Preface

> There's one thing that made Boeing really great all the way along. They always understood that they were an engineering-driven company, not a financially driven company. They were always thinking in terms of "What could we build?" not "What does it make sense to build?"
>
> — Jim Collins, *Built To Last*

Rarely do newspaper headlines, academic research papers, and monthly reports of investment analysts agree so closely about the slow decline of Boeing as an iconic aerospace manufacturer. Recent newspaper articles with headlines like "Boeing Ditches Chicago Headquarters for Washington" and "Airbus Retains Crown over Boeing as Biggest Jetliner for Three Years in a Row" are examples. Tellingly, they highlight the internal dysfunctions at Boeing, a company that was once seen as an American engineering marvel and a technical innovator in all aspects of aerospace – including its history as a global export powerhouse, in addition to being the biggest exporter in America, with manufacturing sites in several states, plus factories in Winnipeg, Canada, and Nagoya, Japan.

Boeing's evolution from the time of its founder, William Boeing, reflects the history of modern American capitalism, highlighting the role of private interests and firms who guide the invisible hand. Today's modern global corporation is largely undeterred over time from participation in political events, dealing with government regulation and technological change with a portfolio of management tools, including the raising of capital. Capitalism in advanced countries comes in many forms, including state corporations. In the global growth of the airline transportation sector, original equipment manufacturers (OEMs) of passenger trains, buses, cars, and planes expanded their market reach, accelerated by government measures to promote but also regulate the sector. Today, the airline sector is the main customer for OEMs, with a record of safety and innovation far beyond the expectations of balloonists, hobby fliers, or planes for military purposes (i.e., reconnaissance, armed conflict, and fighting for air supremacy). It follows that aircraft production even from its earliest days has had both a commercial purpose and a defense role, with governments intimately involved as customers, financiers, technology backers, and defense procurers.

Management tools change with the times, and it is no coincidence that the *Harvard Business Review* recently (March–April 2023) published an article entitled "How Chinese Companies Are Reinventing Management" and another one on Western firms learning foreign practice, such as Japanese management innovations in just-in-time production, quality control, and precision engineering. American management innovation coincides with the strength and output of the American economy and the US stock markets, where today 60 percent of

the world's public shares are listed. In fact, the rise of conglomerate structures in the USA in the 1960s and 1970s, and the rapid spread of highly diversified corporations in the 1980s and 1990s has a resonance today in calls for fundamental changes in the rules of capitalism and forms of governance.

The rise of publicly listed firms first occurred in Europe, when entrepreneurs saw the stock market as a vehicle to raise money, and investors saw corporate performance and outcomes as a market signal to invest more money or divest. Traditionally, management employed the cash from annual profits to pay dividends but left a portion for new capital expenditures on new growth opportunities. Starting in the mid 1980s, as many firms used mergers and acquisitions to enhance corporate growth, rule changes allowed boards and senior management to pay out excess cash as dividends or use the cash for share buybacks (or share repurchases) or a combination of the two. Starting in 1997, the amount of share buybacks became greater than that of cash dividends. In fact, corporate America recently has spent an unprecedented amount for share buybacks ($1.26 trillion in 2022, see Figure 1).

Boeing's investment policies followed this governance course. Despite its postwar history as an engineering marvel and a pioneer of the jet age with the Boeing 707 and its launch of the Boeing 747, the Queen of the Skies, in 1968, Boeing has paid over $43 billion in share buybacks since 2009, at a rate which accelerated from 2013 onwards. Underneath Boeing's public relations umbrella, high development costs, fewer actual orders than expected, and investors unwilling to invest more, Boeing's state of health was in jeopardy. In Boeing's home state, Washington, posters showing "Boeing Bust" were

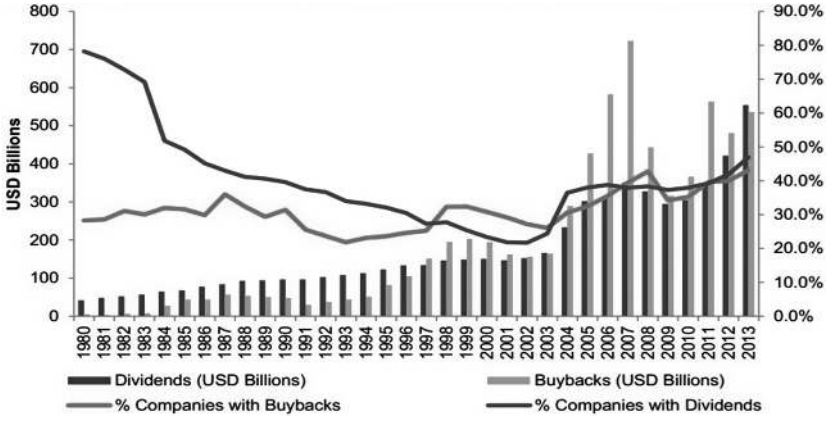

Figure 1 Aggregate dividends and buybacks paid by US firms and percentage of firms with positive dividends and buybacks in the US.

Source: Zeng & Luk (2020).

common. But as the economy recovered and more travel customers took to the air, Boeing rebounded and in the mid 1990s it undertook the largest merger in airline history by acquiring McDonnell Douglas. With its acquisition of the aerospace division from Rockwell, Boeing created a mix of products, factories, and workers in many locations throughout the USA, but the cost of the merger put pressure on the stock price, as investors sought higher returns. Boeing's C-suite and board spent up to $43 billion buying back its own shares, but many analysts worried that it needed this cash hoard to meet increasing competition from a new rival, Airbus. Even more worrisome was Boeing's expensive launch of the new version of the 737, called the MAX.

This Element's case study addresses the evolution of Boeing and the C-suite model of strategy making and core decisions that most firms must address, namely, the pressures from investors and shareholders on trade-offs between short-term returns and long-term growth. The academic debate about boards and senior managers seeking wealth creation via high financial returns and high executive compensation is juxtaposed with a view where firms have multiple stakeholders, a need for a more nuanced view of the trade-offs, including a focus on exploitation of existing assets and exploration of new assets, which influence a culture of learning and innovation. The complexity of commercial airplanes requires huge amounts of engineering expertise and understanding of design issues accompanied by an awareness that even the smallest error can lead to catastrophic consequences. Boeing's design flaws led to two fatal crashes of the 737 MAX, with legal, organizational, and financial consequences that are still undetermined. Lawsuits from airlines that didn't receive orders or who suffered delivery delays are estimated to have cost $8.2 billion, a case of a corporate culture allowing perverse incentives, or penny-wise and pound foolish.

> [F]or a time, Boeing would even become a Wall Street darling, doubling down on stock buybacks that channeled cash to shareholders at the expense of other priorities, such as research and development. From 2013 to 2018, almost 80% of free cash went to buybacks, an innovation in financial engineering.— Peter Robinson

1 Introduction

In the global growth of the airline transportation sector, the OEMs of passenger trains, buses, cars, and planes correspondingly expanded their market reach, accelerated by government measures to deregulate the sector in pricing and entry barriers, starting with the Carter administration in the late 1970s. Airplanes vary in size and type, from small, single-propellor, short-range planes to long-distance jet propulsion. Boeing became the technological pioneer with

the 747, a wide-bodied design with more than 400 seats, ideal for long-haul flights. Growth in travel helped the airline industry, but its real competitive strength was with aircraft OEMs like Boeing, Lockheed Martin, and McDonnell Douglas. Starting with transportation reforms in the Carter administration in the late 1970s, American deregulation initiatives vastly reduced entry barriers for both passenger and cargo aircraft and allowed pricing to become a competitive tool. They also accelerated mergers and industry consolidations among smaller airlines, just as more countries began to privatize their national legacy carriers, such as British Airways and Air Canada.

Today, the airline sector is the main customer for the airline manufacturers, or OEMs, and from its earliest days it has had both a commercial purpose and a military role, with governments intimately involved as customers, financiers, technology backers, and weapons procurers. Orville and Wilbur Wright on December 17, 1903, not only made aviation history but also attracted interest worldwide. For 12 seconds the brothers flew their custom-made Flyer 1, made from spruce wood and powered by a new 12 hp four-cylinder engine with a sprocket-and-chain transmission unit that guided two pusher propellers. In 1909, Winston Churchill, then only a British MP and cabinet minister, and later First Lord of the Admiralty in both world wars, spoke before the Committee of Imperial Defense and suggested the Government make contact with Orville Wright "to avail ourselves of his knowledge."

Churchill was an early advocate of air power and recognized its military application, not unlike another navy expert, Admiral Isoroku Yamamoto, who understood how air power could make large navy ships vulnerable in battle. Churchill's restless mindset led him to take flying instructions to get a pilot's license. At the Admiralty, he established the Royal Navy Air Service and the Royal Flying Corps, which evolved to become the Royal Air Force.

A decade before Pearl Harbor, Admiral Isoroku Yamamoto, who was well-traveled (visits to six countries in Europe), knew details about plans by the American and British navies to employ their superiority in the size of their fleets. Other than size, the Japanese Imperial Navy replicated many aspects of the Royal Navy, including ranks and uniforms. In Japan, Yamamoto took charge of the new Aeronautics Department, which planned and developed aerial weapons, including naval aircraft models such as the Mitsubishi A6 M "Zero" fighter, the twin-engine Mitsubishi G4 M bomber, and the Nakajima B5 N torpedo attack plane. Fluent in English, he was an economics student at Harvard from 1919 to 1921. Like many Americans, including William Boeing, a young entrepreneur who made a fortune in his native state of Washington, Yamamoto brought his ambition and gambling instincts to aviation. He also spent time (1925–1927) in Washington as Naval Attaché in the Japanese Embassy and

used that position to tour many American states, including the oil fields of Texas, as well as Cuba and its lucrative casinos in Havana. When he returned to Japan, like Churchill, he also took flying lessons. Yamamoto was open to new ideas and less interested in the traditional military concepts of the navy or the army acting alone. He saw how air power linked to other military units – ships, tanks, and ground-based forces – could operate from land bases, attacking naval targets, including aircraft carriers.[1]

In America, the US Army showed renewed interest in air power, where the legacy of the Wright brothers attracted entrepreneurial copycats worldwide, given the centuries-old history of flight, from the first manmade kites and hot air balloons. In 1907, the Board of Ordnance and Fortification and the US Army Signal Corps issued a request for proposal, but the specifications ensured that only the Wright brothers would be the viable bidder. Two years later, the United States acquired its first airplane at a cost of $25,000, plus a bonus of $5,000, because the Wright brothers' biplane exceeded 40 miles per hour. Air mail was a lucrative business, and federal contracts were messy, controversial, and politically charged patronage games. In the 1930s, various initiatives by Congress attempted to strike a balance between established companies, especially Transcontinental and Western Air (TWA) and smaller independent operators relying on income from mail contracts, costing taxpayers about $50 million over four years. The Postmaster General, Walter Folger Brown, held hearings known as "spoils conferences," which reshaped the US commercial air map, dividing the major routes among the four largest carriers (United Aircraft and Transport Corporation, American Airways, Eastern Airways, and TWA).

In 1930, the McNary–Watres Act gave most of the airmail contracts to big, established companies, like American Airways, with the popular war hero Eddie Rickenbacker and a young Thomas Braniff lobbying for the independent airlines. Congress held hearings, and charges of corruption, monopoly, and bribery, mostly unfounded, added to the political rhetoric. President Franklin Roosevelt, first elected in 1932, directed the Postmaster General, James A. Farley, to cancel all airmail contracts and allowed the United States Army Air Service to deliver the mail.

As it turned out, the Army Air Corps was ill-equipped, with inferior machines which were poorly maintained. In fact, after several plane crashes and pilot

[1] See Agawa (1969). In one of the great coincidences in industrial design, the Aviation Corps of the Imperial Navy followed the practices of the Royal Air Force by discarding planes with 200 hours in the air. A young engineer thought this was a waste and proposed new design features that would prolong plane life, first to 400 hours, then double that, and then to 1,000. Yamamoto accepted these changes and greatly encouraged this entrepreneurial engineer, Ikichi Honda.

fatalities, deemed by the media as a "fiasco," public outrage forced Congress to take action, and the president suspended the operations of the Air Corps. One of the president's harshest critics was Charles Lindbergh (the first pilot to make a nonstop flight across the Atlantic Ocean), who testified before Congress. The hearings on the so-called Air Mail scandal forced Congress to pass the Air Mail Act of 1934, giving most airmail routes to the airlines but allowing some routes for smaller airlines to promote competition. Regulation was divided among three groups, the Post Office, the Commerce Department, and the Interstate Commerce Commission. Perhaps more importantly, this measure forced a dissolution of aviation holding companies and separated airline firms from aircraft manufacturers.[2]

Wartime put aircraft production at the top of the policy agenda. However, even before the United States joined the war effort after the 1941 attack on Pearl Harbor, President Roosevelt worked with his close ally, General George C. Marshall, on plans to produce 20,000 planes annually. The dour but highly informed Marshall knew that air power alone would need a wider measure of initiatives, like schools to train pilots, technicians to maintain planes, and factories to manufacture ammunition. Roosevelt's views, influenced by Jean Monnet, head of the French government's military purchasing department, led to a proposal for aircraft assembly plants in Canada to supply the French Air Force with parts and components shipped across the border, enough for production of up to 15,000 planes a year. When America declared war, aircraft production was only about 3,000; in 1945, it reached more than 300,000 planes, as factories producing consumer and industrial goods were retooled to meet the military's air-power requirements.

After 1945, OEMs in America had global supremacy in large, commercial airline manufacturing, despite Britain's limited success with its Comet jet airliner. In the Soviet Union,[3] manufacturers like Ilyushin, Tupolev, and Antonov sold planes to the state-owned monopoly airline, Aeroflot, with

[2] For background, including the personalities involved, see Black (2003), pp. 320–323.

[3] In the former USSR, three government ministries and agencies, the Ministry of Aviation Industry, the Ministry of Civil Aviation, and the Ministry of Defense, operated a system where plane design was entirely separated from manufacturing, and actual production took place in multiple locations, often near airports. The biggest lacuna in Soviet aircraft technology and manufacturing was not the body frame, which was mostly aluminum that was readily available, but rather the massively high-decibel-count noisy and fuel-guzzling engines, and even the basic avionics, based on semiconductors and electronics. When the USSR imploded in December 1991, some entrepreneurs from Europe and the United States hoped to refurbish Soviet planes with more advanced avionics and western engines, like converting the Tupolev 40 with engines from Cummings, a US manufacturer. Both Boeing and Airbus had a presence in Russia, given the long history of aircraft production there and the opportunity to use Soviet mathematicians and engineers, as well as sales offices. Both companies closed their operations in Russia after the Putin-led invasion of Ukraine. For background, see Clinton (1995) and Hull (2014).

a fleet of 9,700 planes in 1991. Soviet OEMs exported to communist China, third-world countries, Vietnam, and North Korea, and added to the fleet of state-owned Air India. Soviet passenger planes manufactured in Russia and Ukraine never met the technical standards found in the West, including engines, advanced avionics, and the parts and components that make up the final product in the product line of firms like Boeing. Boeing was the pioneer in this new jet age environment.

Today, Boeing has a 100-year legacy in aircraft design and technological innovation,[4] and is the largest American manufacturer of commercial jetliners, with sales to 150 countries. Boeing's design and production of the B-17 (Flying Fortress) and the B-29 (Superfortress)[5] vastly enhanced the firm's critical mass of skills and internal competences in military and commercial aircraft. Two jet-powered aircraft, the B-47 Stratojet and the B-52 Stratofortress, set the stage for a new age of aircraft design. However, after 1945, in the vastly expanding commercial market, Douglas Aircraft Company and Lockheed were the leaders, while Boeing struggled to align its corporate strategy, starting with the idea of redeploying military design for commercial aircraft. For example, its redesigned model, the 377 Stratocruiser, was a market failure, despite export sales to BOAC. Only fifty-six planes were sold. By 1950, Boeing began a series of design tests for a suite of jet planes suitable for the US military and civilian markets (Figure 2).

Cleverly, Boeing wanted to break from its past traditions by assigning the 300 series numbers to its propellor-driven models, so it chose the 700 series numbers for its jets (Boeing's missile division had already adopted the 400–500 and 600 numbers). Five years later, Boeing launched the jet revolution in the airline sector with its 707, adding to its reputation as a design innovator, which dated from its sketches of a swept-wing jet airline in 1949. Jet airliners like Britain's de Havilland Comet and work in Russia gave impetus to a new plane for long-distance flights at high altitudes, with lessons learned from military aircraft like the B-29 Superfortress and the B-47 Stratojet. By 1954, Boeing's new prototype, called the 367-80 (or Dash 80), powered by Pratt &

[4] For background on the history and evolution of Boeing from its founding, the period before and after World War II, and the rivalry within the US OEM sector, see Mansfield (1956), Sell (2001) and Serling (1992).

[5] For background on the aviation manufacturing sector and the history of Boeing and its founder, William Boeing, see Mansfield (1956), Stekler 1965), Pattillo (2001), and Useem (2019). In an article in *Fortune*, Useem (2000) offered a prescient view of Boeing: "Boeing has always been less a business than an association of engineers devoted to building amazing flying machines. Sheer technical bravado – and at times an almost willful disregard for financial realties – have defined a company that designed the B-52 in a single weekend, wagered three-fifths of its assets on the 707, and launched the 747 when many observers (including *Fortune*) declared it potentially suicidal."

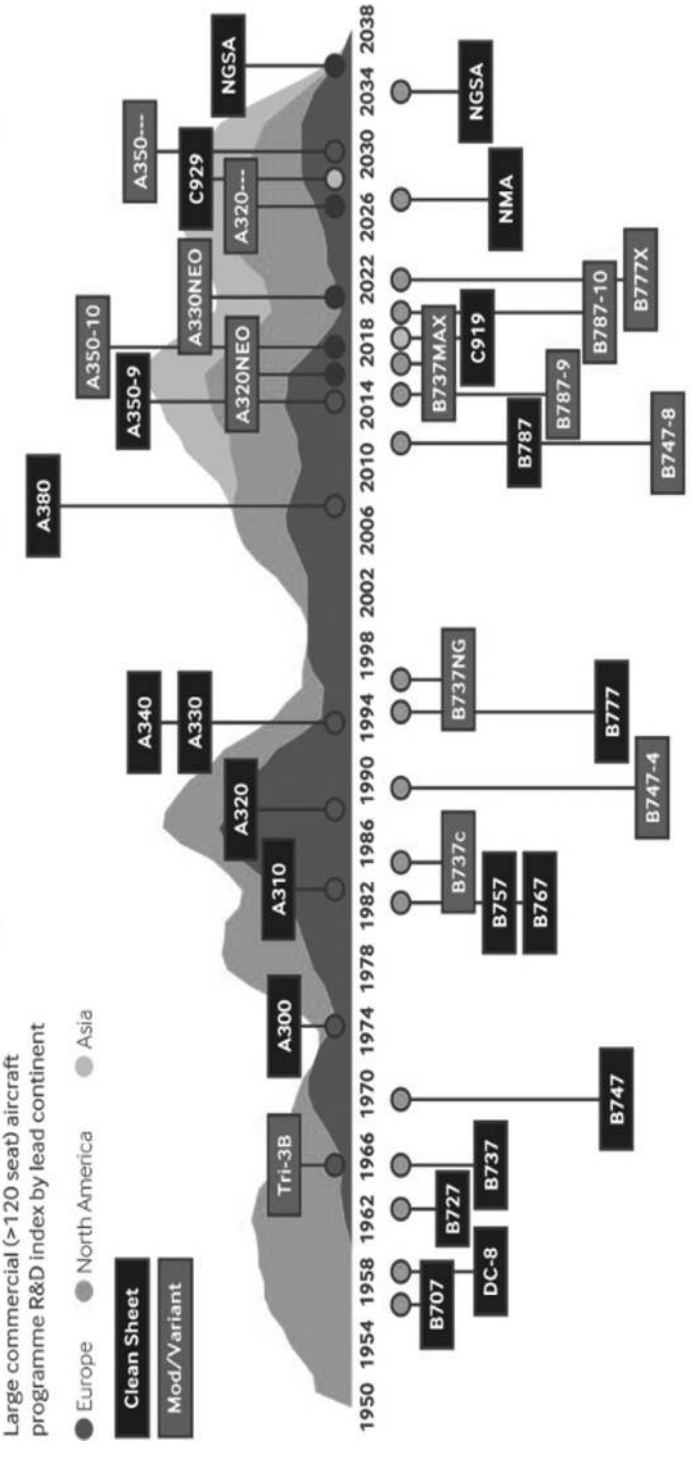

Figure 2 Post-war development of large scale civilian aircraft programs 1950 and future developments.

Source: Adapted From Aerospace Technological Institute Report, 2018.

Whitney turbojets, became the B-52 Stratofortress. Pan-Am was the first customer, buying twenty in the first order, even though Pan-Am also ordered twenty-five aircraft from another new rival, Douglas Aircraft, whose DC-8 was slightly larger and wider than the Boeing 707 (Lombardi, 2008). Over two decades starting in 1958, Boeing produced 1,010 models of the 707 for commercial use and 800 for the military, far exceeding Douglas's sales of 556 DC-8s.

However, the 707 program was never that profitable, despite giving Boeing a technological edge and a clear dominance in long-distance and international flights. In fact, Boeing had a 75 percent market share of all civil jet airliners. Jet aircraft also changed the economies of the airline sector, with the complementary alignment of plane design, advanced manufacturing, and short haul and long-distance flights (including pilots, crews, and navigation tools). Further, aircraft manufacturers, airlines, and airports had government support from the beginning, involving a mix of policy tools like direct ownership, tax policies, and R&D support, subsidies, procurement policies, and other forms of support, such as airport runways, and navigation tools, including weather reports. Aerospace programs today are global, innovative, and immensely complex (Steckler, 1965; Vander Meulen, 1991).

The American government undertook the initial development costs because the US military needed a higher-altitude plane with fuel tankers for its fighter jets. The 707's development costs illustrated the well-known economics of large aircraft production, known as the experience curve of batch production, colloquially known as the 80–20 rule. In practical terms, when a firm received a contract, say for 100 planes, and then another order for 100 planes, the second order would show a decline in costs by 20 percent, and the same for the next contract, another 20 percent, so costs would decline from 100 to 80 percent and so on, but then stop per-unit declining because of high overhead costs. This experience curve effect comes from a cumulative order book and includes learning tools, so this approach to production planning, sometimes called progress cost curves, experience curves, or learning curves, actually dates to American aircraft production during World War II. In the postwar environment, Japanese firms applied this concept with brutal effect against their overseas rivals on products ranging from integrated circuits, color televisions, motorcycles, and auto components, but were hampered in commercial aircraft production by the geopolitics of US–Japan relationships (McMillan, 1985; McGuire, 2007; MacPherson and Pritchard, 2007).

The expansion of the global tourist sector, transforming from a domestic leisure market to a global travel sector, provided opportunities for air travel and the demand for commercial aircraft (Rae, 1968). However, until the late 1960s,