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Boeing's 737 MAX: Company Culture and Product Failure

Lion Air Flight 610 departed Jakarta, Indonesia, at 6:20 a.m. on Monday, October 29, 2018, headed for Pangkal Pinang on the Bangka Belitung Islands. The flight carried 181 passengers and eight crew members. Just 13 minutes after takeoff, the Boeing 737 MAX jet crashed into the Java Sea. No one survived. One month later, Indonesia's National Transportation Safety Committee released its preliminary investigative report. The inquiry identified a key problem: a faulty reading from one of the plane's two angle-of-attack sensors. The reading indicated that the plane had been ascending at an unsafe angle. The sensor triggered the jet's stall-prevention system, known as MCAS (Maneuvering Characteristics Augmentation System). The software should not have been activated, since the sensor reading proved inaccurate. Experts questioned why the MCAS had become engaged based on the reading of one sensor, particularly since angle-of-attack sensors had malfunctioned 50 times over the past five years on flights in the United States.[1] Shouldn't the MCAS have drawn upon and reconciled disparate data from the two angle-of-attack sensors? Later, former Boeing engineer Peter Lemme commented, "From the beginning it should have been a fail-safe design, which would have relied on two inputs to make sure that you weren't sensitive to one failure."[2] But on that Monday morning, the MCAS kicked into gear, repeatedly pushing the plane's nose down. Captain Bhavye Suneja and his co-pilot struggled to pull the plane back up. The software was too strong. Lion Air Flight 610 plunged into the water at more than 500 miles per hour.[3]

In the United States, where Boeing is headquartered, the Federal Aviation Administration (FAA) assessed the situation. The FAA agreed to allow the 737 MAX to continue flying despite concerns about the MCAS. The agency required Boeing to put in place two measures to enhance safety. First, the company needed to test and implement revised MCAS software within seven months. Second, Boeing would inform pilots about how to handle a situation akin to the one that unfolded on Lion Air Flight 610. The FAA informed Boeing that, "Risk is sufficiently low to allow continued growth of the fleet and operations until the changes to the system are retrofitted."[4] When Boeing issued the safety bulletin to the airlines, some pilots expressed dismay. Captain Dennis Tajer, union spokesperson for American Airlines pilots, remarked, "Before the crash we were not provided any information on the MCAS or even its existence."[5]

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Less than five months later, on March 10, 2019, Ethiopian Airlines Flight 302 departed at 8:38 a.m. from Addis Ababa, Ethiopia. The plane never reached its destination in Kenya. Six minutes after takeoff, the Boeing 737 MAX plunged into the ground at a speed of 575 miles per hour. The jet disintegrated upon impact, and 149 passengers and eight crew members perished. Four days later, the FAA grounded the entire fleet of 737 MAX jets after discovering that a sensor malfunction had once again triggered the MCAS to push the nose of the plane down repeatedly. Boeing executives acknowledged the need to address the sensor malfunction and MCAS issues. Still, CEO Dennis Muilenburg stood behind the design, placing some of the blame on the pilots. At the April shareholder meeting, he explained:

> "Again, if you take a look at the end-to-end system procedure that's assigned with this — so, in the case of an MCAS failure scenario, there's something called a runaway stabilizer procedure, which is a memory item in the cockpit. If that kind of scenario occurs and you go through the checklist...it calls out actions that would be taken around power management and pitch management of the airplane. It also refers to the cutout switches, that after an activation that was not pilot-induced, that you would hit the cutout switches. And, in some cases, those procedures were not completely followed."[6]

The Boeing board of directors faced a multi-part dilemma. Was Muilenburg still the right person to lead the company, or to what degree, if any, was he responsible for the position Boeing found itself in? Had something gone awry with the company's culture after decades of engineering excellence? How did it come to happen that pilots suddenly experienced fatal difficulties flying the latest model of one of the world's most-used passenger jets? And, once ascertaining the answers, how could Boeing ensure such a situation would not happen again?

Company History

William Boeing experienced his first plane ride in 1914 and soon became enamored with the possibilities of air travel. He built a hangar in Seattle and, a year later, he founded the Pacific Aero Products Company, later to be renamed Boeing. In its first few decades of existence, the firm focused on the design and production of planes for the United States military, as well as for postal delivery. Meanwhile, Douglas Aircraft established a dominant position in commercial air travel. By 1939, that company's DC-2 and DC-3 aircraft carried 90% of commercial passengers in the country.

Boeing became a major force in the commercial airplane market with the delivery of its first passenger jet in the late 1950s. The Boeing 707 featured four engines and carried more than 150 passengers. The jet flew approximately 20 miles per hour faster than its main rival, the DC-8, and soon surpassed that Douglas aircraft in sales. Air travel expanded dramatically during this era. The 727 debuted in 1962, focusing on travel to and from smaller airports. Boeing executives viewed the jet's development as a risky investment given multiple competitors and the conflicting needs and desires of airline customers. The company projected a break-even point of 200 units, yet the 727 became the first commercial jet to surpass sales of 1,000 units.[7]

During the 1960s, Boeing became worried about the DC-9's emergence in the market. Jack Steiner, the father of the 727, decided to design a new jet to compete with Douglas. According to industry expert Clive Irving, "To minimize the new work necessary for the 737, Steiner had taken the 727 fuselage and greatly shortened it; he was notorious for transferring parts from one airplane to the next."[8] In truncating the 727, Steiner created a "square" plane whose wingspan equaled the length of the fuselage. He worked in a hurry to both design the jet and persuade top management to fund its development. He planned to use roughly 60% of the components found in the 727.[9]

Irving explained, "Unlike the DC-9, which had its twin engines at the tail, the 737 had its engines slung very closely under each wing."[10] According to Boeing, "This engine placement buffered some of the noise, decreased vibration and made it easier to maintain the airplane at ground level."[11] The plane's technology enabled a reduction in the flight crew; a pilot and co-pilot could fly the 737 without the assistance of a flight engineer. The placement of the engines under the wing offered significant advantages over the DC-9. As Douglas tried to launch new larger versions of the DC-9, it had to stretch the nose of the plane to offset the weight of the engines located at the tail. Elongating the plane in that way required adding baggage storage in front of the wings, leading to significant balancing challenges.

However, Steiner had a difficult time persuading Boeing CEO William Allen to move forward with the 737's development. So, he embarked on a risky strategy to garner support. He communicated secretly with members of the board of directors prior to a key meeting. The earlier success of the 727 bolstered Steiner's credibility and elicited confidence from board members. The directors overruled Allen and chose to invest in the 737's development. When Allen discovered what Steiner had done, he confronted the chief engineer. "Jack, *never* do that again," Allen exclaimed.[12] However, the program became a runaway success. Over time, Boeing launched newer generations of the 737 and two decades after its debut, it ranked as the best-selling jet in commercial aviation history.

Boeing launched the 747 jumbo jet in 1969, a bold move that transformed intercontinental air travel. The firm invested more than a billion dollars in the program. About 50,000 employees, who came to be known as "The Incredibles," worked on the design and production of the world's largest aircraft. Boeing described some of the unique attributes of the plane:

> "The 747 was truly monumental in size. The massive airplane required construction of the 200 million-cubic-foot (5.6 million-cubic-meter) 747 assembly plant in Everett, Washington, the world's largest building (by volume). The fuselage of the original 747 was 225 feet (68.5 meters) long; the tail as tall as a six-story building. Pressurized, it carried a ton of air. The cargo hold had room for 3,400 pieces of baggage and could be unloaded in seven minutes. The total wing area was larger than a basketball court. Yet, the entire global navigation system weighed less than a modern laptop computer."[13]

The 747 jumbo jet became the most profitable plane in the commercial aviation industry by the early 1990s. Aerospace analyst Nick Cunningham noted, "In the 1990s, the B747-400 sold at $160 million. One-third of that was profit, and the production rate at one point was up to six a month."[14] The 747 became a powerful cash cow for Boeing, enabling the company to fund the development of other jets such as the wide-body, long-range 777 and the fuel-efficient 787 Dreamliner. The 747's strong profitability proved important because it could take years for Boeing to break even on a new plane. Steven Udvar-Házy, former CEO of one of the largest aircraft leasing companies in the world, estimated that Boeing needed to sell 1,500 787 Dreamliner jets to break even on that program.[15] Boeing itself estimated that it would take 10 years to achieve this target.[16] Boeing finally ended production of the 747 in 2016, as airlines shifted to modern planes, such as the 777 and 787, that used much less fuel and could more readily be operated at capacity. Filling all available seats, after all, turned out to be essential to airline profitability.

Airbus Industrie emerged as the chief rival to Boeing in the final decades of the twentieth century. The European consortium invested heavily to build a global rival to the American aerospace giants, Boeing and McDonnell Douglas. European governments substantially subsidized Airbus research and development efforts and the company achieved a major breakthrough with the debut of the A320 in 1987. The A320 family of aircraft took aim directly, and successfully, at the popular Boeing 737 program and McDonnell Douglas' MD80 jets.

In 1997, Boeing acquired McDonnell Douglas for $13.3 billion in stock. By that time, McDonnell Douglas' commercial aviation business had fallen on hard times. Its market share had shrunk considerably during the 1980s and 1990s, reaching a low point of approximately 5% by the time of the acquisition. The deal also solidified Boeing's position as one of the largest military contractors. According to the *Wall Street Journal*, the acquisition represented the "the climax of Boeing's longstanding efforts to bolster its defense business in order to counterbalance the boom-and-bust cycles of its commercial-jet lines."[17]

By 2003, Airbus had become #1 in the industry in new plane deliveries. Boeing took back the top spot as the Dreamliner program gained traction in 2012. Airbus canceled its A380 jumbo jet in early 2019, after the massive double-decker plane never achieved the ambitious sales goals that Airbus management had projected.[18] However, Airbus regained the top spot in terms of annual jet production in 2019, after the second 737 MAX crash, in large part due to a surge in A320 orders.[19]

During the early part of the 21st century, Brazilian-based Embraer and Canadian jet manufacturer Bombardier became significant players in the smaller regional jet market. Embraer achieved more success, generating stronger profit margins than the Canadian producer. Consolidation eventually took place. Airbus acquired a controlling stake in Bombardier. Boeing did the same with Embraer, though that deal collapsed in April 2020 amidst the COVID-19 pandemic.[20,21]

By 2018, Boeing generated more than $100 billion in revenue, with approximately 60% of sales derived from commercial aircraft.[22] In addition to generating strong profits, Boeing had achieved a stellar record for safety over the years. In the United States, only one passenger had died on a domestic flight from 2010 to 2019 (debris from an engine failure punctured a window and killed a Southwest Airlines passenger in 2018).[23]

Boeing's stock outperformed the S&P 500 Index by a wide margin from the start of the decade until the end of 2018. Naturally, financial results suffered greatly after the two 737 MAX crashes. Total revenue plummeted nearly 25% in 2019. Boeing stock underperformed the S&P 500 Index by a wide margin after the shutdown of the 737 MAX program (see **Exhibits 1** and **2** for financial data). In December 2019, Boeing's board of directors fired CEO Muilenburg. They replaced him with lead independent director David Calhoun, who had spent most of his career as an executive at General Electric, once leading its jet engine business.[24]

An Inflection Point

Throughout most of Boeing's history, engineering and the quest for discovery and invention dominated the organization. Engineers worked tirelessly to develop safer, faster, more fuel efficient, and more comfortable aircraft. Since the airline industry was heavily regulated for decades, Boeing did not have to worry much about costs. The airlines could pass incremental costs on to their customers quite readily. Top executives tended to come from engineering backgrounds. They spoke a common language given their technical training and experience. Everyone aimed to achieve new technological breakthroughs that would revolutionize air travel for millions of passengers. On the military side, patriotism motivated employees to design and build products that would help the country develop a strong national defense.

Many Boeing engineers and industry analysts considered the McDonnell Douglas acquisition a key inflection point in the company's history. Journalist Natasha Frost wrote, "In a clash of corporate cultures, where Boeing's engineers and McDonnell Douglas' bean-counters went head-to-head, the smaller company won out."[25] Others described it as a "reverse takeover" in which McDonnell Douglas seemed to emerge on top.[26] In fact, McDonnell Douglas Chairman John McDonnell and CEO Harry Stonecipher became the two

largest shareholders of the company. While Boeing's CEO, Phil Condit, led the firm after the deal, McDonnell Douglas executives secured many other key leadership positions. Stonecipher became chief operating officer and accumulated a great deal of power. Ron Woodward, ousted as head of Boeing's commercial airplane group soon after the deal, expressed exasperation: "We thought that we'd kill McDonnell Douglas, and we had it on the ropes. I still believe that Harry outsmarted Phil, and his gang bought Boeing with Boeing's money. We were all just disgusted."[27]

Stonecipher began to shift the culture of the company almost immediately. For years, engineers enjoyed the family atmosphere and esprit de corps at Boeing. Stonecipher told them to "quit behaving like a family and become more like a team. If you don't perform, you don't stay on the team."[28] Shareholder value became a much higher priority. He unveiled "passion for affordability" as a new company slogan. Stonecipher explained his thinking: "When people say I changed the culture at Boeing, that was the intent, so it's run like a business rather than a great engineering firm. It is a great engineering firm, but people invest in a company because they want to make money."[29]

Boeing shifted its corporate headquarters from Seattle to Chicago in 2001. Senior executives now worked more than a thousand miles away from the engineers designing the planes. In the past, engineers interacted frequently with senior leaders, often seeing them outside work and bringing up ideas, concerns, and suggestions during these informal interactions. Now, engineers became much more disconnected from top managers. For other reasons too, engineers began to feel disempowered.

Several years after the deal, Boeing's CFO (a former McDonnell Douglas executive) went to prison for flouting government procurement statutes. As a result of the scandal, Condit stepped down as CEO and Stonecipher replaced him, leading one former Boeing executive to note, "There was a little surprise that a guy running a failing company ended up with so much power."[30] Stonecipher championed cost-cutting initiatives, as well as shareholder buybacks, a strategy he had employed repeatedly at McDonnell Douglas. Boeing had rarely engaged in share repurchases prior to the deal. Former engineer Mark Rabin noted, "It was pretty intense low morale because of all the layoffs - constant, grinding layoffs, year after year. So, you really watched your step and were careful about what you said."[31]

In March 2005, Boeing's directors fired Stonecipher after learning of his consensual sexual relationship with a female employee, a violation of company human resources policy. Board Chairman Lew Platt explained, "The board concluded that the facts reflected poorly on Harry's judgment and would impair his ability to lead the company."[32]

James McNerney, former GE executive and CEO of 3M, replaced Stonecipher as CEO. McNerney, an American studies graduate of Yale University with an MBA from Harvard, brought a great deal of management expertise to the company, but lacked training as an engineer. McNerney had implemented numerous GE systems and practices at 3M after becoming CEO. Several processes generated controversy. For instance, some scientists and engineers at 3M questioned whether the Six Sigma process improvement methodology could be applied to research and development work. When McNerney left 3M, his successor George Buckley stopped the use of Six Sigma in key areas of the research organization. Buckley explained: "Invention is by its very nature a disorderly process...You can't put a Six Sigma process into that area and say, well, I'm getting behind on invention, so I'm going to schedule myself for three good ideas on Wednesday and two on Friday. That's not how creativity works."[33]

Aerospace analyst Richard Aboulafia commented on McNerney's appointment at Boeing: "You had this weird combination of a distant building with a few hundred people in it and a non-engineer with no

technical skills whatsoever at the helm."[34] People could not help but contrast McNerney's non-technical background with his mentor Jack Welch's training. Welch, the highly acclaimed former GE CEO, had earned a doctorate in chemical engineering, enabling him to converse effectively with engineers throughout his organization. After noting that McNerney also appointed a non-engineer to run the commercial-jet business at Boeing, Aboulafia offered a scathing critique of the cultural shift at the firm:

> "It was the ability to comfortably interact with an engineer who in turn feels comfortable telling you their reservations, versus calling a manager 1,500 miles away who you know has a reputation for wanting to take your pension away. It's a very different dynamic. As a recipe for disempowering engineers in particular, you couldn't come up with a better format."[35]

The Birth of the 737 MAX

On December 1, 2010, Airbus unveiled the A320neo (new engine option), the latest generation of its popular single-aisle, twin-engine passenger jet. The A320 promised to burn six percent less fuel than the latest Boeing 737 model. A six percent improvement in fuel efficiency promised to be a gamechanger for many customers. For instance, in 2018, Southwest Airlines estimated that every 1% reduction in fuel usage translated into $46 million in annual savings. The move stunned Boeing's senior management, as the A320neo's development had taken place in complete secrecy.[36]

Prior to the unveiling of the A320neo, Boeing executives had debated investing in the development, from scratch, of an entirely new model. Ultimately, they had decided to hold off on that type of expensive research and design effort. After Airbus made its move, Boeing scrambled to respond under McNerney's leadership. A meeting with American Airlines in 2011 alarmed executives; they feared that the loyal buyer of 737 jets might switch to Airbus.[37]

Boeing decided to design a new generation of the 737, rather than developing an entirely new plane. In August 2011, the firm announced that five airlines had committed to order nearly five hundred 737 MAX aircraft. Eventually, Boeing promised that the 737 MAX would be 8% more fuel efficient than the Airbus A320neo. However, engineers faced several major challenges.

First, the newer, more fuel-efficient GE engines did not fit easily under the wing of the 737. The larger diameter of these engines proved problematic, since the 737's wings sat lower to the ground than those of the A320. Consequently, engineers needed to mount the engines farther forward and higher on the wing to achieve necessary ground clearance. That shift in engine location affected the aerodynamics of the plane, causing it to handle differently when climbing at a steep angle.[38]

Second, Boeing faced limits on the types of changes that it could make in the newest generation of its best-selling passenger jet. Boeing wanted the new jet to share the same "type certificate" as earlier 737 models going back to the mid-1960s. By doing so, Boeing could save its customers a great deal of time and money. In fact, they could minimize the new training required to fly the plane and avoid required time in the simulator. Investigative journalists Elizabeth Lopatto and Sean O'Kane explained:

> "By law, a pilot can only fly one type of airplane at a time. However, the FAA allows different models of airplanes with similar design characteristics to share a common 'type certificate.' So, for instance, the 737's three previous generations all have a common type certificate. When you get qualified on one model, you can fly all of them. This allows airlines with common-type fleets to more easily substitute pilots and airplanes, making their operations more flexible."[39]

The Creation of MCAS

Boeing engineers decided to create the MCAS stall-prevention system to address problems that might arise during a steep climb, as a result of the altered engine placement on the 737 MAX. If the software detected the risk of a stall, then the flight control system automatically shifted the plane's nose downward.[40] For simplicity, Boeing engineers designed the MCAS to engage, when necessary, based on the reading of a single angle-of-attack sensor, rather than requiring consistent data from multiple sensors. Consequently, a malfunctioning sensor could trigger the MCAS inappropriately. Boeing engineers assumed that pilots were capable of safely and smoothly counteracting the inadvertent activation of the stall-prevention system; therefore, they didn't worry much about the reliance upon a single sensor reading.[41]

Throughout the design process, Boeing managers emphasized the need to limit the extent to which the 737 MAX differed from previous models. They did not want pilots to have to engage in very expensive additional training. Engineers recalled that Boeing committed to provide a $1 million subsidy per plane to the airlines if design modifications required pilots to spend time in simulators.[42] For this reason, Boeing did not mention the MCAS in the pilot manual. The company assumed that pilots would respond to an improper activation of the MCAS appropriately in all cases, because the corrective action was identical to a runaway stabilizer situation (also referred to as a runaway trim scenario). Pilots had extensive training and experience handling that issue.[43]

In March 2017, the 737's chief technical pilot, Mark Forkner, wrote an email to a colleague in which he stressed the need to avoid an FAA requirement for costly simulator training. He wrote, "I want to stress the importance of holding firm that there will not be any type of simulator training required to transition from NG to MAX. Boeing will not allow that to happen. We'll go face to face with any regulator who tries to make that a requirement."[44] Boeing succeeded in persuading the FAA that the MAX changes were not revolutionary in nature. Therefore, pilots could conduct much less costly training on an iPad and be prepared to fly the 737 MAX.

After the two fatal crashes, however, internal Boeing messages indicated that Forkner had understood the challenges of coping with MCAS activation. As compared to the initial design, engineers had increased the power of the MCAS to prevent stalls during ascent. That modification enhanced the challenge for pilots in the case of an MCAS misfire. In 2016, Forkner wrote, "It's running rampant in the sim on me…Granted, I suck at flying, but even this was egregious."[45] Still, Forkner later lobbied the FAA to not require simulator training for pilots.

As early as 2014, Forkner engaged in an exchange with an employee concerned about the lack of more extensive training for pilots. Forkner remarked, "We need to sell this as a very intuitive basic pilot skill." The employee replied, "I fear that skill is not very intuitive any more with the younger pilots and those that have become too reliant on automation." Forkner acknowledged the employee's concerns, but did not back down: "Probably true, but it's the box we're painted into. A bad excuse, but what I'm being pressured into complying with."[46]

The Rescue Before the Crash

On the day before the fatal crash of Lion Air Flight 610, pilots flying the same plane had a close brush with disaster. On that day, an off-duty pilot joined the two-man crew in the cockpit. A faulty sensor caused an inappropriate and unnecessary activation of the MCAS. The system repeatedly pushed the nose of the plane downward. The pilots experienced several minutes of confusion and uncertainty, desperately trying to interpret the data they were receiving and to determine the appropriate corrective action. Investigative journalist William Langewiesche, a former pilot himself, explained that, "Inside the cockpit, none of the pilots…had ever heard of the MCAS. To them, the event looked like a runaway trim, much as Boeing had expected."[47] However, he noted that the MCAS behavior differed in several important ways from the runaway trim scenario to which pilots were accustomed.

Thankfully, the off-duty pilot came to the rescue before the pilots lost complete control of the plane. Langewiesche wrote, "Finally, the ghost in the jump seat intervened. It is impossible to know if he was a better airman than the pilots in the front or simply had the advantage of an overview. Either way, he recommended the obvious – shutting off the electric trim by flipping the cutout switches. The captain flipped the switches, the trim stopped running away and the MCAS was disabled. It was that easy."[48]

Unfortunately, the Lion Air Flight 610 pilots did not learn about the rescue scenario that occurred the previous day. They did not have the opportunity to hear about the MCAS activation, the struggles to control the plane, and the corrective action taken by the off-duty pilot in the cockpit. Therefore, they approached Flight 610 in a business-as-usual fashion.[49]

After the Ethiopian Airlines crash, journalist James Fallows conducted an extensive search of the Aviation Safety Reporting System (ASRS). This voluntary and confidential program, operated by the National Aeronautics and Space Administration (NASA) for decades, enabled pilots and other airline staff to report safety problems that arose during flights, but which did not lead to an accident. NASA managed this non-punitive system, rather than the FAA, to make pilots more comfortable coming forward about safety incidents. NASA then analyzed the data collected and disseminated important conclusions to the manufacturers and airlines. Fallows discovered at least six ASRS reports pertaining to possible runaway trim problems or related issues on the 737 MAX. Pilots filed two of these reports prior to the Lion Air crash, and four reports between the time of that accident and the Ethiopian Airlines crash.[50]

Finding Fault

After the two fatal crashes, most analysts placed blame on Boeing and its design, rather than the pilots. However, Langewiesche also questioned the decisions made in the cockpit. He pointed out that many pilots relied extensively on automated systems, and they simply did not have the ability to intervene effectively when technology failed. He placed plenty of blame on Boeing, but he also found inadequate training and poor safety protocols within Lion Air and other firms in the industry. He explained:

> "In 2007, the European Union and the United States permanently banned all Indonesian airlines from their national territories. This was done for reasons of safety…The ban put Boeing and Airbus into a delicate position. They would now be selling airplanes to officially declared unsafe airlines that the American and European authorities expected would keep killing and injuring their passengers at a rate that would be unacceptable in the West."[51]

Not everyone agreed completely with Langewiesche's assessment. One veteran U.S. pilot commented, "An airplane shouldn't put itself in a position where the pilots have to act heroically to save the plane. Pilots shouldn't have to be superhuman. Planes are built to be flown by normal people."[52] Some people went so far as to say that Boeing's 737 MAX design exhibited a "reliance on pilots to be flawless cogs."[53] Langewiesche acknowledged that, for much of Boeing's history, its designs "relied on pilots' airmanship as the last line of defense."[54] Meanwhile, Airbus had created automated systems and digital flight controls that reduced reliance on pilot reaction capabilities when problems occurred.

Chesley Sullenberger, the pilot who executed a seemingly miraculous crash landing on New York's Hudson River in 2009, told investigators that he tried out the 737 MAX in the simulator after the two fatal crashes. He found the MCAS misfire scenario to be quite challenging. He remarked, "Even knowing what was going to happen, I could see how crews could have run out of time before they could have solved the problems." He described the MCAS as "fatally flawed" and said he did not think the FAA should have approved it.[55]

A Whistleblower's Complaint

Seven weeks after the Ethiopian Airlines crash, Boeing flight-deck engineer Curtis Ewbank filed an internal ethics complaint. He claimed to have proposed design upgrades in 2014, but that managers turned aside ideas due to "cost and potential training impact." Ewbank said that many engineers feared expressing concerns to management. He wrote, "Given the nature of this complaint, the fear of retaliation is high, despite all official assurances that this should not be the case. There is a suppressive cultural attitude towards criticism of corporate policy—especially if that criticism comes as a result of fatal accidents."[56]

Months later, a series of troubling internal messages from years before the crashes became public. The communications revealed that some employees had reservations about the safety of the 737 MAX. One employee wrote, "Would you put your family on a MAX simulator trained aircraft? I wouldn't."[57] Other messages expressed a lack of respect for FAA regulators. Reflecting on these messages, Sullenberger noted, "We've all seen this movie before, in places like Enron. It's not surprising that before a crisis, there are indications of real deep problems that have their roots in leadership."[58]

Change in Leadership

Industry and leadership experts criticized Muilenburg's response to the crisis. In April 2019, soon after the Ethiopian Airlines crash, industry reporter and analyst Jeremy Bogaisky wrote, "Many observers are giving Boeing and Muilenburg poor marks for their public handling of the crisis. Until late last week, Muilenburg was largely invisible and the company's public statements, while expressing sympathy for family and friends of the deceased, were short on substance."[59] He cited leadership experts who argued that Muilenburg needed to "put a human face on Boeing…and get out in public and engage with the media to try to correct misperceptions and address the many questions about what went wrong, even if he doesn't have ready answers to offer."[60]

On the first anniversary of the Lion Air crash, Muilenburg testified before the U.S. Senate Commerce Committee. He acknowledged, "In the months since the accidents, there has been much criticism of Boeing and its culture. We understand and deserve this scrutiny." He added: "We made mistakes and we got some things wrong."[61] Senators offered a blistering critique of his leadership and the firm's culture, while wishing that he had been more forthright about the company's mistakes after the first crash. He responded, "If we knew then what we know now, we would have grounded right after the first accident."[62] Many legislators

expressed dismay that the CEO had known about a series of troubling internal emails questioning the jet's safety before the second crash, yet the company did not ground the 737 MAX then. Moreover, Boeing did not disclose the messages to investigators until months after the Ethiopian Airlines accident. Nadia Milleron, the mother of one victim of the Ethiopian Airlines crash, challenged Muilenburg as he left the hearing, "Mr. Muilenburg, when you say you're sorry will you turn and look at us?" He stopped to acknowledge her and said, "I'm sorry."

Criticism focused too on the "shareholder-first" culture at Boeing. Scott Hamilton, head of aerospace consulting firm Leeham Company, noted that Boeing's share repurchases averaged $6.2 billion per year from 2013 to 2019. During that same period, the firm invested $2.47 billion per year in research and development related to passenger jets. He and others noted that the company had been reluctant to invest in developing a completely new passenger jet, presumably because it was an expensive proposition, yet the firm had plowed billions into stock buybacks.[63]

The board of directors stood behind Muilenburg for more than a year after the Lion Air crash, despite much public criticism. However, the directors' patience wore thin as the company repeatedly pushed back the timetable for the 737 MAX's return to service. In October 2019, the board decided to remove Muilenburg as chairman while allowing him to remain as CEO. Lead independent director Calhoun became chairman of the board. In November, Calhoun told CNBC, "From the vantage point of our board, Dennis has done everything right from the beginning."[64]

In mid-December, though, the company announced a halt to production of the 737 MAX, since the company had accumulated roughly 400 completed jets in inventory while still not receiving FAA approval to fly them. Given the delays in achieving recertification and the scarcity of orders from airlines due to safety concerns, Boeing had no choice but to shut down MAX manufacturing operations.[65] The stock dropped upon release of the news. The firm's market capitalization had fallen by more than $100 billion since the crisis began.[66] One week later, the board fired Muilenburg and announced that Calhoun would become the CEO. However, Sen. Richard Blumenthal of Connecticut, a member of the Commerce Committee, wondered if the move would right the ship. He commented, "It's more than just one person. It's the management and the culture."[67]

Facing that kind of criticism, Boeing's directors were aware that the company needed to do more than simply fix the 737 MAX. What were the causes, and thus the remedies, for the managerial and cultural deficiencies at the heart of the company's difficulties? What factors increase or decrease the chance of a catastrophic failure? In sum, how do we save the company—and travelers' lives?

Exhibits

Exhibit 1

Selected Financial Data for Boeing

FY2017-FY2019

(in millions)

	FY 17	FY 18	FY 19
Total revenues	$94,005	$101,127	$76.559
Cost of products & Services	$(76,612)	$(81,490)	$(72,093)
Gross profit	$17393	$19,637	$4466
Net income	$8458	$100,460	$(636)
Total assets	$112,362	$117,359	$133,625
Total liabilities	$110,649	$116,949	$141,925
Total equity	$1,713	$410	$ (8,300)

Source: Boeing 2019 10K Report.

Exhibits (cont.)

Exhibit 2

Boeing Stock Performance 11/1/2018 – 1/31/2020

Source: Created by the case writer using www.bigcharts.com.

Endnotes

1 Lopatto, Elizabeth, and Sean O'Kane. "Boeing employees' frightening internal messages released in 737 Max investigation." *The Verge*, 9 Jan. 2020. https://www.theverge.com/2020/1/9/21059420/boeing-employees-messages-737-max-investigation-simulator-crash. Accessed 23 Mar. 2020.

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