

## BOEING: THE 737 MAX CRISIS<sup>1</sup>

*Cindi Ding and Professor Deishin Lee wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.*

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March 10, 2019, saw the second crash of a Boeing 737 MAX in five months. The first had occurred in Indonesia, killing all on board, and the March crash in Ethiopia had again killed all on board.<sup>2</sup> Two such similar crashes so close together left the public questioning the safety of the aircraft.<sup>3</sup> Boeing Company's (Boeing's) stock price declined 11 per cent in the two trading days following the second crash.<sup>4</sup> By March 13, 2019, the 737 MAX had been grounded across the globe.<sup>5</sup>

Twenty-six days after the second crash, Boeing's chief executive officer (CEO), Dennis Muilenburg, apologized in a video. The delay sparked public backlash regarding the company's slow and insufficient response.<sup>6</sup> Moreover, Muilenburg alleged that pilots had not completely followed the manufacturer's emergency procedures. This claim was at odds with what crash investigators had stated about flight software malfunctions, thereby further deepening the public's confusion and distrust.<sup>7</sup>

Muilenburg stated in his apology that Boeing was

... working tirelessly in collaboration with the Federal Aviation Administration and our customers to finalize and implement a software update that will ensure accidents like that of Lion Air Flight 610 and Ethiopian Airlines Flight 302 never happen again. ... We're nearing completion and anticipate its certification and implementation on the 737 MAX fleet worldwide in the weeks ahead.<sup>8</sup>

However, the aircraft was still grounded in April 2020, as Boeing continued to work with regulators on revising its flight software and pilot retraining program.<sup>9</sup> On December 23, Boeing announced that its board of directors was replacing Muilenburg with board chairman David Calhoun, stating that "[a] change in leadership was necessary to restore confidence in the company moving forward as it works to repair relationships with regulators, customers, and all other stakeholders."<sup>10</sup>

Lawmakers had made public statements suggesting that Boeing might be experiencing a culture problem, with cost-cutting taking precedence over both safety and the correction of production mistakes.<sup>11</sup> Many within the US Federal Aviation Administration (FAA) had argued that Boeing had regularly failed to address safety issues in the years leading up to the 737 MAX accidents.<sup>12</sup> As the number of inquiries into Boeing's safety practices continued to grow and public distrust continued to deepen,<sup>13</sup> the question remained: What's next for Boeing?

## THE BOEING COMPANY

In 1916, William Boeing founded Pacific Aero Products Company in Seattle after developing a single-engine, two-seat seaplane.<sup>14</sup> Renamed Boeing Airplane Company in 1917, the company had a successful relationship with the US government, building various aircraft for the military.<sup>15</sup> In 1945, with the Second World War over, the US government cancelled many of its military vehicle contracts with Boeing, which led to significant layoffs.<sup>16</sup> Boeing rebounded by converting one of its military cargo planes into a commercial airliner to capitalize on the growing commercial aircraft industry.<sup>17</sup>

In 1958, Boeing designed the 707, a four-engine commercial aircraft capable of transatlantic flights. This aircraft had been credited with revolutionizing air travel by offering shorter flight time and a smoother ride.<sup>18</sup> The 707 evolved into the 737, which was further developed into a family of modern airplanes. By the end of the 20th century, the 737 was the world's best-selling commercial aircraft.<sup>19</sup> The design of the 747 "jumbo jet," capable of carrying up to 400 passengers, nearly forced Boeing into bankruptcy. However, when it went into service in 1970, the 747 allowed airlines to offer long-distance air travel at affordable costs, giving Boeing a monopoly in this market segment.

Boeing was also successful in the space sector. In 1966, Boeing built the National Aeronautics and Space Administration's (NASA's) first spacecraft to orbit the Moon and was selected as lead contractor for the Saturn V rocket, which launched American astronauts to the moon.<sup>20</sup> In 1993, NASA chose Boeing as lead contractor for the International Space Station, in which Boeing was responsible for its system integration and verification.<sup>21</sup> By 2019, commercial airplane sales made up 42 per cent of Boeing's revenue, with defence, space, and security making up 34 per cent<sup>22</sup> (see Exhibit 1). In 1997, increasingly pressured by competitors such as Airbus, Boeing merged with long-time competitor McDonnell Douglas, paying US\$13.3 billion<sup>23</sup> for the company<sup>24</sup> (see Exhibit 2).

## COMPETITION

In 2020, Boeing's largest competitor was Airbus. Airbus was founded in 1970 in collaboration with France, Germany, the United Kingdom, and the Netherlands in an effort to strengthen the European aircraft manufacturing industry to compete with American aircraft manufacturers.<sup>25</sup> At the time, American manufacturers had 80 per cent of the world's commercial aircraft market.<sup>26</sup> To differentiate itself, Airbus ensured that its aircraft featured the highest level of technology. However, the lack of brand name made it difficult to penetrate the US market.<sup>27</sup> In 1978, Airbus gave Eastern Airlines, an American carrier, four aircraft free of charge for a six-month trial period.<sup>28</sup> As a result of the successful trial, Eastern Airlines ordered 23 more. Further global expansion occurred when Airbus launched the single-aisle A320, which became the world's second-best-selling jet after Boeing's 737.<sup>29</sup> In 1970, Boeing commanded more than 80 per cent of the large commercial aircraft market. Since Airbus's introduction of the A300 in 1974, Boeing's market share had steadily declined; in 2002, Airbus's market share surpassed that of Boeing.<sup>30</sup> Since the A320's launch in 1984, Airbus had grown to displace Boeing as the world's largest commercial aircraft manufacturer.<sup>31</sup>

## INDUSTRY REGULATION CHANGES

Until 1978, the Civil Aeronautics Board (CAB) had heavily regulated the US airline industry, aiming to protect the major players in the industry from competition.<sup>32</sup> Thanks to the CAB's regulation of both the rates charged and the routes that particular airlines could fly, cost reduction was not a priority for airlines—costs could simply be passed on to the consumers. In 1978, however, the US government passed the *Airline Deregulation Act*, allowing airlines to set their own prices and routes, resulting in increased competition

from new entrants and lower prices for consumers.<sup>33</sup> Stable profitability was no longer a guarantee, and cost control became key to survival for airlines, which in turn forced aircraft manufacturers to find new ways to reduce their own costs to remain competitive.<sup>34</sup>

The FAA was responsible for ensuring civil aviation safety, encouraging the development of new aviation technology, and operating air traffic control and navigation systems.<sup>35</sup> Air travel safety had a strong historical record. In 2018, 4.3 billion travellers on 46.1 million flights worldwide safely completed their flights.<sup>36</sup> The US National Safety Council estimated that the lifetime odds of dying as a passenger on an airplane in 2018 were too small to calculate, whereas the lifetime odds of dying in a motor-vehicle crash were 1 in 106.<sup>37</sup> In addition to the emphasis on safety, deregulation led to airlines increasingly insisting that aircraft manufacturers deliver aircraft on time and on budget.

Regulators were also grappling with cost-cutting requirements. In 2005, as a result of budget cuts, the FAA created a program allowing manufacturers such as Boeing to select their own employees to certify the safety of their new planes.<sup>38</sup>

## ORGANIZATIONAL AND CULTURAL CHANGES

As the industry evolved, so did the organization and culture within Boeing. Some Boeing employees perceived their company's finest days as having been the time before deregulation and the McDonnell Douglas merger. During that time, many at Boeing considered the company to be an engineering company at heart, with technical excellence coming first and profits coming second.<sup>39</sup> Insiders often rose through the ranks, and employees felt a high degree of job security. As a 38-year Boeing engineer reported in a 2006 survey:<sup>40</sup>

When I was in engineering college in the UK, we used to dream about working for Boeing. When I say to my friends, "We sold eight planes today," my friends tell me, "You didn't sell the planes, Boeing did." What they don't understand is that we are Boeing—I am Boeing. You don't just work for them; the company is part of you.

After deregulation in 1978, Boeing needed to increase its profit margins to remain competitive with companies such as Airbus. Lean production, computerized operations, and increased outsourcing were adopted in an attempt to increase efficiency and cut costs.<sup>41</sup> In the late 1980s, instead of being promoted from within, many of Boeing's top executives had previously been management consultants and were criticized for having created ideas that put quality in conflict with timing.<sup>42</sup> Rapid introduction of new initiatives in a short timespan led employees to question managerial decision-making.<sup>43</sup> Executives would make promises about projects but a few years later initiated large-scale layoffs, causing many employees to feel betrayed.<sup>44</sup>

Many employees felt that the most significant change in Boeing's culture resulted from the McDonnell Douglas merger in 1997.<sup>45</sup> At the time of the merger, McDonnell Douglas was struggling to remain competitive in the commercial airline industry. Many Boeing employees therefore felt that McDonnell Douglas executives had done disproportionately well following the merger, as they were assigned senior positions. Former McDonnell Douglas CEO, Harry Stonecipher, held twice as many shares as Boeing's CEO Philip Condit.<sup>46</sup> Former Boeing engineers criticized McDonnell Douglas executives for introducing a cost-cutting culture that prioritized keeping costs down over building a technically great airplane.<sup>47</sup> Boeing was said to have largely chosen the more cost-efficient "derivatives" path after the merger, making improvements to existing models rather than spending the additional money to create new ones.<sup>48</sup> Stonecipher, former CEO of McDonnell Douglas and, later, of Boeing, noted that, "When people say I

changed the culture of 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."<sup>49</sup>

Stonecipher became CEO in 2003, and his leadership had a significant effect on employees' perception of Boeing. He was infamously known to have told employees to "quit behaving like a family and become more like a team. If you don't perform, you don't stay on the team."<sup>50</sup> Some employees felt that Boeing no longer valued them and that they could be replaced by cheaper labour overseas.<sup>51</sup> With the increased pressure to remain competitive with rivals such as Airbus, Boeing outsourced certain parts production, which threatened the jobs of hundreds of machinists. In 2005, a 28-day strike resulted in little progress on the outsourcing issue.<sup>52</sup> A 57-day machinists' strike in late 2008 also delayed the delivery of the new 787 airplane.<sup>53</sup>

### DEVELOPMENT OF THE 737 MAX

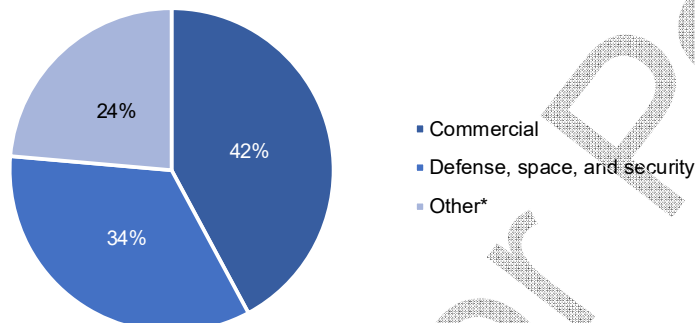
In 2011, Boeing's commercial airline segment faced significant challenges. Two of its aircraft, the 787 Dreamliner and the 747-8 Intercontinental, were behind schedule and over budget, and Airbus was capturing customers with its A320neo.<sup>54</sup> To counter Airbus, Boeing announced that rather than creating a new aircraft from scratch, it would create a derivative of its 737 called the 737 MAX. The development of the derivative aircraft would cost only 10–15 per cent as much as developing a new aircraft.<sup>55</sup>

Compared with its predecessor, the 737, the 737 MAX was equipped with larger, more powerful engines that allowed for greater passenger capacity and fuel-efficiency. Because of the engines' larger diameter, engineers repositioned the engines, thereby shifting the aircraft's centre of gravity, which changed its aerodynamic properties. To compensate, Boeing engineers added automatic flight control software known as the Maneuvering Characteristics Augmentation System (MCAS).<sup>56</sup>

MCAS was originally designed with two sensor inputs, but was later revised to draw from only one input on the assumption—subsequently found to be false—that a hazardous malfunction of that sensor would be virtually impossible.<sup>57</sup> Despite Boeing's chief technical officer having voiced concerns about MCAS, Boeing successfully petitioned the FAA to omit mentioning the system in the flight manuals, arguing that it was unnecessary.<sup>58</sup> Furthermore, Boeing concluded that there would be little risk associated with an MCAS failure, given the FAA-approved assumption that the pilots would respond within three seconds.<sup>59</sup> In both fatal crashes of the 737 MAX, the single sensor sending input to MCAS had failed, leading the system to push the plane's nose down into a dive, killing all passengers.<sup>60</sup>

### THE ROAD AHEAD

As of April 2020, Boeing had replaced its CEO, and its 737 MAX production remained suspended.<sup>61</sup> Up until that point, the grounding had cost the company \$8.3 billion, and that loss was expected to eventually surpass \$18 billion.<sup>62</sup> The timeline for the aircraft return to service had been pushed back multiple times as Boeing worked with the FAA to recertify the plane. CEO David Calhoun had been given the tasks of recovering the 737 MAX program and shifting the company's culture, with the objective of regaining the trust of both Boeing's employees and the general public.

**EXHIBIT 1: BOEING COMPANY'S REVENUE, 2019**

Note: "Other" revenue includes Global Services, which provides services to commercial and defence customers; Boeing Capital, which helps customers finance their purchases; and other miscellaneous items, including sales of previously leased aircraft.

Source: Boeing, *What We Stand for: The Boeing Company 2019 Annual Report*, 20, updated March 1, 2020, accessed February 3, 2020, [https://s2.q4cdn.com/661678649/files/doc\\_financials/2019/ar/2019\\_Boeing\\_Annual\\_Report.pdf](https://s2.q4cdn.com/661678649/files/doc_financials/2019/ar/2019_Boeing_Annual_Report.pdf).

**EXHIBIT 2: TIMELINE OF BOEING COMPANY'S KEY EVENTS**

Year	Event
1916	Founded by William Boeing in Seattle
1958	Introduced into service its first commercial aircraft: the Boeing 707
1967	Introduced into service one of its most successful aircraft: the Boeing 737
1970	Introduced into service the first twin-aisle "jumbo jet" aircraft: the Boeing 747
1978	The <i>Airline Deregulation Act</i> passed in the United States
1997	Merger with McDonnell Douglas, costing Boeing US\$14 billion
2001	Moved corporate headquarters from Seattle to Chicago
2003	Harry Stonecipher replaced Philip Condit as CEO
2005	James McNerney named CEO
2011	Introduced into service: the Boeing 787 Dreamliner aircraft
2015	Denis Muilenburg named CEO
2016	Introduced into service: the Boeing 737 MAX aircraft
2020	David Calhoun named CEO

Note: CEO = chief executive officer

Source: Case writers

## ENDNOTES

- <sup>1</sup> This case has been written on the basis of published sources only. Consequently, the interpretation and perspectives presented in this case are not necessarily those of Boeing Aerospace Company or any of its employees.
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- <sup>16</sup> Kershner, op. cit.
- <sup>17</sup> Ibid.
- <sup>18</sup> Weiss and Amir, op. cit.
- <sup>19</sup> Ibid.
- <sup>20</sup> Ibid.
- <sup>21</sup> Ibid.
- <sup>22</sup> Boeing, *What We Stand For: The Boeing Company 2019 Annual Report*, 20, updated March 1, 2020, accessed June 12, 2020, [https://s2.q4cdn.com/661678649/files/doc\\_financials/2019/ar/2019\\_Boeing\\_Annual\\_Report.pdf](https://s2.q4cdn.com/661678649/files/doc_financials/2019/ar/2019_Boeing_Annual_Report.pdf).
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<sup>41</sup> Ibid., 44.

<sup>42</sup> Ibid., 46.

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<sup>44</sup> Ibid., 47.

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<sup>48</sup> Greenberg et al., op. cit., 35–36.

<sup>49</sup> Ibid., 49.

<sup>50</sup> Ibid.

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