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**Competition Dynamics and Market Power:  
Analysis of the Duopoly Between Airbus  
and Boeing in the Civil Aircraft  
Manufacturing Industry**

**Relatore:**

Prof. Luigi Benfratello

**Candidato:**

Alessio Lo Verde



# Abstract

The Aircraft Manufacturing Industry has a long and complex history, shaped by advancements in technology, geopolitical forces, and the rising demand for global air travel.

Initially, the industry had a monopolistic structure, with Boeing as a main player covering almost the whole demand.

However, by the late 20th century, it consolidated into a duopoly, with Boeing and Airbus emerging as the dominant players.

Boeing, founded in 1916 in the United States, initially specialized in military aircraft before expanding into the commercial sector.

The introduction of iconic models like the 707 and 747 solidified its position as a market leader.

Airbus, instead, was founded in 1970 as a European consortium aimed at creating a competitive alternative to challenge the American dominance in aircraft manufacturing.

With innovative models such as the A300 and later the A320, Airbus rapidly gained market share, challenging Boeing's supremacy.

Both companies have benefited from substantial government support, which has been a subject of international trade disputes.

The competition between Airbus and Boeing has defined the industry's landscape, influencing technological advancements, global trade policies and economic strategies. Today, the civil aircraft manufacturing industry remains largely a duopoly, with these two firms competing for dominance through technological innovation, strategic partnerships, and a deep understanding of market needs.

The core objective of this thesis is to conduct a detailed analysis of the duopolistic Civil Aircraft Manufacturing market, providing an overall understanding of the dynamics driving the civil aircraft manufacturing industry.

The study will trace the historical development of both companies, analyzing the path that led them to establish themselves as leaders in the global aviation sector. Following, a thorough market analysis will explore the current competitive dynamics and key strategic factors that shape the industry.

The analysis will include a detailed examination of their 10-K form, in order to assess their revenues streams and to forecast growth trajectories of both firms.

Furthermore, the thesis also dedicates significant attention to the issue of government subsidies, providing an in-depth exploration of the disputes between Airbus and Boeing over Government financial support.

The study will investigate how these disputes evolved into a political struggle and examine their implications for global diplomacy and economic governance. Through these analyses, the thesis will conclude defining how Airbus' entrance influenced the market and what would be expectable with the entrance of the new players.

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# 1) Introduction

The commercial aircraft industry is a vital component of the global economy, facilitating international trade, tourism, and cultural exchange. Dominated by two major players, Airbus and Boeing, this industry has seen significant advancements and transformations over the decades. This thesis aims to provide a comprehensive analysis of the development of the Aircraft Manufacturers' competitive landscape and the factors affecting it. Additionally, it will explore the ongoing subsidies disputes between Airbus and Boeing and their future implications.

Airbus, a European multinational aerospace corporation, was founded in 1970 as a consortium of European aerospace manufacturers. The creation of Airbus was driven by the need to compete with American aerospace giants and to foster collaboration among European nations.

Over the years, Airbus has grown to become one of the leading manufacturers of commercial aircraft, known for its innovative designs and technological advancements. The company's journey from its first aircraft, the A300, to the modern A350 and A380 models, highlights its commitment to innovation and excellence in the aerospace industry.

Boeing, an American multinational corporation, was established in 1916 by William Boeing. Initially focused on producing military aircraft, Boeing expanded into the commercial sector in the 1950s with the introduction of the Boeing 707, the first successful commercial jetliner.

Its history is marked by a series of strategic mergers and acquisitions, which have solidified its position as a dominant force in the aerospace industry. The company's product line, including the iconic 747 and the modern 787 Dreamliner, reflects its continuous efforts to push the boundaries of aviation technology.

In order to analyze the Commercial Aircraft manufacturer market, the thesis will dive deep, identifying the competitive environment, strategic choices by the duopoly represented by the two companies, how the competition changed with Airbus entrance into the market and main demand drivers represented by airlines and leasing companies.

To have a grasp of the competitive landscape, the thesis will report a brief competition history between the two companies, a market analysis based on the company's income statement and various reports and will define the structural characteristics that describes why the market is an established duopoly and why it is difficult that it will change anytime soon.



The rivalry between Airbus and Boeing has evolved over the years, with each company striving to outdo the other in terms of product offerings, market reach, and technological advancements. This competition has driven significant progress in the aerospace industry, benefiting consumers and stakeholders alike.

The market for Commercial Aircraft is dominated by Airbus and Boeing, with other manufacturers such as Embraer and Bombardier playing niche roles and new players such as COMAC and UAC challenging the duopoly. The competitive landscape is shaped by factors such as market share, technological innovation, and customer relationships. Both Airbus and Boeing have established extensive global networks, enabling them to serve a diverse range of customers and markets.

Lastly, the thesis will report on the longstanding subsidies dispute between Airbus and Boeing.

The legal battle has been a contentious issue, with both companies accusing each other of receiving unfair government support. This dispute has led to numerous trade tensions, impacting the global aerospace industry. The World Trade Organization (WTO) has been involved in adjudicating these disputes, with rulings that have significant implications for both companies and the broader industry.

The ongoing battle for market dominance has led to the development of more advanced, efficient, and safer aircraft, pushing the boundaries of what is possible in aviation.

The resolution of the Airbus-Boeing subsidies dispute will have far-reaching implications for the aerospace industry. It will influence future trade policies, competitive dynamics, and the regulatory environment, shaping the industry's trajectory in the years to come. The outcome of this dispute will also affect the strategic decisions of both companies, potentially leading to shifts in their market strategies and investment priorities.

The thesis will conclude with considerations regarding how Airbus' entrance in the market brought a fierce price competition that led to an increase in benefits for airlines and thus, global traveler and, additionally, how the market would be affected by a new player challenging their established market dominance and how it will benefit all the stakeholders involved.

## 2) Civil Aircraft Manufacturing Industry

The Civil Aircraft Manufacturing Industry represents the global industry that facilitates the movement of people and goods via passenger and cargo planes. The segment contains activities related to the design, production, operation, and maintenance of commercial aircraft, along with the airlines, airports, and associated businesses that contribute to this ecosystem [1].

The market has grown exponentially within the past century, evolving from a niche service into an essential component of the global economy, which allows for rapid international travel and economic and technological development [2].

Its evolution is closely tied to advances in technology, regulatory changes, and shifts in global economics, all of which have shaped the structure and dynamics of the modern aviation industry.

The origins of the commercial aircraft transportation market can be traced back to the early 20th century, with the advent of powered flight. Wright brothers were the first people to successfully developed the first powered flight in 1903, ideally demonstrating the feasibility of air travel, though the technology already possessed in those days [3].

By the 1920s, aircraft technology had progressed enough for the first commercial airlines to emerge. Germany's Deutsche Luft Hansa (founded in 1926, later Lufthansa) and the Netherlands' KLM (founded in 1919) were among the earliest pioneers in offering scheduled passenger services. However, air travel during this period was still expensive and inaccessible to the general public, largely catering to the wealthy and business elites. Aircraft were small, had limited range, and could only carry a handful of passengers, making the market relatively small and exclusive.

The 1930s marked a turning point, as technological advances, particularly in aircraft design and engine performance, led to the development of larger and more reliable planes. The introduction of the Douglas DC-3 in 1935 was widely considered a game-changer.

The DC-3, which could carry up to 21 passengers and had a range of over 1,500 miles, made air travel more economically viable. Its reliability and efficiency allowed airlines to operate at lower costs, making flights more affordable for a broader range of people.

As a result, the commercial aircraft transportation market began to expand, but it still representing a small share of the whole transportation methods market, compared to trains and ships.

World War II had a profound impact on the evolution of the market. The war effort led to significant advancements in aircraft technology, as both sides pushed the limits of design, performance, and production. After the war, many of the innovations developed for military purposes were adapted for civilian use. In addition, surplus military aircraft were converted for commercial purposes, providing airlines with a boost in capacity [4].

The post-war period also saw a surge in demand for air travel, as economies recovered, and the middle class began to grow in many parts of the world. The 1944 Chicago Convention, which established the framework for international aviation and created the International Civil Aviation Organization (ICAO), laid the groundwork for a more structured and regulated global aviation market.

The 1950s and 1960s are often regarded as the golden age of commercial aviation, marked by the introduction of jet engines and the rapid expansion of air travel. The launch of the Boeing 707 in 1958 was a significant milestone, as it was the first successful commercial jetliner. The aircraft could carry more passengers, fly at higher altitudes, and travel longer distances than any previous model, reducing travel times and making air travel more convenient and accessible [5].

This period saw the rise of major global airlines, including Pan Am, British Airways, and Air France, which played a key role in popularizing air travel. The jet age also helped to solidify the structure of the commercial aircraft transportation market, with aircraft manufacturers like Boeing, McDonnell Douglas, and Lockheed dominating the production side, while national flag carriers and private airlines competed for passengers.

The market continued to evolve in the 1970s and 1980s, with the introduction of wide-body jets like the Boeing 747, which could carry over 400 passengers and revolutionized long-haul travel. The 747 became synonymous with international travel, allowing airlines to transport more people across greater distances at lower costs. However, the oil crisis of the 1970s also exposed the industry's vulnerability to fuel price fluctuations, leading to a push for more fuel-efficient aircraft. The introduction of the Airbus A300 in 1974 marked the emergence of a new competitor in the market, challenging Boeing's dominance.

Airbus, a European consortium, adopted a strategy of producing aircraft that offered better fuel efficiency and operational flexibility, which appealed to airlines looking to cut costs. Over the next few decades, Airbus would grow to become Boeing's primary competitor, shaping the dynamics of the commercial aircraft market [4-5].

Deregulation also played a pivotal role in transforming the market, particularly in the United States. The Airline Deregulation Act of 1978 in the U.S. removed government control over fares, routes, and market entry for new airlines, leading to increased competition and the rise of low-cost carriers.

This period saw the emergence of airlines like Southwest Airlines, which pioneered the low-cost business model by offering no-frills, point-to-point services at lower prices. Deregulation led to a proliferation of new airlines and greater competition, which in turn lowered ticket prices and expanded the market. This model would later be adopted by low-cost carriers in other regions, including Ryanair in Europe and AirAsia in Asia, further democratizing air travel and fueling the growth of the commercial aircraft transportation market.

The 1990s and early 2000s were characterized by continued growth in air travel, driven by globalization, economic growth, and the rise of international tourism. Airbus and Boeing solidified their duopoly in the market, with each company producing a wide range of aircraft to meet the needs of different airlines. Boeing's introduction of the 777 in 1995 and Airbus's launch of the A380 in 2005 highlighted the competition between the two giants, as both sought to develop aircraft that could meet the increasing demand for long-haul travel.

The A380, the largest commercial airliner ever built, was designed to carry over 800 passengers on high-density routes [3][5].

While it was a technological marvel, its commercial success was limited, as many airlines favored smaller, more flexible aircraft like the Boeing 787 Dreamliner and Airbus A350, which offered better fuel efficiency and were more adaptable to changing market conditions.

The 21st century has seen the commercial aircraft transportation market face new challenges and opportunities. Technological innovation continues to be a driving force, with manufacturers focusing on sustainability and fuel efficiency.

The rise of the Middle Eastern carriers, such as Emirates, Qatar Airways, and Etihad, has reshaped global air travel, as these airlines have leveraged their geographic location to become major hubs for international flights.

The COVID-19 pandemic, however, brought the industry to a standstill in 2020, leading to unprecedented challenges for airlines and aircraft manufacturers alike. While the market has shown resilience, with air travel gradually recovering, the pandemic has accelerated trends such as the adoption of digital technologies, contactless services, and a focus on sustainability.

In conclusion, the commercial aircraft transportation market has undergone profound changes since its inception in the early 20th century. From the early days of small, unreliable planes to the jet age and the modern era of fuel-efficient, wide-body jets, the market has evolved in response to technological advances, economic forces, and shifting consumer demands [5].

The competition between manufacturers, particularly Boeing and Airbus, has driven innovation and shaped the structure of the industry, while regulatory changes and the rise of low-cost carriers have made air travel more accessible to people around the world. As the industry looks to the future, it faces new challenges related to sustainability, digitalization, and the need to recover from the economic impact of the pandemic.

Nonetheless, the commercial aircraft transportation market remains a critical component of the global economy, enabling the movement of people and goods across vast distances and connecting the world in ways that were once unimaginable.

## 2.1) Boeing History

Boeing is one of the most recognized names in the aerospace industry and a key player in both commercial aviation and defense. Established over a century ago, Boeing's evolution is characterized by strategic decisions, technological innovation, intense competition, particularly with Airbus, and numerous landmark projects [6].

Over the years, Boeing's history reflects the broader evolution of the aviation industry, and its milestones are in line with global historical events, economic shifts, and the changing landscape of air travel.

The company was founded in Seattle, USA, on July 15, 1916, by William E. Boeing, a timber magnate who saw potential in aviation. The company, initially known as the "Pacific Aero Products Co.," was soon renamed the Boeing Airplane Company [7].

In its early days, Boeing's focus was on designing and manufacturing seaplanes, reflecting the founder's vision of exploring new frontiers in flight.

One of Boeing's early breakthroughs came in 1919 when the company developed the B-1 flying boat, designed for both passenger and mail transport. This model laid the foundation for Boeing's future involvement in both commercial and airmail services [8].

As the company grew, so did its technological capacity, eventually leading to the introduction of the Boeing Model 40A in 1927.

The Model 40A was one of the first aircraft specifically designed for airmail, showcasing Boeing's early ventures into commercial aviation. This period also marked the acquisition of airmail routes, which eventually led to the establishment of Boeing's airline, United Airlines [7-8].

World War II was a pivotal period for the aviation industry. Boeing became a significant supplier of military aircraft, particularly bombers such as the B-17 Flying Fortress and the B-29 Superfortress. The wartime demand for aircraft spurred massive growth for Boeing, and it rapidly expanded its workforce and production capabilities [9].

By the end of the war, Boeing had firmly established itself as a cornerstone of the U.S. military-industrial complex.



*Figure 1: Boeing B 17G "Flying Fortress", source: U.S. Air Force*

After the war, many companies faced the challenge of transitioning from military to civilian production.

In the aircraft manufacturing market led to the development of the Boeing 377 Stratocruiser in 1947, which helped the company begin its post-war transition into commercial aviation.

Boeing's strategic choice to continue innovating, even with a decrease in military demand, set the stage for its later dominance in commercial aviation.

During this post-war period, Boeing also made strategic moves to bolster its presence in military aviation, producing the B-47 Stratojet and the iconic B-52 Stratofortress. The B-52, in particular, became a symbol of American air power during the Cold War and remains in service to this day.

In parallel, Boeing entered the space sector with the advent of the U.S. space program. Its involvement in NASA's Apollo missions, the production of the Saturn V rocket, and later developments in space shuttles and satellites further solidified Boeing's position in industries beyond commercial aviation. By investing in defense and space, Boeing created a stable revenue base less affected by the cyclical nature of commercial aircraft demand, a strategy Airbus did not prioritize during its early years, as it primarily focused on passenger and cargo aircraft manufacturing [10].

Boeing's involvement in missile development, including the Minuteman ICBM program, further diversified its portfolio and cemented its status as a key player in defense technology.



*Figure 2: Boeing 707 Pan American, source: Boeing*

Boeing's entry into the jet age is one of its most notable milestones. In 1958, Boeing launched the 707, the first commercially successful jet airliner, which revolutionized air travel. The 707 reduced transatlantic travel times and helped make long-distance air travel more accessible to the general public. It also established Boeing's dominance in the commercial aviation market, a position it would maintain for decades [10].

Following the success of the 707, Boeing introduced other notable models such as the 727, a mid-size jet airliner that became widely used on domestic routes, and the 737, which would go on to become the world's best-selling commercial aircraft. The 737's adaptability, range, and cost-effectiveness made it a favorite among airlines and cemented Boeing's reputation as a leader in aviation innovation.

However, Boeing's crowning achievement during this period was the development of the Boeing 747. Introduced in 1970, the 747, also known as the "Jumbo Jet," was the first wide-body aircraft, capable of carrying hundreds of passengers over long distances.

The 747 became a symbol of international travel and dominated the market for long-haul flights for decades. It also set a new standard for commercial aircraft in terms of size, range, and passenger capacity, further solidifying Boeing's position as a market leader.

Boeing's dominance in the late 20th century was not without its challenges. The company faced increasing competition from European aircraft manufacturer Airbus, which introduced its A300 in 1974.



Airbus' strategy focused on producing fuel-efficient, twin-engine aircraft, which offered a more cost-effective alternative to Boeing's larger, four-engine models. This competition intensified throughout the 1980s and 1990s, leading to the famous duopoly Boeing-Airbus [11].

To stay competitive, Boeing made several strategic decisions. One of the most significant was its 1997 merger with McDonnell Douglas, a major U.S. defense contractor and aircraft manufacturer. This merger expanded Boeing's presence in military aircraft and missile systems while also giving it a stronger base in the space sector.

Moreover, it led to acquire almost all the American market in the commercial aircraft segment, strengthening its position as a global market leader. Overall, the combined company became also a dominant force in both the aerospace and defense industries [10-11].

During this period, Boeing continued to innovate in commercial aviation, introducing the Boeing 777 in 1994. The 777 was the first commercial aircraft designed entirely using computer-aided design (CAD) and became a highly successful long-range, twin-engine aircraft. The 777's success was largely due to its fuel efficiency and passenger comfort, making it a favorite for long-haul routes.

The early 2000s saw Boeing embark on another ambitious project, the Boeing 787 Dreamliner. The Dreamliner, introduced in 2009, was designed with a focus on fuel efficiency, using lightweight composite materials and advanced aerodynamics. Despite initial production delays and cost overruns, the 787 has become a critical part of Boeing's commercial lineup, particularly as airlines seek more environmentally friendly and cost-effective aircraft.

# BOEING 787 DREAMLINER

## CUMULATIVE FIRM ORDERS



## TOP TEN AIRLINE ORDERS

All Nippon Airways	55
Qantas	50
United-Continental	50
Air Canada	37
Japan Airlines	35
Etihad Airways	31
Qatar Airways	30
Air India	27
LAN Airlines	26
British Airways	24

## KEY FEATURES

- 50% of the primary structure - including the fuselage and wing - will be made of lightweight composite materials
- 20% more fuel-efficient than similarly sized planes



- Passengers can expect cabins with higher humidity, increased comfort and convenience

	787-8 Dreamliner	787-9 Dreamliner
Seating	210 - 250	250 - 290
Range	14,200 - 15,200 km	14,800 - 15,750 km
Configuration	Twin aisle	Twin aisle
Cross section	574 cm	574 cm
Wing span	60 m	60 m
Length	57 m	63 m
Height	17 m	17 m
Cruise speed	Mach 0.85, 920 kmh	Mach 0.85, 920 kmh
Max. takeoff weight	227,930 kg	247,208 kg
Cargo volume	4,400 cubic feet	5,400 cubic feet

Figure 3: Boeing 787 Dreamliner orders, features and specifications, source: Reuters

Boeing's rivalry with Airbus was intensified during these years, defining most of the aspects of the modern aviation industry. While Boeing dominated the market for much of the 20th century, Airbus' emergence as a serious competitor in the 1970s created a new dynamic. Airbus' approach, which focused on developing fuel-efficient aircraft with innovative features such as fly-by-wire controls, challenged Boeing's market dominance.

The competition between Boeing and Airbus has led to several high-profile disputes, including accusations of government subsidies on both sides. Boeing has accused Airbus of receiving unfair financial support from European governments, while Airbus has countered with claims that Boeing benefited from military contracts and tax breaks [11]. These disputes have resulted in multiple cases before the World Trade Organization (WTO), with both companies being found guilty of receiving illegal subsidies.

In terms of product competition, Airbus' introduction of the A320 family in the late 1980s directly challenged Boeing's 737.

The A320's fuel efficiency and advanced technology made it a favorite among airlines, sparking fierce competition between the two models that continues to this day.

Similarly, Airbus' A350 was designed to compete with Boeing's 777 and 787, further intensifying the rivalry between the two manufacturers.

From a revenue diversification point of view, Boeing created Boeing Integrated Defense Systems (BIDS) in 2002, which consolidated its military and space operations into one division. BIDS later evolved into Boeing Defense, Space & Security (BDS), focusing on everything from fighter jets like the F/A-18 Super Hornet to satellite systems, missile defense, and space exploration vehicles.

These developments highlighted Boeing's strategic intent to make defense and space a significant part of its revenue, ensuring a steady stream of government contracts and long-term partnerships with entities like NASA and the U.S. Department of Defense.

This strategic move significantly differentiated Boeing from Airbus, which for decades focused predominantly on commercial aircraft. Airbus only began to seriously diversify its portfolio into military aircraft and space in the 2000s, notably through the establishment of Airbus Defense and Space in 2014 [9][12].

However, Boeing's early head start in these sectors allowed it to dominate key defense and space markets, particularly in the United States.

Another significant aspect of Boeing's revenue differentiation strategy came in the form of expansion into services. In 2017, Boeing established Boeing Global Services (BGS), a dedicated unit focused on servicing both military and commercial aircraft.

BGS provides a wide range of services, including aircraft maintenance, upgrades, parts distribution, and digital services for fleet management. By establishing BGS, Boeing wanted to create a more consistent, high-margin revenue stream, further reducing its reliance on aircraft sales, which can be highly volatile due to fluctuating demand from airlines.

Boeing's focus on aftermarket services set it apart from Airbus, which traditionally emphasized aircraft production over services. Although Airbus has expanded its services division in recent years, Boeing's early investments in this area positioned it as a leader in aircraft maintenance and services, an essential factor in generating recurring revenue and enhancing customer loyalty.

In recent years, Boeing has faced significant challenges, particularly with the 737 MAX. Following two fatal crashes in 2018 and 2019, the 737 MAX was grounded worldwide, leading to a crisis for the company. Investigations revealed issues with the aircraft's software, and Boeing faced widespread criticism for its handling of the situation [12].

The grounding of the 737 MAX, combined with the impact of the COVID-19 pandemic on the aviation industry, resulted in significant financial losses for Boeing.

Moreover, Boeing has experienced complications with its wide-body jets, particularly the 787 Dreamliner. Issues related to manufacturing defects, including concerns over structural integrity, resulted in delays in deliveries. The production of the 777X, another of Boeing's flagship models, has also faced setbacks due to a combination of technical challenges and market conditions, causing additional strain on the company's recovery efforts [41].

Despite these setbacks, Boeing remains a key player in both commercial and defense aviation. The company continues to invest in new technologies, including autonomous flight systems, and is exploring opportunities in the emerging field of space exploration. Boeing's long-term prospects will depend on its ability to navigate regulatory challenges, restore confidence in its products, and continue innovating in a highly competitive market.

## 2.2) Airbus History

Airbus, established in 1970, has grown from a modest European consortium into one of the two world's leading aerospace manufacturers, offering a formidable challenge to Boeing's long-standing dominance in the commercial aviation industry [13].

From its inception, Airbus has been characterized by its innovative approaches to aircraft design, strategic positioning in a highly competitive market, and a unique multinational structure.

Over the decades, Airbus has consistently pursued technological advancements, exemplified in its groundbreaking models, which have often set new standards for efficiency, safety, and passenger comfort. Airbus' rise also highlights the fierce and ongoing rivalry with Boeing, a central theme in the global aerospace landscape [13].

Airbus was born out of a desire by European governments to reduce their dependence on American aircraft manufacturers, particularly Boeing, which, as seen on the previous chapter, had dominated the post-war aviation market.

Throughout the 1950s and 1960s, France was facing difficulties to insert itself in a market dominated by America. From 1958 to 1985, American companies monopolized jet airliners with 83 percent of the world market of which Boeing took over half the share of it [14].

In essence, this was due to the limited European domestic markets of the three countries, France, Germany and UK under-capitalization, and inefficient marketing.

The Airbus project was seen as a logical development given the co-operation agreements already in place between British and French governments on aerospace ventures.

In September 1967, the Memorandum of Understanding that officially launched the A300 Airbus program was signed.

This led to the formation of Airbus Industrie with French company Aérospatiale and Germany's Deutsche Airbus as founding members. The UK's Hawker Siddeley later joined, bringing their expertise to the development of the wings for the consortium's first aircraft [15].

Airbus' history is a story of strategic foresight, technological innovation, and relentless competition with Boeing. From its early days as a European consortium seeking to challenge American dominance in aviation, to its current position as a global leader, Airbus has consistently pushed the boundaries of aircraft design and manufacturing.

The company's rivalry with Boeing has spurred innovation on both sides, resulting in some of the most advanced and efficient aircraft in the world. While both companies face significant challenges, Airbus' ability to adapt to changing market conditions and embrace new technologies will likely ensure its continued success in the decades to come.

Airbus' first major commercial success came with the A300, a twin-engine, wide-body aircraft designed for medium to long-haul flights. Introduced in 1974, the A300 was the world's first twin-engine wide-body aircraft, setting a new standard for fuel efficiency and operational cost savings [16].

Although initial sales were slow, airlines gradually recognized the economic benefits of the A300, particularly in an era of rising fuel costs, and it became the cornerstone of Airbus' early success.



*Figure 4: Airbus A300, source: Airbus*

The 1980s marked the beginning of Airbus' full-scale rivalry with Boeing, which, by then, had cemented its dominance in the commercial aviation market with successful models like the Boeing 747 and 737. Airbus' response was to continue pushing innovation, focusing on fuel efficiency and technology that would differentiate it from Boeing [16].

A significant development during this period was the launch of the Airbus A320 in 1988. The aircraft was revolutionary for several reasons. In fact, it was the first commercial airliner to feature fly-by-wire technology, which replaced traditional manual flight controls with electronic systems [16- 17].

This technology improved the aircraft's safety, precision, and performance, giving Airbus a distinct advantage over Boeing's 737, which relied on more traditional controls. The A320 became extremely popular with airlines due to its fuel efficiency, lower operating costs, and advanced technology, helping Airbus gain a significant foothold in the single-aisle aircraft market, where Boeing had long been dominant.

As Airbus grew stronger, Boeing began to view the European manufacturer as a serious competitor. The two companies engaged in a battle for market share that would intensify over the next few decades. Airbus' strategy of focusing on technological advancements, such as more efficient engines and innovations in passenger comfort, contrasted with Boeing's approach, which often emphasized incremental improvements on existing models. This divergence in strategy laid the foundation for the long-standing Boeing-Airbus rivalry.

Airbus' rapid growth in the 1990s was supported by strategic decisions that allowed it to challenge Boeing in nearly every segment of the commercial aviation market. One of Airbus' key moves was its commitment to a globalized production network.

While Boeing centralized much of its manufacturing within the United States, Airbus distributed its production across several European countries, leveraging the expertise of each nation. For example, wings were built in the UK, fuselages in Germany, and final assembly often took place in France. This multinational production structure became a hallmark of Airbus and allowed the company to tap into different engineering traditions and specializations.

In terms of aircraft models, Airbus continued to push the envelope with new designs and concepts. The A330, launched in 1994, was a twin-engine wide-body aircraft aimed at medium and long-haul routes, positioned as a direct competitor to Boeing's 767 and 777.

Similarly, the A340, launched around the same time, was designed for ultra-long-haul routes, offering an alternative to Boeing's four-engine 747 for airlines seeking different performance characteristics.

Airbus also expanded its portfolio by entering the large aircraft market with the introduction of the A380, a double-deck, wide-body airliner capable of carrying up to 850 passengers in a high-density configuration. First announced in the early 2000s, the A380 was Airbus' bold attempt to challenge Boeing's dominance in the long-haul market, where the Boeing 747 had reigned supreme for decades.

The A380 was aimed at airlines operating high-traffic routes between major hubs, offering unprecedented passenger capacity. While it became an iconic aircraft, known for its size and luxury, it struggled to gain widespread adoption due to the shifting preferences of airlines toward smaller, more fuel-efficient aircraft, a trend that Boeing had capitalized on with the 787 Dreamliner [18].

As the aviation industry shifted towards more fuel-efficient, twin-engine aircraft, Airbus adapted by focusing on the development of models that could meet these changing demands. The A350 XWB, introduced in 2013, was Airbus' answer to Boeing's 787 Dreamliner.

The A350 was designed with fuel efficiency in mind, utilizing advanced materials like carbon-fiber-reinforced polymer to reduce weight and improve aerodynamics. This model was a direct competitor to both the 787 and Boeing's 777, and its success helped Airbus gain market share in the long-haul, wide-body segment [18].

At the same time, Airbus updated its popular A320 family with the A320neo (New Engine Option), introduced in 2016. The A320neo featured new, more efficient engines and aerodynamic improvements that reduced fuel consumption and operating costs, further solidifying its position in the highly competitive single-aisle market.

This move was a response to Boeing's 737 MAX, which similarly focused on fuel efficiency and operational savings.

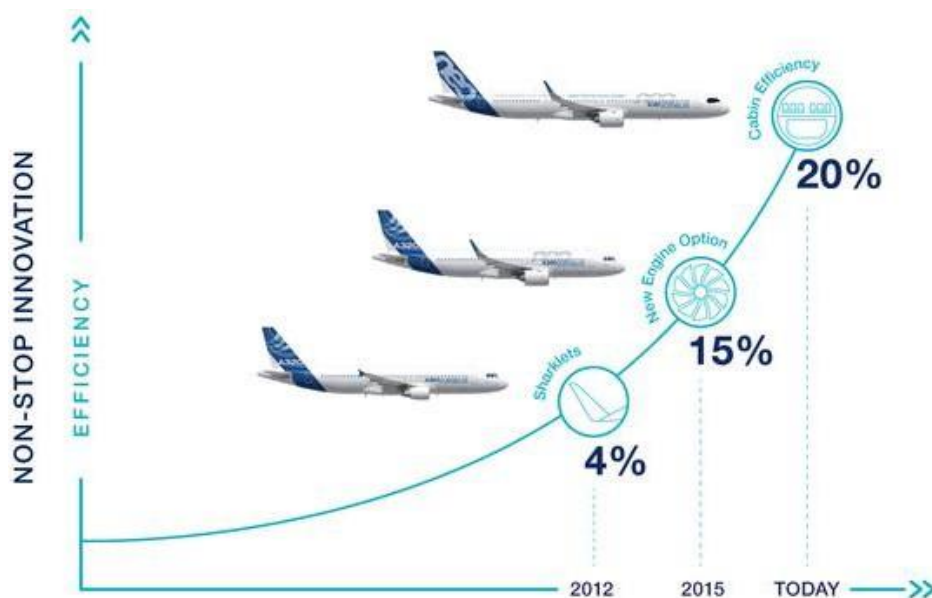


Figure 5: Airbus A320 Neo innovation cycles, source: Airbus





Figure 6: Airbus A320 Neo family main features, source: Airbus

The A320neo and 737 MAX would go on to become the most significant battlegrounds in the Airbus-Boeing rivalry, with both companies vying for dominance in the single-aisle aircraft market, where demand is highest.

The rivalry between Airbus and Boeing has extended beyond product competition and into the political and legal arenas. As reported in the previous subchapter, both companies have long accused each other of receiving unfair government support, leading to a series of disputes that have played out over decades [19-20].

Airbus, being a European consortium, received initial support from European governments in the form of launch aid and subsidies, which Boeing claimed gave Airbus an unfair advantage in developing new aircraft. Conversely, Airbus accused Boeing of benefiting from U.S. government contracts, particularly in defense, and receiving tax breaks that effectively acted as subsidies.

These disputes culminated in a series of cases brought before the World Trade Organization (WTO). Both Airbus and Boeing were found guilty of receiving illegal subsidies, leading to a complex set of rulings that resulted in trade tariffs and retaliatory measures by both the U.S. and European Union. The long-running dispute between the two companies underscores the intensity of their competition and the stakes involved in maintaining leadership in the global aviation market [20].

In recent years, Airbus has faced both opportunities and challenges. The A320neo family has continued to be a strong performer, and the A350 has been embraced by airlines seeking efficient long-haul aircraft. However, Airbus, like Boeing, has been impacted by the global downturn in aviation demand caused by the COVID-19 pandemic, which has disrupted production and led to a significant decline in aircraft orders.

Analyzing Airbus' strategy, it can be concluded that in its early decades, it focused almost exclusively on the commercial aircraft sector, aiming to challenge the dominance of Boeing and McDonnell Douglas in the global market. This focus led to the development of iconic aircraft like the A300, A320, and A340, which successfully gained market share from Boeing in the 1980s and 1990s.

It was already highlighted in the previous subchapter that, while Boeing was diversifying into military and space sectors during this time, Airbus remained committed to competing head-to-head with Boeing in commercial aircraft, particularly by emphasizing technological innovation and fuel efficiency. However, the limitations of relying heavily on commercial aviation became evident, especially during economic downturns that led to reduced demand for new aircraft.

While Boeing was expanding its portfolio into defense, space, and services throughout the latter half of the 20th century and into the early 2000s, Airbus was primarily focused on becoming a leader in commercial aviation. It wasn't until the 2000s that Airbus began to seriously diversify into defense and space. In contrast to Boeing's approach, Airbus' defense activities were largely centered on European governments and did not match Boeing's scale in the U.S. market. Additionally, Airbus did not immediately pursue the establishment of a dedicated services division like Boeing Global Services, though it has made efforts to catch up in this area in recent years [18-19].

Boeing's early entry into the aftermarket services market provided it with a strategic advantage, Airbus, instead, has rapidly scaled its service offerings in recent years.

Airbus' Skywise digital platform, introduced in 2017, allows airlines to use big data analytics to optimize their fleet operations and improve efficiency, enhancing Airbus' aftermarket revenues. Though Boeing continues to lead in the services segment, Airbus has gained ground, positioning itself as a key player in this important market.

When comparing Airbus' diversification strategy with Boeing's, it becomes clear that Boeing had a much earlier and more aggressive approach to expanding its business beyond commercial aircraft. Boeing's ventures into defense, space, and services were well underway by the mid-20th century, giving the company a broader and more balanced revenue mix much earlier than Airbus. In contrast, Airbus initially focused almost exclusively on commercial aviation, only diversifying significantly in the late 1990s and 2000s.

This strategic difference meant that Boeing was better positioned to weather downturns in the commercial aircraft market, such as those caused by the global financial crisis of 2008 and the COVID-19 pandemic. Airbus, though successful in commercial aviation, was more exposed to these cyclical downturns during its early decades [20].

However, Airbus has made significant strides in catching up. By consolidating its defense and space activities into Airbus Defense and Space, and by rapidly expanding its services division, Airbus has diversified its revenue base in recent years. While Airbus still derives a larger percentage of its revenue from commercial aircraft sales compared to Boeing, the gap has narrowed.

Airbus also enjoys a strategic advantage in its stronger presence in the European defense market, whereas Boeing remains dominant in the U.S. military and space sectors. Airbus' defense projects, such as the A400M and Eurofighter Typhoon, serve European and global customers, allowing the company to compete for international defense contracts, albeit on a smaller scale than Boeing [20].

In conclusion, the key differentiator between the two companies has been Boeing's long-term focus on creating a balanced revenue mix, with commercial aircraft, defense, space, and services each contributing significantly to its overall business. Boeing's defense and space sectors now regularly account for around one-third of its total revenues, providing stability during downturns in the commercial aircraft market. Airbus, though diversifying, still derives the majority of its revenues from commercial aviation, making it more exposed to market cycles compared to Boeing.

Despite these challenges, Airbus remains well-positioned to compete in the coming decades. The company has been investing in new technologies, including electric and hydrogen-powered aircraft, as part of its long-term vision for more sustainable air travel.

Airbus' focus on environmental sustainability reflects the broader industry trend toward reducing the carbon footprint of aviation, an area where it hopes to lead future innovation.

## 2.3) Companies' Revenues diversification

The previous paragraph reported how both Airbus and Boeing, in recent years, have deliberately diversified their revenue streams. Their strategy aims to mitigate the inherent risks of relying heavily on the cyclical nature of the commercial aviation market, while capitalizing on new growth areas such as defense, space, and aftermarket services. Despite pursuing a similar goal of revenue diversification, Boeing and Airbus have taken distinct approaches, shaped by their respective markets, historical strengths, and regional contexts [21].

As reported before, Boeing's decision to diversify its revenue streams stems largely from the volatility and unpredictability of the commercial aviation market, which is highly sensitive to economic downturns, regulatory changes, and geopolitical instability.

The 737 MAX crisis, coupled with the global COVID-19 pandemic, severely impacted Boeing's commercial aircraft division, leading to production halts and a significant loss of revenue.

The loss reached the point where backlog orders were cancelled, bringing the company to the verge of bankruptcy. Boeing's ability to avoid financial distress after these events can be attributed to a combination of strategic financial maneuvers, government support, and the company's inherent market strength [22].

As expected, the main driver that helped the company recover from the setback was the strategic diversification of their earnings. Focusing on other revenue streams helped cushion the financial impact caused by the setbacks in the commercial sector. The company also secured new financing to strengthen its liquidity during the crisis.

These events underscored the importance of reducing reliance on a single segment. In response, Boeing has significantly expanded its Defense, Space & Security and Global Services divisions. The former focuses on government contracts for military aircraft, missile systems, and space exploration technologies, offering more stable and consistent revenues, especially during periods of reduced demand for commercial airplanes. Meanwhile, Boeing’s Global Services division, which provides maintenance, upgrades, and parts distribution, has become a major profit driver [22-23].

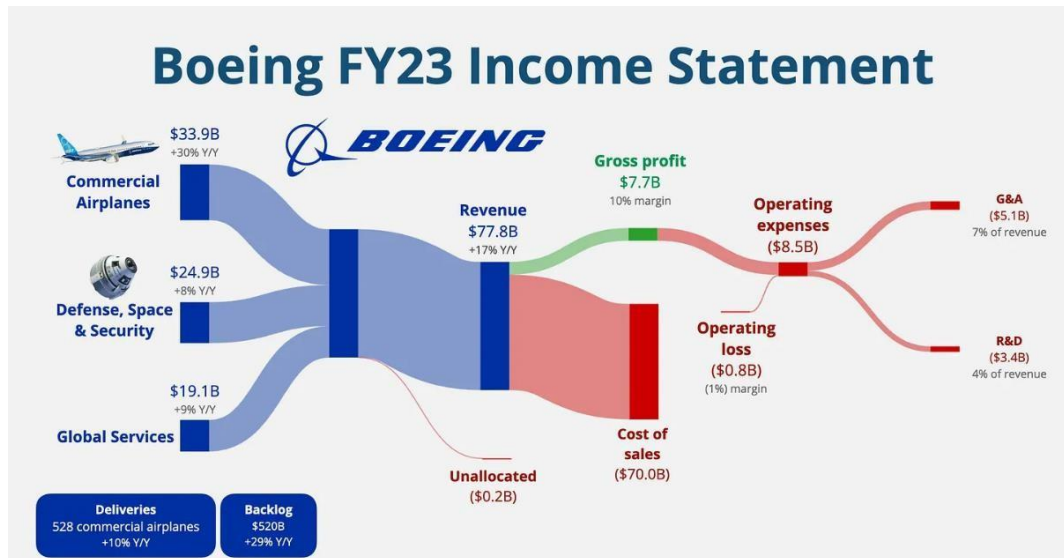


Figure 7: Boeing FY23 Income Statement, source: AppEconomyInsight

This shift toward service-based revenue reflects Boeing’s recognition of the value in capturing the full life cycle of an aircraft, from production to aftermarket support.

Looking at Boeing’s Fiscal Year 2023 Income Statement representation above, which highlights the company’s revenue streams, gross profit, cost of sales, and operating expenses, we can define the company’s financial health, each segment margin and strategic initiatives [42].

Boeing’s revenue for the fiscal year 2023 was derived from three primary streams: Commercial Airplanes, Defense, Space & Security, and Global Services. The Commercial Airplanes segment generated \$33.9 billion, accounting for approximately 43.5% of the total revenue. This segment saw a resurgence as global air travel demand rebounded after a post-pandemic, leading to increased aircraft deliveries. The Defense, Space & Security segment contributed \$24.9 billion, representing almost 32% of the total revenue. This segment remained robust due to sustained government contracts and defense spending. Lastly, the Global Services segment brought in \$19.1 billion, making up to 24.5% of the total revenue. This segment benefited from the growing demand for maintenance, repair, and overhaul services as airlines sought to extend the life of their existing fleets [23][42].

The gross profit for Boeing in 2023 was \$7.7 billion, which translates to a gross margin of approximately 10%. This figure is derived after accounting for the cost of sales, which totaled \$70 billion. The cost of sales includes various components such as raw materials, labor, manufacturing overhead, supply chain and logistics and other direct costs associated with the production of aircraft and related services. The significant cost of sales reflects the high expenses involved in aerospace manufacturing, including the procurement of advanced materials and the integration of sophisticated technologies [24][42].

Operating expenses for Boeing in 2023 were reported at \$8.5 billion. These expenses are categorized into Selling, General, and Administrative (SG&A) expenses, which amounted to \$5.1 billion, and Research and Development (R&D) expenses, which were \$3.4 billion [42].

The SG&A expenses encompass a wide range of costs, including salaries and benefits for corporate staff, office supplies, financing activities, advertising, promotional activities, and sales commissions. The increase in SG&A expenses can be attributed to Boeing's intensified marketing efforts to regain market share and enhance brand visibility, as well as inflationary pressures and competitive compensation packages aimed at retaining top talent. Additionally, investments in digital transformation and cybersecurity measures contributed to the rise in SG&A costs [24-25].

The R&D expenses reflect Boeing's commitment to innovation and the development of next-generation aircraft technologies. These expenses include costs related to the design, testing, and certification of new aircraft models, as well as the enhancement of existing technologies. The substantial investment in R&D underscores Boeing's strategic focus on maintaining its competitive edge in the aerospace industry.

In summary, Boeing's financial performance in 2023 was characterized by a diverse revenue base, with significant contributions from its Commercial Airplanes, Defense, Space & Security, and Global Services segments. The company's gross profit and cost of sales highlight the high expenses associated with aerospace manufacturing, while the operating expenses reflect strategic investments in marketing, talent retention, and technological innovation. Despite the challenges, Boeing's financial results demonstrate its resilience and commitment to long-term growth and operational excellence [25].

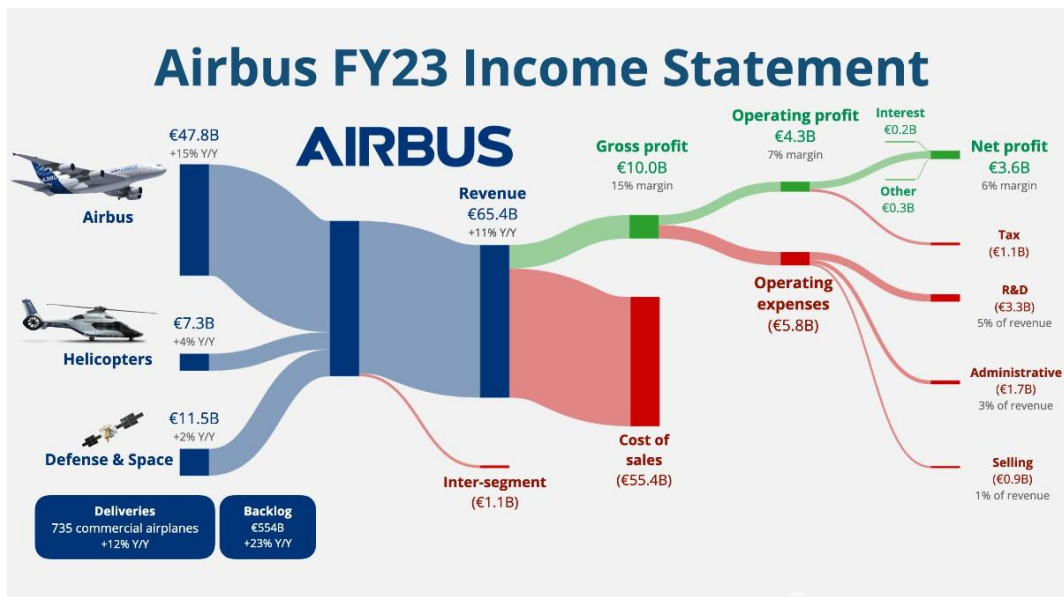


Figure 8: Airbus FY23 Income Statement, source: AppEconomyInsight

Moving on, Airbus SE's income statement for 2023 reflects the company's robust performance across its various business segments, with commercial aircraft manufacturing continuing to be the primary driver of revenues. Airbus's diverse revenue streams, complemented by strong performance in defense, space, and helicopter segments, helped the company weather market fluctuations and maintain its position as one of the global leaders in aerospace manufacturing [26].

In 2023, Airbus recorded total revenues of approximately €65.4 billion, driven primarily by the sale of commercial aircraft, which accounted for about 73% of the total revenue. This reflects Airbus's leadership in commercial aviation, where it continues to benefit from a global recovery in air travel and a growing demand for fuel-efficient aircraft. In terms of specific figures, Airbus delivered around 720 aircraft in 2023, with single-aisle planes such as the A320neo family being the main contributor. This segment alone generated revenues in the range of €47.5 billion, representing the bulk of Airbus's total earnings. Additionally, the company benefited from increased demand for its wide-body aircraft, such as the A350, driven by international traffic recovery post-pandemic. The defense and space segment, which includes military aircraft, satellites, and cybersecurity, contributed around €7.3 billion, or 11% of total revenue. Meanwhile, Airbus Helicopters, another significant business segment, added approximately €11.5 billion (around 15%) to the company's total income [25-27][43].

In terms of gross profit, Airbus recorded approximately €10 billion in 2023, representing about 15.3% of its total revenue. This figure highlights Airbus's ability to maintain strong margins, despite the challenges posed by rising raw material costs, supply chain disruptions, and inflationary pressures. The company's cost of sales, which comprises direct production costs, procurement, labor, and associated overheads, amounted to approximately €55.4 billion, or about 84.7% of total revenue [43].

A significant portion of this cost is tied to the production of aircraft, including material costs such as aluminum and composite materials, as well as the complex logistics required to assemble aircraft across multiple sites in Europe. Labor costs, particularly in the highly skilled aerospace sector, also represent a substantial part of the cost of sales.

These costs increased dramatically after the Russian sanctions following the Russia-Ukraine war, and companies all over the world still struggle finding less expensive raw material supplies [27].

Moreover, the pandemic led to a serious halt of the aviation sector, with loss of aircraft orders, skilled labor and supply chain disruptions.

Airbus' operating profit for 2023 stood at approximately €4.3 billion, translating to an operating margin of 7%. The company's operating profit reflects the income generated after deducting operating expenses from gross profit, showcasing Airbus's efficiency in managing its core operations. Operating expenses include research and development (R&D) costs, sales, general and administrative expenses, and other overheads.

In 2023, Airbus's operating expenses amounted to approximately €5.8 billion, or approximately 7% of total revenue. R&D expenses, which are crucial for maintaining Airbus's competitive edge in innovation, particularly in the development of more fuel-efficient and sustainable aircraft, accounted for a significant portion of this amount. Additionally, administrative costs tied to running the company's vast operations and sales-related expenses are included in this figure [28].

Airbus's strong financial results in 2023 can be attributed to several factors. First, the commercial aircraft market experienced a strong recovery following the global COVID-19 pandemic, as airlines sought to modernize their fleets with more efficient aircraft. Airbus's extensive backlog of orders for the A320neo family and its dominance in the narrow-body aircraft market provided a steady stream of revenue. Additionally, the company's focus on sustainability, including investments in hydrogen-powered aircraft and other green technologies, helped secure long-term contracts with airlines looking to meet stricter environmental regulations. Moreover, Airbus managed to optimize its supply chain and improve production efficiency, even amid global supply chain challenges, which positively impacted its cost structure [25][28].



Airbus, while also diversifying its revenue, has taken a somewhat different approach, influenced by its European context and historical strengths. Like Boeing, Airbus has expanded its presence in the Defense & Space sectors, generating revenue from military aircraft, satellites, and cybersecurity solutions. However, Airbus has placed a stronger emphasis on sustainability and innovation in aviation.

Its investments in the development of hydrogen-powered aircraft, such as the ZEROe project, demonstrate a commitment to leading the charge in sustainable aviation technologies. This forward-looking approach reflects Airbus's strategic position to meet future environmental regulations and shifts in customer demand toward greener aviation solutions. In addition, Airbus has leveraged its Helicopters division, a significant revenue source that serves both civilian and military markets, to further diversify its income. The company's helicopter business, while smaller than its commercial aircraft division, provides stability and caters to specialized sectors such as medical transport, law enforcement, and defense [25-26].

Both companies, compared to their previous year's performance, have seen a growth in revenues thanks to the growth in each sector. Boeing shows the steepest growth, e.g. 30%Y/Y sales for commercial airplanes compared to the 2022, thanks to their comeback after the 737 MAX production quality issues already described previously, which brought the company to a near standstill.

Thanks to their strategic approach, revenue diversification and future term mentality represented by the expenditure in R&D, both companies have increased their sales in each segment, improving their financial health.

When comparing Airbus's 2023 performance to Boeing's fiscal year 2023, several differences emerge. While both companies remain key players in the global aerospace market, their financial results reflect varying market conditions and strategic focuses. Boeing relies more heavily on its defense and space sectors to offset the impact of the ongoing 737 MAX issues and delays in the production of new aircraft [29].

Boeing's commercial aircraft segment generated a smaller proportion of total revenue compared to Airbus, largely due to production constraints and delivery delays. Boeing's gross margin, at around 10%, was slightly lower than Airbus's, reflecting higher costs associated with the ongoing restructuring of its production processes and the impact of supply chain issues. Similarly, Boeing's operating profit, was lower both in absolute terms and as a percentage of revenue compared to Airbus, underscoring the challenges Boeing faces as it works to regain its footing in the commercial aircraft market.

In comparing their strategies, Boeing's focus on growing its Global Services division sets it apart from Airbus. Boeing has prioritized expanding its aftermarket services globally, recognizing the long-term profitability of maintaining and upgrading aircraft already in operation. This is evidenced by the fact that in 2023, Boeing's Global Services division achieved higher margins than its commercial or defense sectors, demonstrating the financial viability of this strategic focus [28].

Airbus, in contrast, has emphasized sustainability and innovation as key differentiators, positioning itself as a leader in the transition to environmentally friendly aviation. This is particularly important given the European Union's stringent environmental regulations and the global shift towards decarbonization.

In summary, both Boeing and Airbus have diversified their revenue streams in response to the challenges and uncertainties of the commercial aviation market. Boeing has focused on expanding its defense and service-based revenues, while Airbus has leveraged its innovation in sustainability and its helicopters business [29-30].

Despite these differences, the overarching goal for both companies remain the same: to create a more resilient, diversified business model capable of withstanding market fluctuations while positioning themselves for future growth [30].

### 3) Aircraft Manufacturers Competition

The commercial aircraft market is a vast and complex industry that plays a critical role in the global economy, facilitating international travel and commerce. It is a market that has been characterized by intense competition among key manufacturers, technological innovation, and evolving customer demands. Historically dominated by a few major players, the market is structured around distinct segments, each serving different types of airline needs [31].

These segments can be broadly categorized into narrow-body aircraft, wide-body aircraft, and regional jets. Each segment caters to specific routes, passenger capacities, and operational requirements, influencing the strategies of the manufacturers that compete within them [31-32].

The competition did not influence only the market for aircraft manufacturers but also the direction of geopolitics, billions spent on R&D, and the pursuit of efficiency and safety.

The competition between Airbus and Boeing became a duopoly in the large jet airliner market from the 1990s. A lot of factors contribute to such duopoly persistence in the industry, from technical and financial obstacles, through government support, customer loyalty, and extensive supply chains, to regulation restraint and, last but not least, sustainability.

As a result, Boeing and Airbus have created a near-unassailable competitive position that defines the global landscape for aircraft manufacturing [33].

It has also to be mentioned how their mergers strategy within the global aerospace industry, with Airbus beginning as a pan-European consortium while the American Boeing absorbed its former arch-rival, McDonnell Douglas, in 1997, was a key strategy for both firms to reach the market structure of today.

Their strategy and choices brought other manufacturers, such as Lockheed Martin and Convair in the United States, and British Aerospace (now BAE Systems) and Fokker in Europe, to be no longer able to compete until the point that they effectively withdrew from this market.

Airbus is nowadays the world's top commercial airplane manufacturer based on airplanes delivered. Boeing is in second place because its deliveries stalled due to the grounding of certain aircraft, the COVID-19 pandemic, and issues concerning its 737-MAX aircraft [34].

After having reported in the previous chapters users and main customers of aircrafts and how they influence aircraft market demand, the following paragraph will focus on describing the aircraft manufacturers environment characteristics that brought the market to a duopoly setup.

Following, the interaction between these two companies will be analyzed, reporting their sales trend and what affected their position as market leaders through the years [34].

### **3.1) Competition through the years**

For many years, the global Commercial Aircraft manufacturer market has been dominated by the competition between Airbus and Boeing. Competition from these two giants of the industry has driven technological breakthroughs, strategies by airlines, and worldwide legal and political disputes since Airbus entered the market for the first time in the 1970s.

Airbus emerged to challenge directly Boeing's dominance, which had been established since the early years of the commercial jet age. Boeing started its leading market share position in the industry with its 707 and 747 aircraft. In response, Airbus introduced into the world the first twin-engine wide-body aircraft, the A300, as part of its efforts to innovate its way into competitiveness [35].

In the last decade, Airbus expanded its product line by developing a family of aircraft with the aim of competing directly with Boeing in a number of market segments. An important turning point for the aircraft manufacturers market was the creation of the first single-wing aircraft in the 1930s, which served as the model for contemporary passenger aircraft [49].

Most of these aircraft, therefore, were used in carrying men and material during the Second World War, establishing their importance as a vital component of economic advancement.

At that time, the United States was in the lead in the develop passenger aircraft segment. The fast-growing American dominance in the Aerospace environment represented a threat for European nations such as France, Germany, and Britain [36][49].

In order to not fall behind in the aerospace industry, they realized that greater cooperation was required.

These states agreed to pursue joint development work in order to promote cooperation, strengthening Europe's position in the global aviation market. These shared intents resulted in an agreement signed in July of 1967, which eventually led to the creation of Airbus.

This new entity was established with a purpose to be able to offset the growing dominance of the rivals in the aerospace sector, as well as to secure Europe's competitiveness in a fast-moving aviation market.

First move that the new collective firm did to compete with Americans' aircraft products, was the development of a wide-body jet. On May 29, 1969, the Europeans decided to devise and produce an appropriate model, the Airbus A300B, to take over the aerospace industry.

With this new model, Airbus sought to expand its global market share. Airbus acknowledged the importance of the American market and tried its best to break down Americans' negative perceptions of European aircraft dependability [37].

Therefore, in September 1973, Airbus took the A300 on a six-week tour of North America to demonstrate its dependability to American skeptics. The competition between Airbus and Boeing in the aerospace market started from this point and grew increasingly fierce as time passed.

The two manufacturers' competition grew more intense in the 1990s and 2000s as they both unveiled flagship aircraft that came to symbolize their rivalry. Boeing developed the 777, a wide body, long-range wide-body aircraft that gained popularity for quick international routes.

In response, Airbus launched the A330 and later the A340, designed to capture the same market.

Boeing expanded its business through mergers and acquisitions (M&A). On August 8, 1997, Boeing and McDonnell Douglas, the first and third largest producers of civilian jets, merged to form a single company.

Following this M&A, only Boeing and Airbus remained competed in the large commercial aircraft market, which was estimated to be worth USD 1.1 trillion over the next two decades. Boeing's merger with McDonnell Douglas boosted its market share to 70 percent [38].

In response, Airbus decided to change its management structure from a consortium to a corporation. Airbus' management committee said the move aimed to strengthen the company's competitiveness by facilitating rapid decision-making and independent financing, which were among the benefits of such independent management, to counter the Boeing and McDonnell Douglas attacks.

In October 2016, Airbus took a significant step by acquiring a majority stake in the C Series of small passenger aircraft, a program developed by the Canadian aerospace company Bombardier. In response to this strategic move, Boeing aimed to enhance its position in the market by pursuing the acquisition of Brazilian aircraft manufacturer Embraer [37-38].

To counter Airbus's strategic move with the C Series, Boeing aimed to acquire Embraer, a Brazilian aircraft manufacturer, to strengthen its position in the market. Historically, both Boeing and Airbus had largely ignored the market for aircraft with fewer than 100 seats, focusing instead on larger planes due to similar development costs but much lower profit margins for smaller aircraft.

Airbus' investment in the C Series was a game-changer, signaling a shift towards small passenger aircraft. Boeing's attempt to acquire Embraer was a clear acknowledgment of this new competitive landscape and the potential of the small aircraft market, which it had previously been reluctant to enter. However, Boeing struggled to finalize the deal with Embraer, and after prolonged negotiations, they couldn't reach an agreement.

Historically, both Boeing and Airbus had concentrated their efforts on the large passenger aircraft segment, largely overlooking the market for aircraft with fewer than 100 seats. This was due to the fact that the development costs associated with smaller aircraft were comparable to those for larger planes, yet the profit margins in the smaller segment were considerably lower. However, Airbus's investment in the C Series marked a pivotal shift, as the company began to implement a strategy focused on small passenger aircraft.

Finally, on April 25, 2020, Boeing announced his withdrawal from the planned joint venture with Embraer, effectively stepping back from the small aircraft market.

The rivalry between Boeing and Airbus hit new heights with the launch of the Airbus A380 in 2007, a superjumbo designed to carry over 500 passengers, challenging Boeing's dominance in the large aircraft segment, where the 747 had been the leader for decades.

Boeing, instead, focused on the 787 "Dreamliner", a wide-body, long-range and more fuel-efficient aircraft. The airplane was designed to satisfy the growing need for a more compact, flexible airplane capable of point-to-point international travel. Thanks to its advanced aerodynamics and composite materials, the 787 allowed airlines to reduce operating costs, which led to its immense popularity [49].

Airbus responded with the A350, designed to compete directly with the 787, offering similar fuel efficiency and long-range capabilities.



Figure 9: Airbus A380 and Boeing 787 Dreamliner, source: Unknown

The rivalry between Airbus and Boeing extends beyond product innovation and into legal battles, particularly over government subsidies. Both companies accused each other of receiving unfair financial support from their respective governments, leading to a series of disputes at the World Trade Organization (WTO) [40].

The United States claimed that Airbus benefited from European “launch aid” subsidies, while the European Union contended that Boeing received significant government assistance through military contracts and tax incentives.

These disputes led to WTO rulings that allowed both sides to impose tariffs on each other’s goods, affecting also other sectors of the worldwide economy [49].

Over the years, the market share between Airbus and Boeing has seen fluctuations. In the early 2000s, Boeing encountered setbacks, including delays in the launch of the 787 Dreamliner and increased competition from Airbus, which surpassed Boeing in global orders for several consecutive years [39-40].



However, Boeing regained its footing, especially in the narrow-body market with the success of its 737 series, which directly competes with Airbus's A320 family.

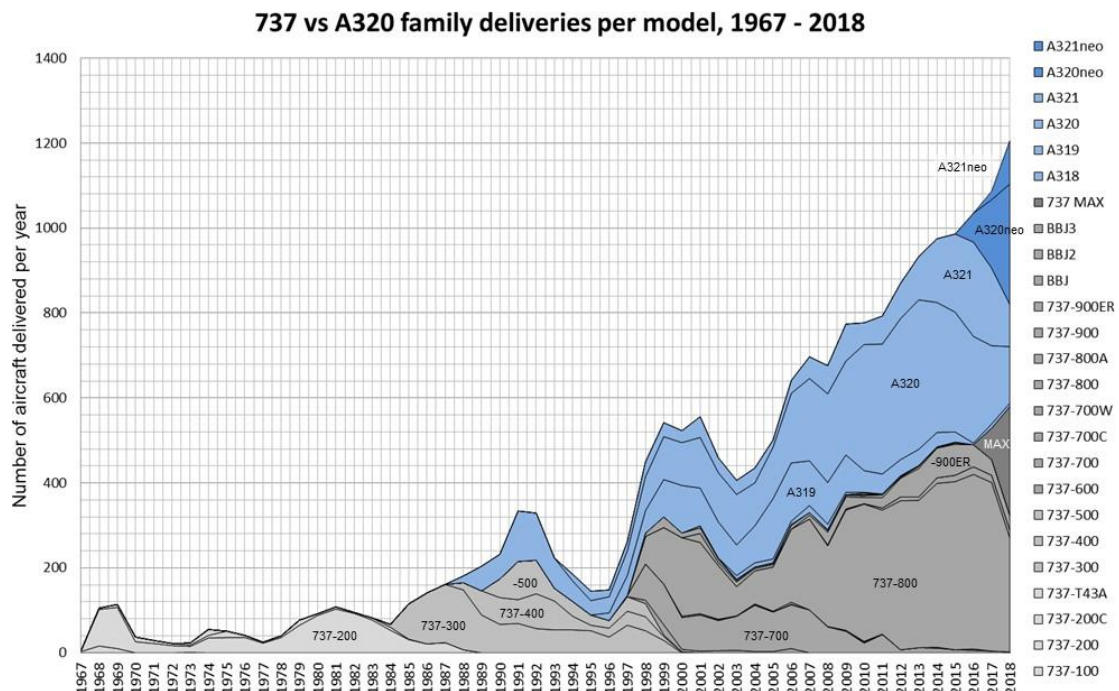


Figure 10: 737 vs A320 family deliveries per model, 1967-2018, source: Wikipedia

In recent years, the competition between Airbus and Boeing in the commercial aircraft sector has intensified, shaped by evolving market demands, technological advancements, and global economic challenges. Following the initial disruptions caused by the COVID-19 pandemic, both manufacturers have been navigating a landscape marked by fluctuating demand and the need for sustainable practices.

In 2018, Airbus launched the A321XLR, an extended-range version of its A321neo, designed to meet the demand for long-range, narrow-body aircraft. This model quickly gained traction among airlines, offering a combination of capacity and efficiency, making it a strong competitor to Boeing's 737 MAX series. The A321XLR's capabilities allowed airlines to explore new routes with lower operational costs, thereby expanding its appeal in the market [36].

However, the competitive dynamics took a dramatic turn in March 2019 when the Boeing 737 MAX was grounded following two fatal accidents. This unprecedented move significantly impacted Boeing's market position, as the grounding led to delays in deliveries and a decline in orders. In contrast, Airbus capitalized on this opportunity, attracting many airlines that had previously ordered the 737 MAX to consider the A320 family instead. The grounding not only affected Boeing's financial performance but also shifted the balance of power in the narrow-body market [39].

In 2019, Airbus displaced Boeing as the largest aerospace company by revenues due to the Boeing 737 MAX groundings, pulling in revenues of US\$78.9 billion and US\$76 billion respectively. Boeing recorded \$2 billion in operating losses, down from \$12 billion profits the previous year, while Airbus profits dropped from \$6 billion to \$1.5 billion [32].

The COVID-19 pandemic further complicated the competitive landscape. The aviation industry faced unprecedented challenges, with travel restrictions and declining passenger numbers leading to a dramatic drop in aircraft demand.

Both Airbus and Boeing were forced to adjust their production rates and implement cost-cutting measures. Airbus announced plans to reduce its production output, while Boeing faced financial pressures that resulted in layoffs and restructuring efforts.

As air travel began to recover in 2021 and 2022, Airbus capitalized on its existing portfolio and innovative strategies. The company gained significant traction with its A320neo family, which has become a popular choice among airlines seeking fuel efficiency and lower operating costs. The A321neo, in particular, has seen robust orders as airlines look to optimize their fleets for short- to medium-haul routes. Airbus's emphasis on sustainability has also resonated with many carriers, as the industry increasingly focuses on reducing carbon emissions [37-39].

Boeing, while historically dominant, faced several challenges during this period, particularly due to the continued fallout from the 737 MAX crisis, which had resulted in a lengthy grounding and regulatory scrutiny. Although the aircraft was cleared to fly again, the impact on Boeing's reputation and financial performance has been profound. In response, Boeing has sought to regain market confidence by enhancing its existing models and investing in future technologies, including sustainable aviation fuels and electric propulsion systems.

In 2023, the rivalry continued to be marked by strategic initiatives aimed at enhancing sustainability. Airbus announced its ambition to develop hydrogen-powered aircraft by 2035, aligning with global efforts to reduce emissions in the aviation sector. Boeing, on the other hand, emphasized its commitment to improving the efficiency of its existing fleet and investing in sustainable aviation fuels. The push for greener technologies has become a critical factor in shaping the competitive strategies of both manufacturers [37] [49].

Despite the fierce rivalry, Airbus and Boeing dominate the global aircraft manufacturing market, accounting for the majority of new aircraft orders worldwide. Their competition has pushed both companies to continually innovate, responding to evolving market demands, environmental concerns, and the shifting dynamics of the airline industry.

While Boeing has traditionally held the upper hand in North America, Airbus has made significant inroads globally, particularly in Asia and the Middle East, securing major deals with rapidly growing airlines in these regions. The next few years will be crucial in determining how effectively each company can leverage its strengths and navigate the complexities of a rapidly changing global market [40].

## 3.2) Market Competition Analysis

The commercial aircraft market is a vast and complex industry that plays a critical role in the global economy, facilitating international travel and commerce. It is a market that has been characterized by intense competition among key manufacturers, technological innovation, and evolving customer demands [31]. Historically dominated by a few major players, the market is structured around distinct segments, each serving different types of airline needs.

These segments can be broadly categorized into narrow-body aircraft, wide-body aircraft, and regional jets. Each segment caters to specific routes, passenger capacities, and operational requirements, influencing the strategies of the manufacturers that compete within them [32].

The most prominent competitors in the commercial aircraft market are Boeing and Airbus, two aerospace giants that control the majority of the market. These companies have established themselves as the primary suppliers for commercial airlines globally [33].

Other manufacturers, such as Embraer and Bombardier, play a significant role in the regional jet segment, while emerging companies from China and Russia are beginning to challenge the traditional duopoly of Boeing and Airbus. As of 2023, the global commercial aircraft market is valued at approximately \$189 billion, with narrow-body aircraft accounting for the largest share of this figure, followed by wide-body and regional aircraft.

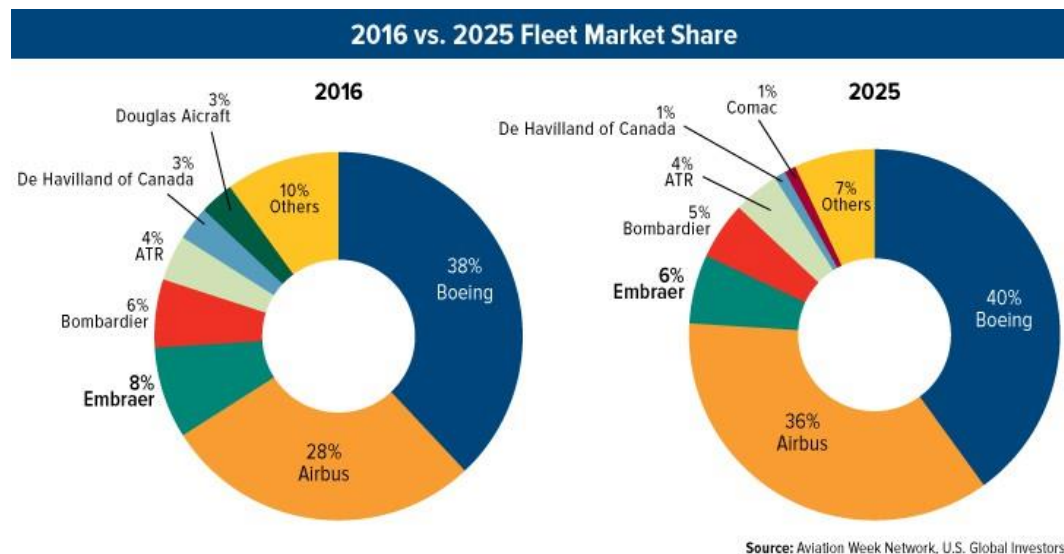


Figure 11: 2016 vs. 2025 Fleet Market share source: Aviation week Network, U.S. Global Investors

The narrow-body aircraft segment is crucial to the market due to its extensive use in short to medium-haul routes, which are the most frequently traveled and generate substantial revenue for airlines. Boeing and Airbus dominate this segment with their 737 and A320 families, both designed for fuel efficiency to help airlines reduce operational costs. By 2023, narrow-body aircraft accounted for approximately 71% of global market sales. Airbus, particularly with its A320neo, led this segment, delivering 661 aircraft in 2022, compared to Boeing's 387 deliveries of the 737 MAX [34].

Airbus held a 56% market share, while Boeing controlled 44%. Price competition between the A320neo and 737 MAX has been intense, with Airbus offering the A320neo for \$110–120 million in 2022, slightly undercutting Boeing's 737 MAX, priced at \$120–130 million. This pricing strategy pressured Boeing to offer discounts and better deals, intensifying competition and benefiting airlines with more cost-effective purchasing options.

In the wide-body aircraft segment, which includes planes designed for long-haul international travel, Boeing and Airbus once again dominate, though the market dynamics are somewhat different from the narrow-body space. Wide-body aircraft are essential for airlines operating transcontinental and international routes, offering greater passenger capacity and range [38].

Boeing's 787 Dreamliner and 777 families, alongside Airbus' A350 and A330, are the major players in this segment. As of 2023, wide-body aircraft constitute around 16% of the global market in terms of units sold, but they represent a higher percentage of revenue due to their larger size and higher price points.

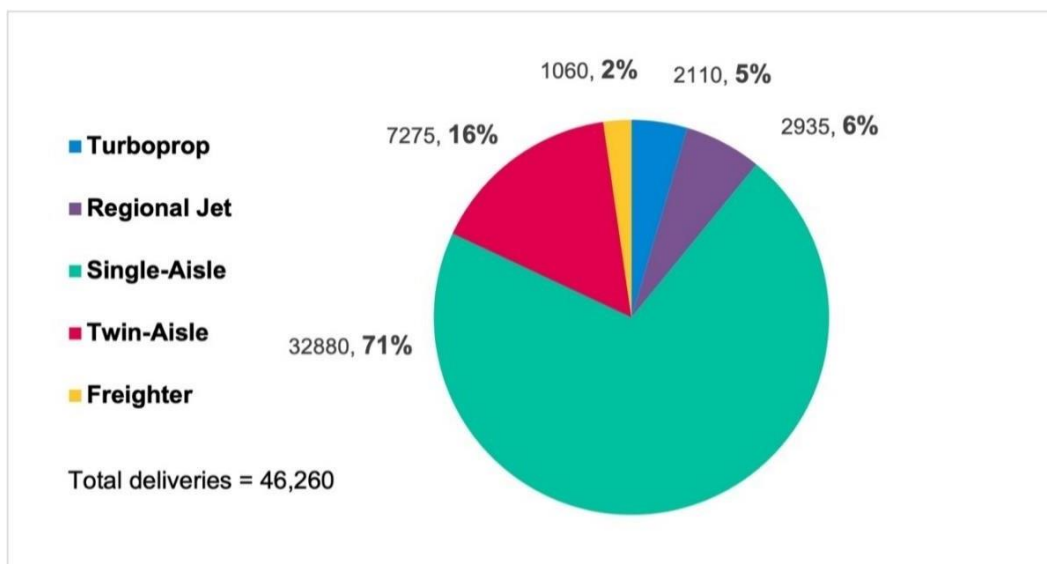


Figure 12: Overall Aircraft Sales per type

Boeing has traditionally held an advantage in the wide-body segment, thanks to its popular 777 and 787 models. The 787 Dreamliner, which is known for its fuel efficiency and passenger comfort, has been a critical driver of Boeing's sales [38].

In 2022, Boeing delivered 103 units of the 787, capturing around 65% of the wide-body market, while Airbus delivered 60 units of its A350, holding approximately 30% of the segment.

The A350 has become increasingly popular with airlines that prioritize fuel efficiency and long-range capabilities. Boeing's 777X, a new variant of the 777 series, was originally slated to dominate this market, but delays in development and changing market conditions have impacted its initial sales figures.

Again, in the wide-body segment, where margins are higher, Airbus is challenging Boeing's dominance with a more aggressive price competition. The 787 Dreamliner is priced between \$250 million and \$300 million, while the 777 ranges from \$306 million to \$442 million. Airbus products instead are offered as follows: A330 between \$239 million and \$296 million and the A350 from \$317 million to \$366 million [40].

Another significant segment within the commercial aircraft market is the regional jet category, which focuses on smaller planes designed for short-distance routes, typically servicing secondary cities and less-trafficked routes [44]. While Boeing and Airbus have some presence in this segment, the market leaders are Embraer and Bombardier. Embraer's E-Jet family, particularly the E175 and E190, are the most popular models in this category. As of 2023, regional jets make up about 6% of the global aircraft market by units sold, though their overall market value is lower compared to narrow- and wide-body aircraft.

In 2022, Embraer delivered 57 regional jets, accounting for around 35% of the regional aircraft market, while Bombardier, now primarily focusing on business jets, delivered 25 units [45-46].

The competitive landscape of the commercial aircraft market has evolved significantly over the past decade. Airbus and Boeing continue to dominate, but the emergence of new players, particularly from China and Russia, is beginning to disrupt the status quo. The Chinese manufacturer COMAC has developed the C919, a narrow-body aircraft that aims to compete directly with Boeing's 737 MAX and Airbus' A320neo.

In 2022, COMAC delivered its first C919, marking the beginning of what could become a significant challenge to the Boeing-Airbus duopoly, particularly in the growing Chinese domestic market [47]. The C919 currently holds only a small fraction of the market, but with over 1,000 orders from Chinese airlines and leasing companies, its market share is expected to grow in the coming years. Similarly, Russia's United Aircraft Corporation (UAC) has developed the MC-21, another narrow-body aircraft that aims to compete on the global stage, though its success has been hampered by geopolitical factors and economic sanctions [48].

# How COMAC's C919 compares to the Boeing 737 MAX 8 and Airbus A320 neo



Commercial Aircraft Corporation of China (COMAC) **C919**

Overall length: **127 feet, 6 inches**

Wingspan: **117 ft., 5 in.**

Passengers\*: **180** 

Range (miles): **3,452** 




Boeing **737-MAX 8**

Overall length: **129 ft., 6 in.**

Wingspan: **117 ft., 10 in.**

Passengers\*: **186** 

Range (miles): **4,045** 

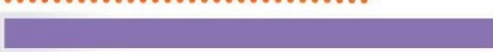


Airbus **A320 neo**

Overall length: **123 ft., 3 in.**

Wingspan: **117 ft., 5 in.**

Passengers\*: **177** 

Range (miles): **4,258** 

\* Single class comparison

Figure 13: COMAC C919 comparison, source: The Seattle Times



Despite these emerging threats, Airbus and Boeing remain firmly entrenched in the market, largely due to their established relationships with airlines and their proven track records in aircraft safety and performance. In terms of overall market share, Airbus and Boeing control over 90% of the global commercial aircraft market, composed by single aisle, twin aisle and regional jet, with Airbus holding a slight lead at 52%, while Boeing accounts for 41%. The remaining 7% is divided among smaller manufacturers like Embraer, Bombardier, and newcomers like COMAC and UAC [46-48].

One of the defining characteristics of the commercial aircraft market is the cyclical nature of demand. Aircraft sales are closely tied to global economic conditions, with periods of economic growth leading to higher demand for new planes as airlines expand their fleets to accommodate increased passenger numbers [50].

Conversely, economic downturns, such as the one experienced during the COVID-19 pandemic, resulted in reduced demand as airlines cut back on spending and delay orders. The pandemic had a particularly severe impact on the industry, with global aircraft deliveries falling by 42% in 2020 compared to 2019.

However, the market has since shown signs of recovery, with both Airbus and Boeing increasing their production rates in response to growing demand for new aircraft [50-51].

Technological innovation also plays a critical role in shaping competition within the commercial aircraft market. Both Airbus and Boeing have invested heavily in research and development to improve fuel efficiency, reduce emissions, and enhance passenger comfort.

The A320neo and 737 MAX are prime examples of how manufacturers are responding to airline demands for more efficient planes. These aircraft are equipped with advanced engines and aerodynamic improvements that allow them to burn less fuel and reduce operating costs. Additionally, the focus on sustainability has become increasingly important, with both Airbus and Boeing developing new technologies to reduce their environmental impact. Airbus, for instance, has announced plans to develop hydrogen-powered aircraft by 2035, while Boeing is exploring the use of sustainable aviation fuels (SAF) and electric propulsion [52].

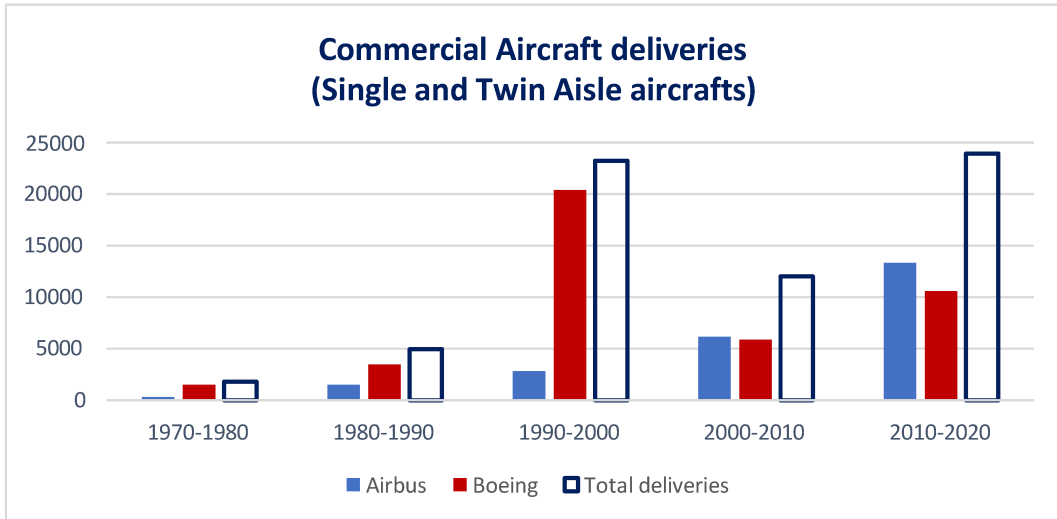


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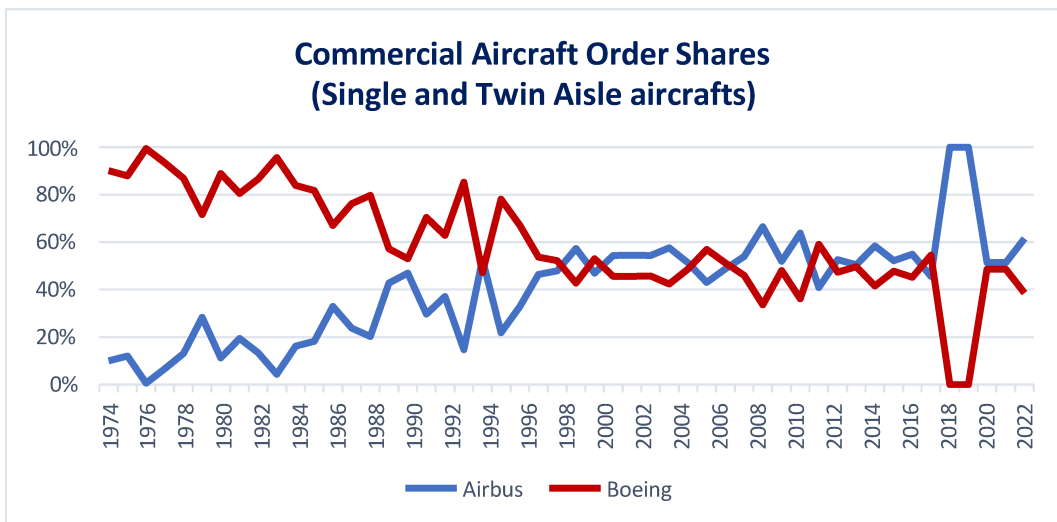


Figure 15:

Airbus	Overall Deliveries (1970-2023)	Boeing	Overall Deliveries (1970-2023)
A220	335	707	1010
A300	561	717	155
A310	255	727	1831
A320	11471	737	11762
A330	1601	747	1573
A340	377	757	1049
A350	602	767	1311
A380	251	777	1729
		787	1129
<b>Tot</b>	<b>15453</b>	<b>Tot</b>	<b>20420</b>

Figure 16:

In conclusion, the commercial aircraft market is a dynamic and competitive space that is dominated by Boeing and Airbus. These two manufacturers control the vast majority of the market, with their narrow-body aircraft, the 737 MAX and A320neo, leading in terms of sales and market share. The wide-body segment, while smaller in terms of units sold, is critical for long-haul routes, with Boeing's 787 Dreamliner and Airbus' A350 competing for dominance. Regional jets, though a smaller part of the market, are crucial for connecting less-trafficked routes, with Embraer leading in this space. Emerging competitors, particularly from China and Russia, are starting to challenge the traditional duopoly, but Boeing and Airbus remain well-positioned to maintain their leadership in the industry, especially as they continue to innovate and respond to changing market conditions and technological advancements [52].

### **3.3) Structural Characteristics**

The commercial aircraft industry is characterized by substantial barriers to entry, making it a market dominated by few key players. The capital-intensive nature of aircraft development, coupled with the need for relationship with specialized suppliers, high technological level and extensive regulatory compliance, creates significant challenges for new entrants. Over time, these factors have contributed to the emergence of a near duopoly, where only a small number of companies possess the resources, technological capabilities, and production scale to compete effectively [53- 54].

The final cost of an aircraft is shaped by a multitude of factors, each contributing significantly to the overall price and ultimately reinforcing the dominance of established manufacturers like Boeing and Airbus [55].

The complexity of designing, testing, and certifying a new aircraft not only requires significant financial investment but also the ability to manage large-scale global supply chains while adhering to stringent safety standards. This combination of technical expertise, regulatory navigation, and financial heft has created a market where the few established players benefit from economies of scale, long-term relationships with suppliers, and deep familiarity with industry regulations, making it difficult for new competitors to enter the space [56-57].

One of the most fundamental barriers to entry is the massive initial capital expenditure required to develop an aircraft. The design and development of a new model can take five to ten years and require billions of dollars in research and development (R&D), cutting-edge production facilities, and a highly skilled workforce [58].

For instance, Boeing's development of the 787 Dreamliner cost approximately \$32 billion, with a selling price unit that ranges from \$248million up to \$338.2million, a sum that new entrants would struggle to raise and ask back from buyers. Additionally, the complexity of aircraft design and manufacturing demands expertise in aerodynamics, engineering, materials science, and other fields that only a handful of companies can afford to gather and coordinate. This expertise is crucial for navigating the long and intricate development process that spans from the conceptual phase to final delivery [59].

The development timeline of an aircraft involves several phases: conceptual design, engineering, testing, certification, and finally production. Each of these phases must meet stringent regulatory standards imposed by authorities like the FAA and EASA, which adds further time and cost to the process.

Once the aircraft passes its certification tests, manufacturers face the challenge of ramping up production. This phase typically involves setting up specialized production lines, training personnel, and securing the necessary components and materials, often across a global supply chain. Delays at any stage of development can lead to significant cost overruns, as demonstrated by Boeing's delays in the 787 Dreamliner program and Airbus's A380 program, which were hampered by technical and supply chain issues. These risks make the aircraft development process not only expensive but also highly uncertain, further discouraging new competitors from entering the market [60].

A key reason why the aircraft manufacturing market has evolved into a near-duopoly is that established manufacturers enjoy significant economies of scale. Companies like Boeing and Airbus can produce aircraft at lower costs per unit due to their large production volumes. This allows them to spread fixed costs, such as R&D, production facilities, and regulatory compliance, across many units, thereby reducing the per-aircraft cost [61].

New entrants or smaller competitors cannot match these volumes, making it impossible to compete on price without incurring unsustainable losses. This cost advantage is reinforced by the manufacturers' ability to leverage long-standing relationships with suppliers and airlines, further reducing procurement and operating costs.

Manufacturing and development costs alone account for roughly 20% to 30% of the total cost of aircraft development. These expenses are driven not just by the complexity of the design but also by the need for large-scale, state-of-the-art production facilities and highly specialized labor [62].

For instance, incorporating advanced materials like carbon fiber-reinforced polymers and lightweight alloys adds further to the cost, as these materials, while improving fuel efficiency and durability, are significantly more expensive than traditional materials like aluminum. Additionally, the engines, which are some of the most expensive components of an aircraft, can cost between \$10 million and \$20 million each [63-64].

All these elements create a significant entry barrier for any company looking to enter the market, as the financial and technical resources required to design, build, and certify a new aircraft are staggering.

Fuel efficiency and operating costs, which account for 30% to 35% of the total aircraft cost, are also pivotal in shaping the long-term economics of aircraft ownership. Modern aircraft are designed to be more fuel-efficient than their predecessors, but achieving such efficiency requires significant investment in technology and innovation [65].

New entrants would need to match these efficiency standards, which would require substantial R&D expenditure, further adding to their development costs. The volatility of fuel prices adds another layer of complexity, as airlines prioritize fuel-efficient models to lower operating expenses, making it harder for new companies to compete with established, efficient designs like the Boeing 737 or Airbus A320.

Maintenance, repair, and overhaul (MRO) costs represent another substantial financial burden, typically accounting for 15% to 20% of the total lifecycle cost of an aircraft. Older aircraft models tend to incur higher maintenance costs, but new entrants would also face significant challenges in proving the reliability and longevity of their designs. Airlines are hesitant to invest in untested aircraft models due to concerns over maintenance expenses, further discouraging competition in the market [66].

Established manufacturers benefit from decades of data on the reliability of their aircraft, allowing them to offer favorable maintenance terms that new entrants would struggle to match.

The financing and depreciation costs of an aircraft, which together represent 15% to 25% of the total cost, also play a critical role. Aircraft are typically financed through a combination of debt and leasing arrangements, with airlines paying interest on loans or leasing payments over the aircraft's operational life. Established manufacturers can leverage their strong relationships with financial institutions to secure better financing terms, while new entrants, lacking a track record, would face more expensive financing options [67].

Depreciation is another important factor, as the value of an aircraft decreases over time. Older models tend to depreciate more slowly, but the introduction of newer, more efficient aircraft accelerates the depreciation of older models, adding pressure on manufacturers to continuously innovate [68].

The complexity of these financial, technical, and regulatory challenges creates significant barriers for new companies attempting to enter the aircraft manufacturing market.

The dominance of established players like Boeing and Airbus is further reinforced by their ability to continuously improve existing models, such as the Boeing 737 and Airbus A320, which have been in production for decades. These iterative improvements allow manufacturers to reduce costs while maintaining market relevance. Once an airline has invested in a particular model, switching to another manufacturer involves high costs for pilot training, maintenance, and spare parts, which further discourages competition.

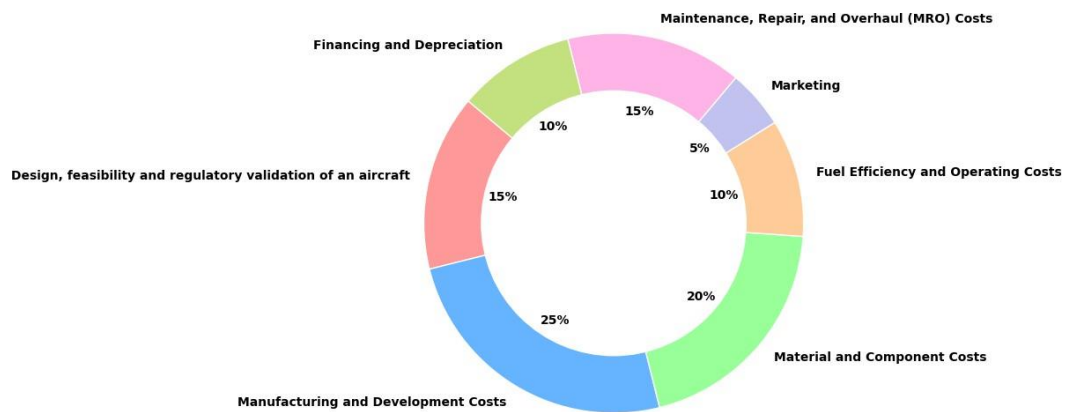


Figure 17: Aircraft Development Cycle Cost Shares

Having clear in mind the whole determinants of the aircraft development costs, it is understandable how Commercial Aircraft production is a highly coordinated effort that involves thousands of suppliers worldwide, each responsible for delivering specific parts that must be assembled with precise accuracy. The complexity of aircraft production lines, especially for wide-body aircraft, requires sophisticated logistical management and quality control to ensure that each plane meets the exacting standards set by the manufacturer and regulators.

Thus, the relationship between aircraft manufacturers and their suppliers is a vital and complex element of the market.

Their interdependence creates long-term partnerships that can shape the success or failure of a production program. Additionally, these relationships often establish high barriers to entry for new players in the aerospace sector.

Aircraft manufacturers like Boeing and Airbus work with a vast array of suppliers across the globe, but many of these suppliers have become highly specialized, developing proprietary technologies that are essential to the construction of modern aircraft. For example, General Electric (GE Aviation) and Rolls-Royce are leading suppliers of aircraft engines, providing power plants for a variety of aircraft models across different manufacturers [69].

Both Boeing and Airbus rely heavily on these suppliers for their expertise in engine technology, which requires years of research, development, and certification. Similarly, Spirit AeroSystems, a company that was once part of Boeing, is a major supplier of fuselage sections for Boeing's aircraft, including the 737 and 787.

The deep integration of these suppliers into the production process demonstrates the univocal nature of many of these relationships: manufacturers depend on specific suppliers for critical components that are difficult or even impossible to source elsewhere.

The nature of these partnerships, as introduced briefly above, also creates significant entry barriers for new companies wishing to enter the aerospace industry. For example, new entrants must navigate complex supply chains and establish relationships with companies like Honeywell, which provides avionics and control systems, or Safran, a French supplier specializing in landing gear and engine components [69].

These companies often hold exclusive contracts with existing manufacturers, limiting new players' ability to source high-quality components. The high cost of developing alternative systems or components from scratch is a formidable barrier for new firms.

Moreover, considering the long production cycles, with development, testing, and certification of new aircraft often taking a decade or more, it is clear how these collaborations start with the design of the aircraft and could continue even after the project conclusion.

The nature of this environment creates an additional entry barrier, as new manufacturers must not only develop technical capabilities but also gain the trust and collaboration of specialized suppliers who are often contractually tied to existing players.

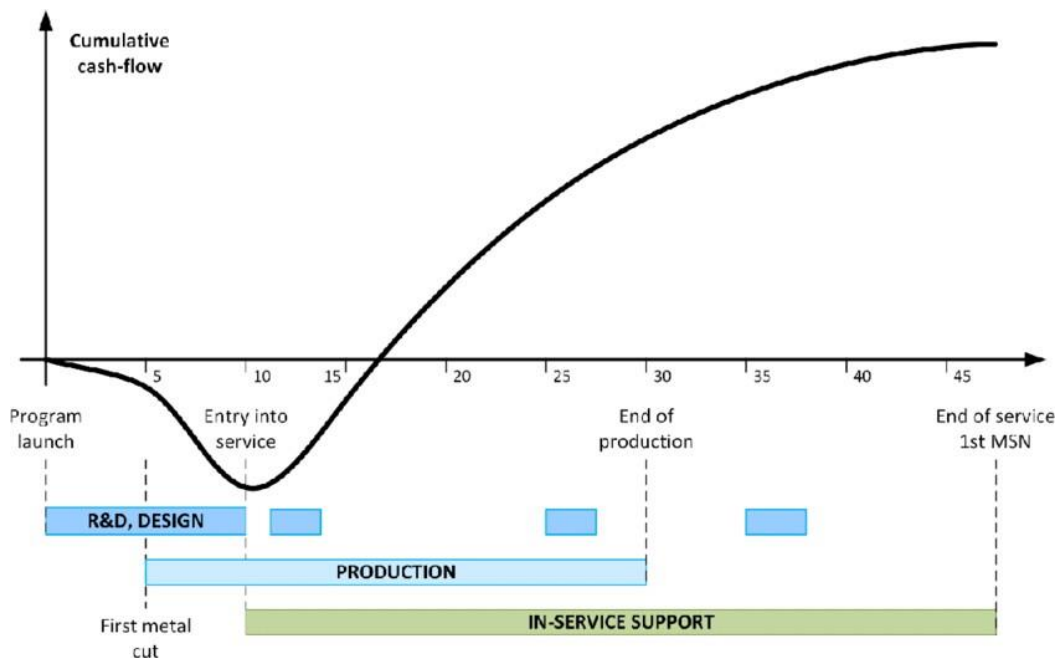


Figure 18: Aircraft program lifecycle, source: European Commission (2010)



In addition to long-term development cycles, suppliers often invest heavily in manufacturing capabilities tailored to the needs of specific manufacturers. For instance, UTC Aerospace Systems (now part of Raytheon Technologies) designs and manufactures a variety of critical systems, such as landing gear, electrical power generation, and cabin pressure systems, for both Boeing and Airbus [70].

These tailored systems require unique designs that align with the specifications of particular aircraft models, making it difficult for a new player to simply replace an existing supplier without significant investment in R&D. This level of customization between suppliers and manufacturers creates a high degree of interdependence and further limits market entry for new competitors.

The regulatory environment also plays a crucial role in reinforcing these supplier-manufacturer relationships. Aircraft components must meet strict safety standards set by aviation regulatory bodies such as the Federal Aviation Administration (FAA) and the European Union Aviation Safety Agency (EASA). Suppliers with a long history of working within these regulatory frameworks, such as Collins Aerospace, which provides interior cabins and communication systems, have established processes for obtaining certifications and complying with safety protocols [70].

New entrants would need to navigate these stringent regulatory hurdles, which not only takes time but also requires a deep understanding of industry standards, which is often easier for established suppliers with years of experience.



Figure 19: Aircraft Manufacturers' main supplier, source: SiaPartners

Moving on with the analysis, a key factor that will be introduced in the following subchapter will bring to light how Boeing and Airbus have built strong relationships with airlines over many years. These relationships include long-term contracts for aircraft purchases, maintenance agreements, and extensive support services [71].

Airlines are unlikely to risk these established ties by purchasing aircraft from a new, unproven competitor.

Moreover, Commercial aircraft must meet strict safety and operational standards set by international regulatory bodies like the FAA (Federal Aviation Administration) and EASA (European Union Aviation Safety Agency). The certification process for a new aircraft model can take years and cost billions of dollars, making it nearly impossible for smaller companies to compete [71-72].

Lastly, the market for commercial aircraft is relatively small in terms of the number of customers (primarily airlines and leasing companies). Each aircraft can cost hundreds of millions of dollars, meaning the number of buyers is limited [72].

This naturally consolidates the market around the most reliable and well-established manufacturers.

### **3.4) Aircraft Manufacturing Market Overview**

The Commercial airplane manufacturing market is part of the entire Commercial Aeronautical industry and, as seen in subchapter 2.3, it represents almost 65% of company's revenues.

The estimated value of the global market is over \$424 billion in 2024 and is expected to grow, reaching over half a trillion dollars by 2032 [73].

In its Commercial Market Outlook 2019–2038, Boeing predicted that the global economy would grow 2.7 percent annually and that air traffic demand would grow 4.6 percent annually over the next 20 years. Airbus, instead, predicted that air traffic would grow at an annual rate of 4.3 percent over the next 20 years and that the related service market would reach USD 4.9 trillion over the same period [74-75].

Companies operating in the market are involved in the manufacture of airplanes and their components, including engines and propulsion systems. Suppliers are critical to the Aircraft Manufacturing ecosystem, they provide essential components, main assemblies, and materials that are required to build an aircraft. This includes avionics, propulsion systems, landing gear, cabin interiors, and composite materials [76].

These companies range from large companies that produce major systems to smaller specialized firms. Aircraft manufacturers depend on these suppliers for the initial construction of aircraft and ongoing maintenance and replacement parts.

## 787 Dreamliner structure suppliers

Selected component and system suppliers.



Figure 20: Boeing 747 Dreamliner Structure supplier, source: Business Insider, Boeing

Court battles, World Trade Organization complaints, and negotiations at the highest political levels for aircraft contracts mean more is at stake. Together, this duopoly's decisions on production rates, aircraft models, and what technology they will use set trends for the entire industry. They affect everything from airline fleet choices to what kind of technology pilots and regular consumers will find once on board [77].

The primary factors driving the growth of the industry include the increasing demand for commercial. For instance, by November 2021, Boeing reported a backlog of 4,210 commercial aircraft manufacturing, while Airbus reported a backlog of 7,036 [78].

This huge demand for planes from the commercial sector is anticipated to drive the growth of the airplane manufacturing market. Furthermore, the increasing passenger traffic globally is estimated to drive growth. Moreover, advancement in technology is projected to offer substantial growth opportunities.

According to records, the Commercial Aircraft manufacturers market will have the highest revenue share in 2021 and will likely lead the market in the years to come.

This important share of the civil segment can be attributed to the increasing passenger and freight traffic on a global scale.

Furthermore, it is projected that the market would have enormous development prospects due to the emergence of LCCs (Low-cost carriers). With the increased competition in the airplane manufacturing industry, other airlines must adapt their business models to challenge LCCs and secure their future.

The airplane fleet modernization along with the destination expansion plans of the airlines in the region is anticipated to drive the growth of the airplane manufacturing market. Moreover, the high passenger traffic to & from the US is estimated to boost the market growth [80].

In addition, the Asia Pacific aircraft manufacturing market is anticipated to exhibit the highest CAGR over the forecasting years. The overall industry has significantly benefitted from various emerging markets such as India, China, Japan, and others. Rapid economic growth and income growth are acting as a catalyst that is surging air travel across the Asia Pacific. Furthermore, airlines in these emerging nations are rapidly expanding and ordering a huge number of airplanes to meet the growing demand for air travel [79].

In subchapter 3.5) will be introduced and described in detail a new airlines market trend that represents an enormous market opportunity for aircraft manufacturers.

Leasing companies' number is growing and links the airliners need for newer aircraft for operational cost reduction and sustainability purposes and aircraft manufacturers need for new clients who would buy airplanes in bundles, to sustain new aircraft projects during their lifecycle.

It was introduced above how the rising need for air travel in developing nations, especially in Asia and the Middle East, presents another market driver. In these regions, the demand for air travel is driven by an expanding middle class, urbanization, increasing wages and more purchasing power. This represents an opportunity for the aircraft manufacturers to provide planes that are ready to meet the regional demand and preference.

As seen in the previous subchapters, supply chain disruption is one of the most significant threats that the global Aircraft Manufacturing business faces. The availability of vital components and supplies can be significantly impacted by geopolitical tension, natural disasters, and worldwide pandemics [81].

# LARGEST ORDERS of AIRCRAFT

Number of airplanes ordered by airlines in 2023, for orders of 30 or more

Large aircraft orders reflected the surge in international travel in 2023 and an overall optimistic outlook for passenger air travel. Many of the airlines placed orders at global events like the Paris Air Show and the Dubai Air Show.



All aircraft ordered were either Boeing or Airbus, with a mix of narrow and wide-body jets.



Avolon is an aircraft leasing company.

Air India's order was split into 220 Boeing and 250 Airbus aircraft.

IndiGo's order with Airbus for 500 A320 airplanes is the biggest single purchase agreement in the history of commercial aviation.



## MANUFACTURER PERCENTAGES OF ORDER



The planes in this order will be delivered between 2030 and 2035.

Data is for the period January to November 2023. Source: Airbus, Boeing

Figure 21: Aircraft order overview: Airbus and Boeing Globally, 2023, source: Airbus, Boeing

As expected, the aerospace supply chain is vulnerable to disruptions since it is heavily interconnected and depends on a large number of parts that are sourced from many locations and businesses throughout the world. Geopolitical tensions, such as trade disputes or conflicts, often result in sanctions or export restrictions. These penalties could influence access to strategic materials, such as rare earth elements and advanced technologies [83].

For example, tensions between the United States and China have caused tariffs and export controls. The effect was that manufacturers searching for alternative firms and drive up their cost of production.

On another note, natural disasters can drastically impact production. Earthquakes or floods in the highly concentrated area of aerospace suppliers can alter the supply of key items for a limited time.

Similarly, natural disasters can significantly affect output. The aerospace sector has faced temporary shortages of critical parts due to natural disasters like earthquakes and floods in areas where the suppliers are concentrated. This was evident during the 2011 earthquake in Japan, which caused severe disruptions to worldwide supply chains [82].

The COVID-19 pandemic further increased the vulnerability of the aircraft manufacturing supply chain. Delays in logistics, the decline in demand for new aircraft, and the shutdown of factories caused huge slowdowns in the aircraft market. Smaller suppliers, in particular, faced severe financial difficulties, and their struggles affected the broader production network.

Aircraft Manufacturers had to address these delays and disruptions in their supply chain. These measures, as expected, resulted in higher expenses and postponed deliveries.

Suppliers counter these vulnerabilities by sourcing materials from various locations, diversifying their sources of supplies, and applying state-of-the-art technologies that can predict and manage disruptions.

Despite these initiatives, the global nature of the aerospace supply chain means that it remains difficult to fully shield against potential disruptions. Therefore, due to pressure from these unpredictable world events on the ability of businesses to cope with difficult situations, the industry has tried to make supply chain resilience its top priority [84-85].

### **3.5) Aircraft Demand Main Drivers**

The Aircraft Manufacturers market is part of the overall Commercial Aviation industry, which represents a key part of modern transportation, technology, and global connections.

This industry has a big impact on international trade and economic growth on a global scale, considering its scope regarding the movement of people and things around the world.

The aerospace industry represents the pinnacle of engineering and technology discoveries. The Improvement of sustainability, safety, and efficiency represents three key goals for aircraft manufacturers and virtually every related business, whether they contribute to the construction of a plane or serve airlines. Concepts in materials science, aerodynamics, avionics and propulsion systems have evolved to the point where airplanes can be designed to cost less fuel and also environmental damage per revenue mile of air travel [86].

The industry is also subject to very close regulatory control. Agencies such as the Federal Aviation Administration (FAA) in the United States and the European Union Aviation Safety Agency (EASA) in Europe have well-developed procedures for ensuring that aircraft are within the regulations and meet high safety standards [87-88].

Certification for new aircraft designs is, therefore, a long and expensive process due to the high stake involved in keeping passengers safe.

The aeronautical industry plays a significant role in the geopolitics of the world and in national security. Other than commercial aviation segment, the production of military aircraft and defense systems forms part of national defense strategies for many countries. The production of military aircraft and defense systems is also part of many countries' national defense strategies. In strategic capabilities, governments often work closely with the companies, providing funding, contracts, tax reduction and subsidies at times [89].

The following chapter will dive deep analyzing the commercial aeronautical industry to highlight main characteristics, trends and reasons that help understand how the market naturally converged into a duopoly shared between Airbus and Boeing [90].

Firstly, one of the most significant drivers of aircraft demand is global economic growth. As the global economy expands, it stimulates business and leisure travel, which in turn drives demand for air transportation.

Countries with robust economic growth often experience a surge in domestic and international travel, particularly in emerging markets such as China, India, and Southeast Asia, which represent nowadays, as seen in subchapter 3.4), the biggest shares of aircraft orders.



The rapid growth of middle classes in these regions has significantly increased air travel demand as disposable incomes rise and more people can afford to fly. For aircraft manufacturers, this translates into increased orders from airlines that need to expand their fleets to accommodate rising passenger traffic [91].

The correlation between economic growth and air travel demand is particularly evident during periods of economic boom or recession. In times of prosperity, airlines invest heavily in fleet expansion, upgrading their aircraft to accommodate more passengers, improve fuel efficiency, and enhance the overall travel experience [89-90].

Conversely, during economic downturns, demand for air travel declines, leading to a reduction in aircraft orders or even the postponement or cancellation of previous orders. The 2008 global financial crisis, for example, resulted in a significant decrease in air travel demand, leading many airlines to delay their fleet renewal plans. Aircraft manufacturers like Boeing and Airbus were directly impacted by these cyclical trends. Moreover, the 9/11 event reshaped the whole aviation industry, impacting negatively over the whole market, with a notable decrease in demand and new stringent regulation over the aircrafts for security reasons [92].

Year	Annual change (%)	Shock events
2001	-0.6%	9/11 Attack & dot-com bust
2002	-1.81%	9/11 Attack & dot-com bust
2003	2.45%	9/11 Attack, SARS, and dot-com bust
2008	0%	Global Financial Crisis
2009	1.81%	Global Financial Crisis & H1N1 Pandemic
2020	-60.31%	COVID-19 pandemic

Figure 22: Shock events in air passenger traffic from 2001-2020 and relative annual change(%)

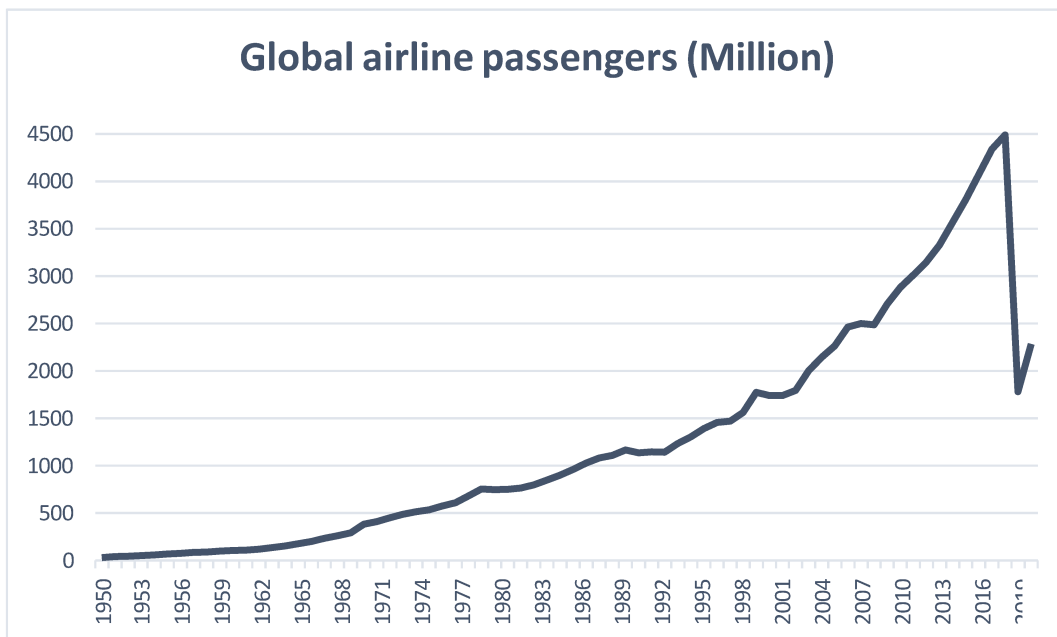


Figure 23: Shocks in global air passenger traffic from 1950-2020

Closely tied to economic growth is the profitability of airlines, which is a key determinant of their ability to invest in new aircraft. When airlines are profitable, they are more likely to purchase new planes to expand their fleets, replace aging aircraft, and improve operational efficiency. In periods of strong financial performance, airlines prioritize fleet modernization to reduce maintenance costs, enhance fuel efficiency, and offer improved services to passengers [93].

The decision to invest in new aircraft is often influenced by the need to stay competitive in a highly dynamic industry.

Fleet modernization is not only about expanding capacity but also about keeping up with advancements in aircraft technology. Newer aircraft models typically offer better fuel efficiency, lower emissions, and enhanced passenger comfort, which are critical factors for airlines seeking to differentiate themselves in the market. In this regard, aircraft manufacturers that introduce innovative models with superior performance characteristics are well-positioned to capture demand from airlines that prioritize efficiency and cost savings [94].

Conversely, when airlines face financial difficulties, they tend to delay or cancel aircraft orders. Profitability is influenced by various factors, including fuel costs, labor expenses, and competitive pressures. High fuel prices, in particular, can significantly impact airline profitability, as fuel accounts for a large portion of an airline's operating expenses. In times of rising fuel prices, airlines may prioritize the purchase of fuel-efficient aircraft to mitigate the impact of increased costs. This trend has driven demand for aircraft models like Boeing's 787 Dreamliner and Airbus' A350, which are designed to reduce fuel consumption and operating costs [95].

Thus, fuel prices play a crucial role in shaping aircraft demand, as their volatility has a direct impact on airlines' profitability and their investment decisions.

When fuel prices are high, airlines prioritize the acquisition of fuel-efficient aircraft to reduce their overall fuel consumption and remain competitive in the market. Aircraft manufacturers have responded to this demand by developing more efficient models that reduce fuel burns and emissions.

Boeing's 737 MAX and Airbus' A320neo are another example of fuel-efficient models thanks to their advanced engines and aerodynamic improvements designed to offer significant savings compared to older models.



Figure 24: Airbus new aircraft families, source: Airbus

The introduction of more fuel-efficient aircraft is also driven by the need to comply with stricter environmental regulations. Governments and regulatory bodies around the world have implemented policies aimed at reducing greenhouse gas emissions from the aviation sector, prompting airlines to invest in new technologies that align with these regulations. The International Civil Aviation Organization (ICAO) has established a global market-based measure known as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which aims to cap emissions from international flights starting in 2021. Such regulatory initiatives have further accelerated the demand for new, environmentally friendly aircraft models [95-96].

Talking about environmental concerns, in recent years they have emerged as a significant driver of aircraft demand. The aviation industry has come under increasing scrutiny due to its contribution to global greenhouse gas emissions, leading to growing pressure from governments, environmental groups, and consumers to adopt more sustainable practices.

In addition to the development of more fuel-efficient aircraft, manufacturers are also exploring alternative fuels and propulsion systems. The use of sustainable aviation fuel (SAF) has gained traction as a potential solution to reduce the aviation industry's carbon footprint.

Both Boeing and Airbus have been involved in testing aircraft powered by SAF, which can significantly reduce life-cycle emissions compared to traditional jet fuel.

Although SAF is not yet widely adopted due to cost and supply challenges, its potential to shape future demand for aircraft is becoming increasingly evident.

The drive for sustainability is not only a response to regulatory pressure but also reflects changing consumer preferences. Passengers are increasingly concerned about the environmental impact of their travel choices, leading airlines to prioritize the acquisition of aircraft that align with sustainability objectives.

Airlines that demonstrate a commitment to reducing their carbon footprint may gain a competitive advantage, particularly among environmentally conscious travelers. This shift in consumer preferences is expected to continue influencing aircraft demand in the coming years [96].

Technological innovation has long been a key driver of demand in the aircraft manufacturing industry. The introduction of new aircraft models with enhanced capabilities, better fuel efficiency, and improved passenger comfort can significantly influence airlines' purchasing decisions. Aircraft manufacturers invest heavily in research and development to bring innovative products to market, and airlines are eager to adopt these technologies to stay competitive [94].

Furthermore, technological advancements are driving the development of next-generation aircraft, such as electric and hybrid-electric propulsion systems.

While these technologies are still in the early stages of development, they hold the potential to revolutionize the industry by offering even greater fuel efficiency and environmental benefits. Aircraft manufacturers that lead in developing these innovations are likely to capture future demand as airlines seek to adopt more sustainable and cost-effective solutions.

The competitive dynamics of the airline industry also play a significant role in shaping aircraft demand. Airlines operate in a highly competitive environment, where fleet composition and operational efficiency can determine their market position. As low-cost carriers (LCCs) continue to expand their presence, traditional airlines are under pressure to modernize their fleets and offer competitive fares. This has led to a surge in demand for single-aisle aircraft, such as the Boeing 737 and Airbus A320, which are popular among LCCs for their fuel efficiency and ability to operate on shorter routes with high passenger loads [96].

Moreover, airlines are constantly seeking to differentiate themselves through fleet composition and passenger experience. Full-service carriers often invest in wide-body aircraft like Boeing's 777 and Airbus' A350 to provide long-haul international services with enhanced comfort and amenities. The increasing trend of global airline alliances and joint ventures has further influenced aircraft demand, as airlines coordinate their fleets to optimize route networks and share resources to reduce operative costs, which are killing their already thin revenues [94-95].

Lastly, a new buyer entered the market: leasing companies have emerged as a dominant force in the commercial aircraft segment, fundamentally reshaping the landscape of aircraft acquisition. Traditionally, airlines were the primary buyers of new aircraft, but the growing prevalence of leasing companies has changed the dynamics of the market.

Leasing companies purchase aircraft from manufacturers like Boeing and Airbus and lease them to airlines, providing airlines with more financial flexibility and reducing the need for large capital expenditures.

As of 2023, leasing companies control nearly 50% of the global commercial aircraft fleet, up from around 25% in the early 2000s. This trend has continued to grow, with major lessors such as AerCap, GECAS, and Air Lease Corporation playing a significant role in aircraft purchases. In fact, leasing companies have accounted for approximately 40% to 45% of Boeing and Airbus' annual deliveries in recent years [96].



Figure 25: Value chain Aircraft demand, Source: SiaPartners

This shift reflects the broader movement towards asset-light strategies by airlines, allowing them to focus on operational efficiency while leaving the financial burden of aircraft ownership to lessors. The growing influence of leasing companies has not only increased their market power but has also had a profound impact on how aircraft are financed, sold, and utilized across the global aviation industry.

## 4) Subsidies disputes

European technological collaboration is, by its very nature, deeply linked to politics, particularly in fields where critical technologies are closely tied to both military and economic security. In these sectors, such as aerospace, defense and advanced manufacturing, technological development is not solely a matter of industrial progress but is also connected to the strategic national interest [101-102].

Trade-off between security concerns, economic goals, and political priorities of multiple states makes the process of collaboration highly intricate and often contentious [103].

Logically, collaboration has often been shaped by the necessity to balance national sovereignty with the collective goals of European integration.

The different and sometimes opposite interests of individual nations, each with its own historical, economic, and geopolitical considerations, frequently complicate decision-making processes. As a result, some collaborative programs that may appear economically non logical or industrially inefficient have been justified by broader strategic and political objectives. For example, unemployment issues, the protection of national industries or the desire to maintain technological independence from non-European nations played a role in pushing forward initiatives that might not otherwise meet strict economic criteria [104-106].

Despite these challenges, the strategic nature of European technological collaboration has brought the EU to profound changes in national industries and policies.

In the aerospace sector, for example, joint efforts like Airbus are an European nations' effort to challenge the dominance of the United States in commercial aviation, while simultaneously developing technological innovation and industrial efficiency, in order to be able not to depend on a non-European national company. The shared resources, talent, and knowledge across borders strengthened Europe's position in global markets and reduced reliance on external powers for critical technologies [107][109].

For example, national industries with a state-controlled structure or focused on domestic markets have increasingly been integrated into multinational frameworks, promoting competition, innovation, and efficiency [108].

European governments, recognizing the benefits of shared development, have adjusted their industrial policies to support cross-border cooperation, contributing to the emergence of a -more collaborative and competitive European technological environment. This shift has allowed Europe to remain at the top of technological advancement in key industries, despite the challenges involved in aligning the diverse national interests of its member states.

The practice of collaboration in European aerospace has attracted often justified criticism for its cumbersome organizational forms and politically inspired industrial choices such as the initial insistence by France on the development of two versions of Concorde and the allocation of Tornado equipment contracts to German companies despite their relative inexperience [110-111].

But part of the problem has been to establish the practice of working together with the same partners on several related programs.

Airbus Industrie, based originally on the A 300 airliner, is perhaps the European organization that has come closest to this 'integrated' approach to collaboration [112-114].

It was the first collaborative consortium unique in uniting the three major European aerospace nations, France, Great Britain and Germany, to a significant degree in a large-scale program. unequivocal. For most European firms, collaboration has become routine. Huge development costs, market pressures and, these days, the momentum of past commitments have created the conditions in which collaboration appears as a natural industrial strategy.[97]

The legal disputes between Boeing and Airbus concerning subsidies have been a relevant aspect of international trade relations, particularly within the context of the World Trade Organization (WTO). These disputes were mainly composed by allegations that both companies received unfair governmental subsidies, tax reduction, free credits and/or exemptions, like the House Bill 2294, which provided tax reductions, credits, and exemptions to Boeing worth almost \$3.5 billion over twenty years [98], thus distorting competition in the global aerospace market. The complexities of these legal battles brought financial penalties and tariffs and have influenced trade dynamics in both related and non-related markets.

For example, the feud escalated when the Trump administration-imposed tariffs on European goods including Parmesan cheese, French wine and Scotch and Irish whiskies. The European Union, in turn, slapped tariffs on US goods such as wine, cheese and suitcases [98-99].



## **4.1) Airbus-Boeing dispute over the years**

Historically, direct state intervention in the development and production of civil aircraft has been more common in Europe than in the United States. When the Airbus began seriously to threaten American markets, USA started complaining regarding European subsidies, focused on the Airbus A320's, development and production funding.

Aerospace was particularly sensitive for the US government because it was one of the few manufacturing sectors where the United States had consistently had a balance of payments surplus of \$13 billion back in 1985 [97].

The United States complained that Europe was infringing the 1979 GATT agreement on civil aircraft, which covers formal and non-tariff barriers to trade in civil aerospace products. In particular, the key clause which USA was referring to be the one stating that “all parties should seek to ensure a reasonable expectation of recoupment of all costs in launching a civil product” [100].

The EU replied in turn that Boeing received far greater help thanks to subsidies provided by federal F&D programs and indirect assistance by the US defense contracting.

The Airbus-Boeing dispute, particularly following the U.S. withdrawal from the 1992 Bilateral Agreement and the subsequent legal battles at the World Trade Organization (WTO), had wide-ranging effects on several key markets and trade dynamics, particularly through the imposition of retaliatory tariffs. These tariffs not only impacted on the aerospace sector but also extended to various industries, leading to broader economic and geopolitical repercussions.

The most direct impact of the dispute was felt within the aerospace industry itself, where both Airbus and Boeing were central players. The retaliatory tariffs imposed by the U.S. and the European Union on aircraft, parts, and other aerospace goods disrupted the global supply chain and increased the cost of doing business for airlines and aircraft manufacturers. For instance, the U.S. imposed tariffs of up to 15% on Airbus aircraft, significantly affecting Airbus's competitiveness in the lucrative U.S. market. These tariffs made Airbus planes more expensive for U.S. airlines, which in turn influenced their purchasing decisions and forced them to weigh the increased costs against potential alternatives, such as delaying fleet upgrades or negotiating with Boeing [115].

On the other hand, the European Union responded by imposing tariffs on Boeing aircraft. This made Boeing less competitive in the European market, where Airbus traditionally held a stronger presence. As a result, European airlines faced higher costs when purchasing Boeing aircraft, potentially pushing them toward Airbus or other manufacturers. This disruption in trade dynamics affected not only sales figures for both companies but also complicated long-term strategic decisions for airlines regarding fleet composition, route expansion, and operational efficiency.

The impact of the tariffs extended beyond the aerospace sector. To maximize leverage in the trade dispute, both the U.S. and the EU imposed tariffs on a wide range of goods unrelated to aircraft manufacturing. The U.S. placed tariffs on European exports such as wine, cheese, olives, and luxury goods, targeting politically sensitive industries in key European economies like France, Spain, and Italy. In response, the EU imposed tariffs on American exports, including agricultural products like whiskey, tobacco, and processed food, as well as industrial goods and machinery [116].

These tariffs had significant effects on trade flows and market dynamics. For example, European wine producers saw a decrease in exports to the U.S. as tariffs made their products less competitive in the American market. Conversely, American whiskey producers faced similar challenges in Europe, with tariffs dampening demand and increasing costs for European consumers. These industries, which were already operating in highly competitive global markets, struggled with reduced demand and increased costs of doing business, leading to lower revenues and, in some cases, job losses.

The Airbus-Boeing dispute also had a broader impact on global trade relations, straining the U.S.-EU economic partnership and adding uncertainty to the international trading system. The imposition of tariffs not only increased costs for businesses but also created volatility in markets that depend on stable trade agreements. For instance, companies that source components from both the U.S. and Europe were forced to navigate complex supply chain disruptions caused by the tariffs. This led to inefficiencies, increased production costs, and delays in the delivery of goods, affecting not only large aerospace manufacturers but also smaller suppliers and related industries [117].

Moreover, the tariffs threatened to undermine long-standing trade relationships and prompted concerns about protectionism. The uncertainty surrounding the dispute discouraged investment in affected sectors, as businesses became hesitant to commit resources in a market environment that could be further destabilized by escalating trade tensions.

In addition to its impact on established markets, the Airbus-Boeing dispute also influenced the dynamics of emerging aerospace markets, particularly in regions like Asia and the Middle East. Both Airbus and Boeing have been vying for market share in these rapidly growing markets, where demand for commercial aircraft has been increasing due to the expansion of low-cost carriers and the rise of middle-class consumers. The imposition of tariffs and the resulting shifts in pricing structures impacted the ability of these companies to compete effectively in emerging markets [118].

For instance, Chinese and Middle Eastern airlines, which had traditionally sourced aircraft from both Airbus and Boeing, faced uncertainty over the long-term costs of their purchases. As these airlines sought to expand their fleets, they had to factor in the possibility of future tariffs and trade disruptions, potentially affecting their decisions on fleet composition and future partnerships.

In some cases, the dispute also opened opportunities for new competitors, such as China's COMAC, which is developing its own line of commercial aircraft to compete with Airbus and Boeing. The trade tensions between the U.S. and the EU, along with the uncertainties surrounding future tariffs, provided a window for emerging players to establish a foothold in global markets by offering lower-cost alternatives and avoiding the political complexities associated with Airbus and Boeing aircraft [119].

As stated before, it can be concluded that the fallout from these disputes has extended beyond just Boeing and Airbus, influencing the global aerospace market and related industries. The tariffs have disrupted supply chains, raised production costs, and shifted competitive dynamics. Airlines, which rely on affordable aircraft procurement, have been impacted by the higher costs associated with tariffs, while suppliers and manufacturers of aircraft components have also faced fluctuations in demand and increased expenses.

In response to these challenges, both the U.S. and EU have started exploring ways to reduce their reliance on subsidies, potentially shifting towards more market-driven approaches. As governments strive to comply with WTO rulings while managing domestic economic pressures, national restrictions on subsidies may evolve. This shift could drive Boeing and Airbus to focus more on innovation and operational efficiency rather than government support.

As the global market for commercial aircraft continues to expand, the effects of these disputes are likely to persist. Future developments will depend on ongoing negotiations between the U.S. and the EU, with the possibility of creating a more balanced framework for subsidies in the aerospace sector, which could ultimately influence the competitiveness of both manufacturers [120].

## 4.2) Future Implications

The long-standing Airbus-Boeing dispute, despite recent efforts at resolution, continues to cast a shadow over the aerospace industry and global trade. Though tariffs were suspended in 2021, the conflict's underlying tensions suggest enduring implications for the future. One of the most significant outcomes is the potential transformation of the competitive landscape within the aerospace sector [121].

Both Airbus and Boeing have been weakened by the protracted legal battle and external challenges like the COVID-19 pandemic and global supply chain disruptions. This has created opportunities for emerging players, particularly China's Commercial Aircraft Corporation (COMAC), to gain a foothold.

COMAC's development of the C919 aircraft is seen as a direct challenge to Airbus and Boeing, and geopolitical tensions could further facilitate its growth, especially in Asia. Similarly, aerospace companies from Russia, Japan, and Brazil may find space to expand in regions affected by the Airbus-Boeing tariffs, especially as airlines search for more stable and cost-effective solutions [122].

Environmental concerns will likely become another critical factor in this evolving competition. Both Airbus and Boeing are increasingly focused on developing sustainable aircraft, including electric and hydrogen-powered models. The future conflict may center less on traditional subsidies and more on government support for sustainable technologies. With climate change and emissions reduction becoming a central focus in the aviation sector, competition for leadership in green innovation could drive new forms of dispute, especially as governments begin to channel more support toward these technologies [123].

Beyond the aerospace industry, the Airbus-Boeing dispute also signals broader implications for global trade. The case exposed the complexities and fragility of international trade in highly interconnected sectors like aerospace, where supply chains stretch across borders and involve numerous smaller players. The imposition of tariffs disrupted these global supply chains, leading companies to reconsider their reliance on cross-border production.

Moving forward, both Airbus and Boeing may place greater emphasis on regionalizing production to safeguard against future trade disruptions. This shift could increase costs for manufacturers, which may be passed down to airlines and, ultimately, consumers. Moreover, countries heavily integrated into the global aerospace supply chain, such as Canada, Mexico, and Japan, could face challenges if production moves closer to home in the U.S. and Europe.

The conflict also underscores the evolving nature of US-EU relations. Although the 2021 suspension of tariffs was a positive step, the core issues surrounding state support for the company remain unresolved. In the future, this tension could escalate once more, particularly as both the U.S. and the EU ramp up industrial policy efforts to support their aerospace sectors and other strategic industries [124].

The growing focus on reshoring production and government spending in high-tech sectors could lead to new forms of competition and even conflict, particularly as both regions aim to counter the rising influence of China in global markets. How these tensions are managed will be critical to the future stability of transatlantic trade relations and may influence broader geopolitical dynamics as well.

Additionally, the dispute's broader effects on the market were not confined to the aerospace sector. Tariffs on unrelated goods such as wine, cheese, and whiskey revealed how trade disputes in one industry can ripple through global markets, affecting industries and consumers far removed from the original conflict [125].

This highlights the interconnectedness of global trade and underscores the risk of using tariffs as a tool for leverage, as they can lead to unintended economic consequences across diverse sectors.

While the Airbus-Boeing dispute may have seen a temporary lull, the future remains fraught with challenges. The aerospace industry's competitive dynamics will continue to shift as new players emerge, sustainability becomes a focal point, and supply chain adjustments reshape global manufacturing patterns [126].

At the same time, U.S.-EU trade relations will likely experience ongoing tension as both sides navigate the complexities of state support and protectionism in an increasingly competitive global economy [127].

The broader lessons from this long-running conflict will undoubtedly shape the future of aerospace, international trade, and industrial policy for years to come.

## 5) Conclusion

Thanks to the previous chapters, it was shown how the entrance of Airbus into the commercial aircraft market marked a significant turning point in the aviation industry, particularly in terms of competition, innovation, and cost dynamics.

One of the most profound changes introduced was its impact on pricing strategies. With a new competitor in the market, Boeing, as the largest player, faced pressure to react in order to maintain market share.

Commercial aircraft are high-value products that require substantial investment to be produced, with thin margin revenues. Airbus' entrance introduced a degree of pricing flexibility that had not been seen before, offering its aircraft at approximately 5% to 10% lower prices than its primary competitor, Boeing, in the narrow-body market during the early years of its expansion, as a strategy to penetrate the market. [128]

The thesis concludes that the Bertrand competition model, which assumes that firms compete primarily on price, was the primary Airbus' strategy to penetrate the market. The price rivalry, characterized by aggressive pricing moves from both manufacturers, exemplifies the Bertrand competition in action, with Airbus leveraging price reductions as a key tool to challenge Boeing's market position.

Airbus also exploited vertical differentiation strategies thanks to their innovations aimed at reducing long-term operational costs for airlines. Their combination of price and product differentiation strategy choices brought the company to their position as a market leader.

With thin margins over each aircraft sale, on average 5-10% for Airbus and 7- 15% for Boeing, these strategies could not be exploited without government intervention.

In fact, the European subsidies were vital for Airbus to sustain this aggressive pricing and enormous investments in R&D to achieve technological growth, in order not to go on default. [131]

The broader impact of Airbus' entrance into the market extends beyond pricing and technology; it also reshaped the supply chain dynamics in the industry. The increased demand for aircraft components from both Airbus and Boeing led to greater innovation and cost competition among suppliers. This, in turn, contributed to a more efficient production process, which ultimately resulted in lower costs for manufacturers and airlines alike. Airbus' approach to outsourcing parts and systems from various global suppliers forced Boeing to adopt a similar strategy, leading to cost reductions across the board for the aircraft manufacturing process.

In addition, Airbus entrance into the market did not significantly reduce the entry costs for new participants. Instead, it created an environment where the barriers to entry remain high, largely due to the capital-intensive nature of aircraft manufacturing, the necessity of advanced technology, and the stringent regulatory requirements. Moreover, the technological expectations placed on manufacturers set by the competitive landscape, further raising the bar for new entrants.

New entrants on the market would need to not only match these technological advancements but also potentially surpass them in order to stand out, leading to even higher development costs.

From a social welfare point of view the thesis concludes that the pricing strategy adopted by Airbus brought substantial benefits to the buyers for both price and products offering. Airbus focusses on models operating with 20-30% less costs and their technological innovation pursuit brought a steep growth in the market, with newer solutions available in a short time.[131]

For aircraft users instead, while the decrease in ticket prices over time cannot be attributed solely to Airbus' entry into the market, the increased competition certainly contributed to this trend, with the average price of airline tickets decreased by approximately 50% over the last 30 years, adjusting for inflation. While many factors contribute to this decline, including increased operational efficiencies, more fuel-efficient aircraft, and broader market liberalization, the competitive pressures brought about by Airbus' market presence have been a driving force in pushing airlines to seek out cost savings and pass those on to consumers in the form of lower ticket prices. [129]

The industry remains highly capital-intensive, technologically demanding, and subject to stringent regulatory oversight. Any new entrants would need to overcome the same challenges Airbus faced, including high development costs, certification hurdles, and the need to compete with established players that benefit from economies of scale and long-standing supplier relationships.

The thesis formulates that, theoretically, the potential entry of another major player into the commercial aircraft market, particularly from countries like China or Russia, represents a threat for the established duopoly between Boeing and Airbus. Both China's state-backed Commercial Aircraft Corporation of China (COMAC) and Russia's United Aircraft Corporation (UAC) have made considerable efforts to develop aircraft that can compete on the global stage.

The introduction of these new manufacturers into the market could have a profound impact on both the pricing of aircraft and the cost of air travel for consumers, creating a new competitive dynamic that may reshape industry in the coming years.



If either COMAC or UAC succeeds in gaining significant market share, it would likely lead to increased price competition for aircraft. Both companies have the advantage of state backing, which allows them to offer pricing that could undercut Boeing and Airbus.

A new competitor offering lower prices could have a ripple effect throughout the supply chain and lead to reductions in production costs. Boeing and Airbus might need to renegotiate contracts with suppliers to cut costs and maintain profitability in the face of lower aircraft prices.

The impact on ticket prices for passengers could also be significant, though indirect. Lower aircraft acquisition costs would reduce the capital expenditure burden for airlines, especially in markets where profit margins are tight. Airlines operating on thin margins, particularly low-cost carriers, could pass some of these savings on to consumers in the form of lower ticket prices.

For example, if COMAC's C919 offers a 20% reduction in acquisition costs compared to Airbus and Boeing models, airlines could potentially reduce ticket prices by 5% to 10%, depending on how much of the cost savings are directed toward operational efficiency and competitive fare pricing. However, the extent to which passengers would benefit from lower airfares will depend on several factors, including fuel prices, airport fees, and broader economic conditions. [130-131]

In addition to pricing pressure, the entry of new competitors from China and Russia could accelerate the adoption of new technologies within the industry. The competitive push could also result in faster development timelines for new models, as the existing duopoly is forced to respond to the technological and pricing pressures posed by new entrants.

Despite these possibilities, it is important to note that any new entrant to the commercial aircraft market faces substantial challenges. The certification process for aircraft in markets like the United States and Europe remains a significant hurdle. For instance, the C919 has faced delays in receiving certification from the European Union Aviation Safety Agency (EASA) and the Federal Aviation Administration (FAA), limiting its appeal to airlines operating in those regions.

Without international certification, the C919 and MC-21 may struggle to gain traction beyond their domestic markets, reducing their potential to disrupt the global market. However, if these hurdles are overcome, the global market share of COMAC and UAC could grow steadily, potentially capturing 10% to 15% of the market by the 2030s, according to some industry forecasts. [130-131]

The introduction of new manufacturers from China or Russia could also have geopolitical implications, particularly in regions where relations with the United States or Europe are strained. Airlines in countries with close ties to China or Russia may favor the C919 or MC-21 over Western models, further shifting the market dynamics.

In conclusion, the entry of new players like COMAC and UAC into the commercial aircraft market could have far-reaching consequences for the industry. Increased competition would likely lead to lower aircraft prices, driving both Boeing and Airbus to reduce costs and innovate further.

This competitive pressure could also benefit airlines by reducing their capital expenditure and operational costs, potentially resulting in lower ticket prices for passengers. However, the ability of these new entrants to truly disrupt the market will depend on their ability to overcome certification challenges, establish global supply chains, and gain the trust of airlines and regulators outside their domestic markets.

If successful, their presence could fundamentally alter the competitive landscape, creating a more dynamic and price-sensitive market for both aircraft and air travel and increase global social welfare.

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