraft operating cargo-only flights where cargo has only been loaded into the hold.

Seats have been removed from 18 Emirates Boeing 777-300ER aircraft, allowing for additional cargo capacity.

Radical solution – the early days

Increased demand for personal protective equipment (PPE) manufactured in Asia required fast distribution across the world. This, however, coincided with the sudden reduction in passenger flights, which sharply cut the amount of cargo capacity available.

Cirium aviation data researcher Bin He notes: "At the beginning of the pandemic, Chinese airlines distributed essential cargo across the country on board passenger aircraft. Boxes of PPE were loaded into the hold, but were also placed into the passenger seats too. But as the pandemic intensified and global demand for PPE rapidly increased, it became apparent that airlines needed a more radical solution."

The **A330** has been a popular widebody for cabin cargo operations, accounting for **31.5%** of Cirium's Cabin Cargo fleet.

China Eastern Airlines removed seats from 19 Airbus A330 aircraft to carry cargo in the cabin.

Cabin cargo conversions, also known as the preighter

81.5% of the converted aircraft are Airbus and Boeing twin-aisle jets

Forty-seven aircraft belonging to 10 Chinese airlines have had all or most of their seats removed, making up 23.5% of Cirium's cabin cargo fleet. Over half of those aircraft are Airbus A330s, 19 of them operated by China Eastern Airlines. Bin He explains: "China Eastern began by operating flights where boxes were carried in the seats, but by March they were removing the seats entirely, further maximizing the cargo capacity of each aircraft." The A330 has been a popular widebody for these operations, accounting for 31.5% of Cirium's cabin cargo fleet.

Ten of the A330s belong to Lufthansa, whose group chief executive Carsten Spohr is credited with coining the term preighter (a portmanteau of passenger and freighter). Lufthansa Technik obtained approval from the German regulator to convert the cabins to carry cargo, removing seats and IFE wiring and installing fire-suppression measures. Each A330-300 could then transport medical supplies from Asia to Lufthansa's Frankfurt hub. Cirium's flight-tracking data shows that between late March and late May, these aircraft operated an average of 50 flights each, after which time they concluded flying these services, and have since had their seats reinstalled, allowing them to return to passenger service.

Widebodies make up the majority of our Cabin Cargo fleet: 81.5% of the aircraft are Airbus and Boeing twin-aisle jets. In addition to 63 A330s, 58 Boeing 777s have been employed by 17 different airlines, including the operator of the world's largest 777 fleet.

Emirates had initially modified 10 777-300ERs to operate as Mini Freighters supplementing its 11-strong fleet of 777 Freighters

Emirates had initially modified 10 777-300ERs to operate as Mini Freighters supplementing its 11-strong fleet of 777 Freighters. Now they are up to 18 converted planes. Each of the 360-seat three-class aircraft have had 305 economy seats removed, creating space in the cabin for up to 132cbm or 17t of cargo, in addition to the 40-50t capacity in the hold.

Emirates senior vice-president of worldwide cargo operations Henrik Ambak notes: "We have operated flights on the modified Boeing 777-300ER aircraft with around 60-70t of cargo payload per flight." The first of these aircraft commenced cargo services from Dubai in mid-June. Recently, Emirates has returned two of these 777s to their lessor, while dedicating another eight examples to this role.

By this time, demand for urgent distribution of PPE by air had softened, as supply chains settled and shippers turned to less time-sensitive and more cost-effective modes of transport such as land and sea. With far fewer passenger flights operating, the lack of aircraft hold capacity restricted the ability to ship traditional consumer goods. Airlines such as Emirates have filled some of the capacity gap by introducing Mini Freighters.

Ambak adds: "While supplies of PPE such as masks and gloves tend to be more frequently transported, we have also loaded items such as garments and textiles, fresh cut flowers, fruits and vegetables, pharmaceuticals and manufacturing components."

Loading cargo into cabins requires a lot of manpower, compared with loading it into aircraft bellies in containers and on pallets

The peak number of Cabin Cargo aircraft in service simultaneously was reached in June with only minor fluctuations to the total since then. This has occurred because some airlines reinstalled seats on aircraft, which then returned to passenger services, while other carriers commenced Cabin Cargo operations during the second half of the year.

So far, 75 aircraft, equating to 37.5% of the Cabin Cargo fleet, have completed their cargo duties, with the majority returning to passenger service. Some others have not: 29 aircraft, representing 14.5% of the Cabin Cargo fleet, went into storage following their cargo flights. The rate of aircraft being converted has slowed, but has not stopped entirely. During the second quarter of 2020, 116 aircraft had seats removed; followed by just 32 aircraft during the third and fourth quarters combined. Our latest research reveals a further 25 aircraft have adopted the Cabin Cargo role so far during 2021.

While the number of converted aircraft has increased and appears to be a helpful revenue source while passenger counts are down, it's unsure how many will remain as counts return. As long as fares are low and business travel remains limited, we'll likely see cargo used to offset passenger revenue losses. For long-term continuation, more efficient conversion and loading methods will be required.

The future of cabin cargo

Chris Seymour, head of market analysis at Ascend by Cirium, offers this perspective: "Early in the pandemic, there was an urgent need to move cargo quickly. Now that things have settled down, airlines are looking at how to move cargo cost-effectively. Loading cargo into cabins requires a lot of manpower, compared with loading it into aircraft bellies in containers and on pallets. The issue for airlines is whether to spend money on reconfiguring cabins, or simply operate aircraft with cargo loaded in the belly and on the seats if required."

For the time being, Emirates says it will "continue to use the modified aircraft for cargo operations across our network. Given that global cargo demand continues to evolve rapidly, it is hard to make any predictions for the medium or the long term."

In the short term, the industry is faced with what IATA chief executive Alexandre de Juniac describes as "the biggest airlift in history" as COVID-19 vaccines begin to be distributed across the world. The complexities of transporting vaccines, particularly those requiring cold storage, point to them being placed in aircraft holds, so it seems unlikely that they will be carried in the cabin.

Nevertheless, until carriers are able to reintroduce routes and frequencies of passenger services, thereby increasing global air freight capacity, the Cabin Cargo fleet will perhaps still play a role in global distribution, for the time being at least.

Eight digital transformation initiatives for air cargo

Cirium contributors: Jordan DuFault, Kevin Murphy, Andrew Ainsworth

Improving customer confidence while finding new efficiencies is the best way to capture potential long-term demand for air cargo

Logistics success comes down to operational excellence and customer confidence, with the first often driving the latter. Increases in e-commerce, global supply chains and disruption in shipping have all contributed to much more complex operating environments, but also opportunities for air cargo growth.

The air cargo industry has been slow to invest heavily in digitalization, but it is becoming increasingly clear to create sustainable success and take advantage of growth opportunities, companies need to invest in digital transformation.

Technology topics like "automation," "artificial intelligence", "big data," and "5G" aren't new, but they are often treated as unreachable goals, due to complexity or difficulty in proving return on investments.

Improving customer confidence while finding new efficiencies is the best way to capture potential long-term demand for air cargo.

To simplify and get the most value out of digital investments, Cirium experts recommend a portfolio approach to digital transformation that focuses on building trust with customers and improving critical decision making.

The fastest way to build trust and expedite decisions is to remove fear, uncertainty and doubt from your portfolio.

Cirium experts identified eight digital transformation initiatives designed to build sustainable success, minimize risk and create growth in today's operating environment.

1

- **Create complete transparency and provide end-to-end visibility on shipments among all stakeholders.**
  Some call it the Amazon effect, others call it customer service. When customers, customer service and employees know the status, location and potential risks regarding their shipment, their confidence increases significantly.

2

- **Incorporate data into product and value propositions.**
  Offer data to customers as part of a service. Easy access to history, schedule options, on-time performance, pricing trends and surcharges creates a better-informed customer. The more data a customer has, the more likely they will stay loyal and eliminate other providers from their mix.

3

- **Develop user-centric customer experiences that can differentiate your services.** Enable customers to manage their own accounts and handle simple tasks through well designed web and mobile applications. Free customer service and sales people from the mundane and enable them to focus on providing value at the more complex levels.

4

- **Democratize critical planning data available.** Enable faster decision making and create a culture around data by making it accessible to all employees who make scheduling, planning or even in-the-moment routing and delivery decisions.

5

- **Create cargo community.** Normalize data formats and access across the air cargo industry to ease communication and data sharing. The closer the connections between exporter and freight forwarder, and freight forwarder and transporter, customs broker, ground handlers, airlines and destination delivery, the less room for error and better communications between parties. Solutions include e-Air Waybill (e-AWB) and e-Freight as well as standardized XML schema.

6

- **Identify bottlenecks in decision making and build data-driven scenarios.** Pre-determined scenarios like alternative routing options can cut research and decision-making time down to mere moments in the case of schedule delays or equipment changes.

7

- **Apply machine learning to historical data to help determine the most reliable routes, schedules and carriers.**

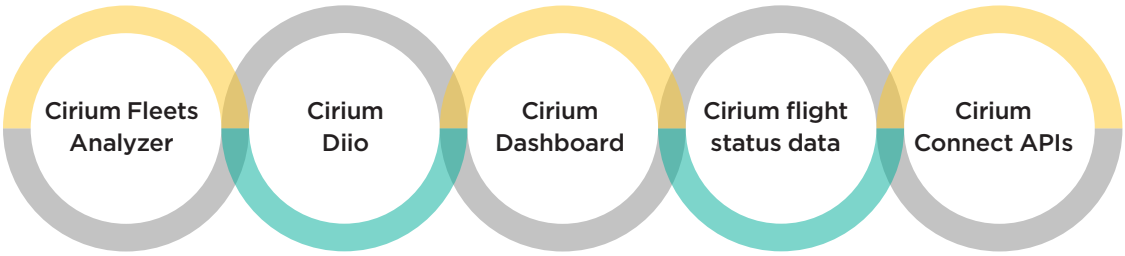
8

- **AI and machine learning don't have to be difficult or scary. Using historical data and outcomes, quickly train systems to help optimize decisions and minimize risk.**

These initiatives can result in higher levels of trust and value for the customer, improved operations, and an increase in market share at a premium price. At the center of the initiatives is the ability to collect, process and manage quality data. Organizations should look to understand the data they have, acquire the data they need and then organize it in a way to make it easily accessible and portable for individual applications and programs.

Resources

- **Cirium Solutions for Air Cargo:** https://www.cirium.com/industry-solutions/air-cargo-data/
- **IATA:** IATA Air Cargo Market Analysis
- **Ascend by Cirium Viewpoint:** 2nd Quarter 2021, Issue 71
- **Related products and data sets:**



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