

OUR OPINION ON  
LEGAL  
CONSEQUENCES AND  
BUSINESS  
IMPLICATIONS  
ON THE  
**BOEING 737  
MAX 8**  
ACCIDENTS.



HERRERA & PARTNERS



There are just two very similar narrow-body planes dominating the sky. One is the European company Airbus’s 320 family, with models called A318, A319, A320, or A321. These four variants, the pilots can be trained to fly them interchangeably. The 320 family competes with a group of planes that Boeing calls the 737 — there’s a 737-600, a 737-700, a 737-800, and a 737-900. In other words, basically these are the two companies competing for the control of the market.

Additionally, the fuel is a major cost for the airlines. Consequently, improving fuel efficiency is one of the major bases of competition between airline manufacturers. Airbus came out with an updated version of the A320 family that it was called the A320neo, with “neo” meaning “new engine option.” The new engines were going to be more fuel-efficient, with a larger diameter than previous A320 engines, with the same airframe. One of the issues for Boeing is that it takes more work to put new engines on the 737 than on the A320. Because, the Boeing 737 is lower to the ground than the A320, and the new engines have a larger diameter. It might happen than Boeing’s best option was to take a few years to design a new airplane. On February 2011, Boeing chairman and CEO James McNerney rejected the plan to design a totally new aircraft. From an engineering perspective, the preferred solution was to build a new plane but for business reasons, it was not strong decision to manufacture a “new plane” that would require a lengthy certification process and extensive and expensive new pilot training for its customers. Herrera and Partners in Thailand have prepared a holistic opinion and summary on this and the different aspects involving the Boeing 737 Max 8 accidents.

**Mr. Damian Cambroner, Aerospace and Aviation Consultant at Herrera and Partners H&P**

## 1. Boeing 737 Max 8s, a new fuel-efficient and cost-effective aircraft / MCAS system

In the highly competitive jetliner business, the announcement in late 2010 that Airbus would introduce a more fuel-efficient version of its best-selling A320 led to a direct commercial confrontation on its rival Boeing's 737. Basically the 737 Max was Boeing's response to a more fuel-efficient version of its rival Airbus's A320.

On regard jet engines, not many commercial planes have three or four engines. Engine technology is more efficient and more reliable, and the iconic four-engine Boeing 747 is sharply limiting its future production while Airbus is cancelling its four-engine A380 in favor of smaller two-engine planes. Airline engine choices are essentially based on economic decisions.

Basically, four engines use more fuel than two, so the plane must fly fully booked of passengers to make a profit. On the other hand, airlines can tackle different factors more profitable with a two-engine fleet and newer engines are more fuel efficient and also more reliable. Perhaps there was a rush in the competition to come up with a plan featuring engine with similar fuel savings.

### 1.1 MCAS System

When Boeing designed the Max jets, Boeing made the engines larger to increase fuel efficiency, and positioned them slightly forward and higher up on the plane's wings. Many opinions claimed that the relocated engines caused the jet's nose to pitch skyward. To compensate this, Boeing added a computerized system called MCAS (Maneuvering Characteristics Augmentation System) to prevent the plane's nose from getting too high. MCAS is unique to the Max jets, and it isn't present in another Boeing 737s.

MCAS is activated without the pilot input. After the accidents happened in Indonesia and Ethiopia an intense debate in the aviation sector raised about a possible change introduced to the 737's flight control system for the Max.

Initially European regulators disagreed with the F.A.A.'s judgment about the need for additional training but ultimately went along.

### 1.2. Airlines cost and time saving

Some experts said it is possible that the technology could have made the 737 MAX too complicated to fly and increased the probability of air crashes. Other experts say technology makes airlines safer, leading to ever-lower number of crashes.

The fact is that the companies usually do not share the view that technology is as a separate thing from corporate profit-making and cost-reducing strategies. It is true that technology may improve airline safety, but it is adopted to make money too. The relationship between airline employees and technology is driven by costs and firm strategies, says Rick McGahey, economist at The New School.

It would make economic sense for aircraft makers and airline service providers to continually seek profits by implementing technology through what economist Bill Lazonick calls adding value – making a safer and better product – but also by extracting value by saving on labor costs.

### 1.3.- Pilots and Pilot Unions

By designing the 737 Max, Boeing was offering to the airlines, aircraft's fuel savings, operating cost reductions and other improvements but at the same time, some experts share the opinion that Boeing perhaps was trying to avoid mayor modifications' that would trigger the F.A.A. certification to determine that the existing 737 pilots would need new and costly time-consuming training.

Additionally, perhaps Boeing would save airlines time and money by not putting their 737 pilots in simulators for hours to train on the new aircraft. Airplanes don't fly themselves. Some critics say Boeing failed to alert pilots about the MCAS and any dangers associated with it, and that some airlines skimped on pilot rest, training and maintenance in order to get additional profitable flight time.

A spokesman for the American Airlines pilots Union said there should have been more training and alerts from Boeing, including sale of and time in simulators, which the Federal Aviation Authority (FAA) did not require.

Unions noted some of the pilots involved in the two 737 crashes had very little flying time. Although the captain of the Ethiopian Airlines flight had a lot of hours, the first officer reportedly only had 200 hours of flight time (U.S. regulators require 1500).

Pilot unions, naturally, want higher requirements, more training, and higher pay for pilots. But airlines, like all profit-making firms, aggressively get down wages and working conditions, reducing the number of on-board pilots and cutting their rest periods and training costs. And airlines are facing a growing pilot shortage. This is leading some to lower requirements for pilot training and experience.

Technology often substitutes for what companies perceive as too-costly and scarce human labor. Upward pressure on pilot wages because of so-called pilot shortages is leading companies to cut pilot costs wherever possible, including designs for future jetliners that will only need one pilot.

Of course, hiring pilots with less experience and providing them with less training is another way to cut costs. We believe it is too soon to tell if the 737 MAX crashes can be blamed in part on poor training and lack of pilot experience.

### 1.4. The FAA and Boeing

Ultimately, the F.A.A. determined that there were not enough differences between the 737 Max and the prior aircrafts to require pilots to go through simulator training.

While the agency did require pilots to be given less training or information on a variety of other changes between the two versions of the plane, M.C.A.S. was not among those items either.

Perhaps the bottom line was that there was no regulatory requirement for Boeing or its airline customers to flag the changes in the flight control system for its pilots — and Boeing contended that there was no need, since, in the company's view, the established emergency procedures would cover any problem regardless of whether it stemmed from the original system or the modification.

At least as far as pilots knew, M.C.A.S. did not exist, even though it would play a key role in controlling the plane under certain circumstances but the F.A.A.'s determination that the system did not have to be flagged for pilots gave pause to some other regulators.

## **2. Fuel efficiency and cost effectiveness competition between Airbus and Boeing. Aspects to be considered.**

### 2.1. FFA Certification process issues

The approval process for Boeing's Max jetliners was rushed and possibly compromised, according to a report published by The Seattle Times. Reporter Dominic Gates found that FAA managers pushed the agency's engineers to delegate safety assessments to Boeing and to speedily approve the resulting analysis. There was pressure to approve its new Max jets so it could catch up to Airbus, Boeing turned in a safety assessment to the FAA that was riddled with errors, the Times reported. "There was constant pressure to re-evaluate our initial decisions," the former [FAA] engineer said. "And even after we had reassessed it ... there was continued discussion by management about delegating even more items down to the Boeing Company."

Others said that even the work that was retained, such as reviewing technical documents provided by Boeing, was sometimes curtailed. "There wasn't a complete and proper review of the documents," the former engineer added. "Review was rushed to reach certain certification dates."

The Department of Transportation's Inspector General is probing the FAA's approval of the Max jets. The DOT's investigation is focused on the FAA's Seattle office, which certifies the safety of new aircraft. A subpoena seeking documents from the office, including emails, correspondence, and other messages has been issued, The Wall Street Journal reports.

The FBI is joining the mix of agencies investigating the crashes and their aftermath. According to The Seattle Times, the agency will lend its considerable resources to DOT agents probing the FAA's certification of the Max jets.

The F.A.A.'s review of the 737 Max's certification is a part of an ongoing investigation with the N.T.S.B. and Indonesian civil aviation authorities" the agency said in a statement, referring to the National Transportation Safety Board. "We cannot provide details of that review until the investigation is complete."

### 2.2 Were Pilots given an adequate training?

When the Max jet was under development, regulators determined that pilots could fly the planes without extensive retraining because they were essentially the same as previous generations, according to The New York Times. This saved Boeing a lot of money on extra training, which aided the company in its competition with Airbus to introduce newer, more fuel-efficient airplanes. The FAA didn't change those rules after Lion Air 610 crashed.

According to Reuters, the Lion Air cockpit voice recorder revealed how pilots scoured a manual in a losing battle to figure out why they were hurtling down to sea.

Since the crash of Ethiopian Airlines 302, on Sunday 17<sup>th</sup> of March, Muilenburg issued a statement describing steps the company was taking to update its technology. “While investigators continue to work to establish definitive conclusions, Boeing is finalizing its development of a previously-announced software update and pilot training revision that will address the MCAS flight control law’s behavior in response to erroneous sensor inputs,” Muilenburg said.

### **3. Consequences and what is next.**

#### 3.1. The facts

Lion Air Flight 610 took off from Jakarta (Indonesia) on Monday 29<sup>th</sup> of October 2018, at 6:20AM local time. Its destination was Pangkal Pinang, the largest city of Indonesia’s Bangka Belitung Islands. Twelve minutes after takeoff, the plane crashed into the Java Sea, killing all 189 passengers and crew.

Nearly five months later, Ethiopian Airlines Flight 302 took off from Addis Ababa, Ethiopia on Sunday, 10<sup>th</sup> of March 2019, at 8:38AM local time. Its destination was Nairobi, Kenya. Six minutes after takeoff, the plane crashed near the town of Bishoftu, Ethiopia, killing all 157 people aboard.

Both crashed jets were Boeing 737 Max 8s, a variant of the best-selling aircraft in history.

#### 3.2 What caused the crashes?

Both crashes are currently under investigation and there is no final word on what caused either tragedy but investigators are focused on a specific tech feature that may have forced both planes into a nosedive seconds before the crashes.

A preliminary report from Indonesian investigators indicates that Lion Air 610 crashed because a faulty sensor erroneously reported that the airplane was stalling. The false report triggered an automated system known as the Maneuvering Characteristics Augmentation System, or MCAS. This system tried to point the aircraft’s nose down so that it could gain enough speed to fly safely.

#### 3.3 Pilots, Airlines, Boeing Management and FAA Management are aware of safety issues

Two pilots reported their planes unexpectedly pitched nose down after engaging autopilot following the jets taking off. Another pilot said the plane's automation triggered a “temporary level off.”

Indonesian officials held a briefing, at which they confirmed reports that an off-duty pilot was in the cockpit of the Lion Air plane the day before the crash. According to Bloomberg, the plane experienced a similar malfunction that caused it to nosedive, but the off-duty pilot correctly diagnosed the problem and helped the crew disable the flight-control system and save the plane. The next day, the plane was under a completely different crew when it experienced the same problem, causing it to crash into the Java Sea.

Recently it has been revealed that Boeing wanted to wait 3 years to fix safety alert on 737 Max, according to CTV News 7<sup>th</sup> of June 2019. Boeing acknowledged that they originally planned to fix a cockpit warning light in 2020 after two key lawmakers disclosed the company's timetable on Friday.

U.S. Reps. Peter DeFazio of Oregon and Rick Larsen of Washington wrote to Boeing and the Federal Aviation Administration and asked why the company took more than a year to tell the safety agency and airlines that the alert did not work on Max jets.

A Boeing spokesman said that based on a safety review, the company had originally planned to fix the cockpit warning when it began delivering a new, larger model of the Max to airlines in 2020.

Both Boeing and the head of the FAA say that the alert is not critical for safety. Boeing says all its planes, including the Max, give pilots all the flight information - including speed, altitude and engine performance - that they need to fly safely.

DeFazio and Larsen are leaders of a House committee that is investigating the crashes and the FAA's regulation of Boeing. They said Friday that Boeing decided in November 2017 to defer a software update to fix the sensor alert feature until 2020 but accelerated that timeline after the Lion Air crash. Larsen questioned why Boeing didn't consider the problem critical to safety.

### 3.4 What happens next? Political implications?

The crash investigations are still ongoing. We have yet to hear information from Ethiopian Airlines 302's black box beyond initial (and vague) reports about similarities to Lion Air 610. More relevant information should emerge soon.

The US Senate will convene a hearing on the FAA's certification of Boeing 737 Max jets on 27<sup>th</sup> of March, Reuters reports. Boeing executives and officials from the FAA will be called to testify at the first congressional hearing on the twin crashes.

On 19<sup>th</sup> of March, Trump named Stephen Dickson, a former Delta Air Lines executive, as his choice to become the permanent head of the FAA. There is no doubt that Dickson will face stiff questioning during his confirmation process, as more details about the agency's certification of the Max jets trickle out.

Boeing and the FAA are currently at odds over how much pilot training will be required in conjunction with a coming software fix for MCAS, according to The Wall Street Journal. The FAA says it is keeping a close eye on Boeing's software update that is intended to correct problems with MCAS, CNBC reports.

## **4. A glance to the future implications of the crashes**

H&P believe that the implications and consequences for Boeing are not still defined enough but will start to be seen in the short term.

John Barton, a 737 captain who spoke on the condition that the airline he flies for not be identified, said the blame started with Boeing and the F.A.A. but extended to airlines and pilot unions. In some cases, management's monetary, time saving certification process concerns often override safety actions. If management is able to override quality and/or safety concerns, then why have SMS? The "System" approach to process management has worked for years and still works because it is based on empirical "data".

H&P lawyers and aerospace consultants have studied all the articles coming out about the possible technical aspects of the failure, the MCAS software, Pilot training and we would like to make some initial comments on the functionality of the Management System, a Process Control model and its compliance.

#### 4.1. Legal Consequences and Liabilities for the parties

##### 4.1.1. Boeing main legal consequences

From the legal perspective we would like to give some guidelines on the legal consequences that Boeing could face due to issues related to the 737 Max 8.

Firstly, based on our legal understanding it would need to be proved that there was a violation of safety. On a preliminary base, we have no doubt that there will be some litigation and court proceedings, as precedents have been set with other aircraft systems, that caused feasible failures. If it was a deliberate act of safety breach, there is a court case to rule on this. If it can be proven there was willful neglect, there will be millions of dollars in compensation.

The media informed that nearly three dozen lawsuits have been already filed against Boeing since its 737 Max 8 aircraft operated by Lion Air crashed in Indonesia on 29<sup>th</sup> of October, killing all 189 people aboard.

Now that an Ethiopian Air flight in a 737 Max 8 crashed in Ethiopia on 10<sup>th</sup> of March and killed 157 people, and the United States and many other countries grounded the aircraft series pending further investigation, Boeing could face countless other lawsuits, report Crain's Chicago Business and CNN.

Eight of the passengers on Ethiopian Airlines Flight 302 were citizens of the United States of America, whose families could bring lawsuits against Boeing.

Peter Flowers, a partner with plaintiff's law firm Meyers & Flowers in Chicago who filed a lawsuit against Boeing on behalf of a Lion Air crash passenger, said in a press release Wednesday that he thinks mounting evidence will prove that Boeing failed to manufacture a safe aircraft. "The company's ongoing negligence resulted in the deaths of passengers and crew of the Lion Air flight, and possibly now the Ethiopian Airlines flight as well," Flowers said in the release. "It is no wonder so many countries are grounding Boeing's 737 Max 8".

##### 4.1.2 Airliners are asking Boeing for liabilities and compensation due to grounding fleet.

H&P lawyers believe that airlines may bring legal actions over revenue losses incurred due to grounding. American Airlines flies 24 Max 8 jets, and were waiting on the delivery of 16 more this year. Another 20 should be delivered in 2020 and 2021, and 40 are slated to join its fleet in 2024. Southwest Airlines, American Airlines or any other airline that operates the series also could sue over loss of revenue during the grounding of the fleet.

Norwegian Air CEO Bjørn Kjos announced to the customers in a recorded message that the airline would seek compensation from Boeing. Norwegian has eighteen 737 Max 8 planes in its fleet, mostly for trans-Atlantic flights between Europe and the East Coast of the United States. The airline has ordered more than 100 of the 737 Max 8 planes. "It is quite obvious we will not take the cost related to the new aircraft that we have to park temporarily," said Norwegian CEO Bjørn Kjos in a recorded message to customers. "We will send this bill to those who produce this aircraft".

Aviation authorities in most of European countries as well as the United States, Australia, Indonesia, China and elsewhere have temporarily barred the planes from their airspace. A growing number of airlines have also announced they may not fly the planes until they know what happened in the fatal crashes.

There are more than 350 of the 737 Max planes of different configurations that have already been delivered to airlines around the world.

The lawyers of Norwegian Air are not ready to confirm how much money the company would be seeking from Boeing for this grounding. It is difficult to be precise on how much Boeing would have to pay as it will be determined by terms of sales contracts between the aircraft maker and its customers, just a simple delay with a delivery can cause Boeing or the rival Airbus to compensate its customers.

#### 4.1.3 FAA and future legal implications

In H&P opinion, the legal consequences may not be limited only to Boeing. CNN reported, US Justice Department prosecutors have issued multiple subpoenas as part of an investigation into Boeing's Federal Aviation Administration certification and marketing of 737 Max planes, sources briefed on the matter.

Transportation Secretary Elaine Chao on Tuesday asked the agency's inspector general to investigate the Max certification. Criminal investigators have sought information from Boeing on safety and certification procedures, including training manuals for pilots, along with how the company marketed the new aircraft, the sources said.

The Seattle Times reported: The FBI has joined the criminal investigation into the certification of the Boeing 737 MAX, lending its considerable resources to an inquiry already being conducted by U.S. Department of Transportation agents, according to people familiar with the matter.

The FBI Seattle office and Justice Department's criminal division in Washington are leading the investigation.

#### 4.2 Boeing shares impact and orders being revised. What are the possible legal liabilities for Boeing?

The correct answer to this depends on whether the lawyers working with the aerospace experts can determine a definitive cause behind the crashes in Ethiopia and Indonesia and if Boeing can come up with a remedy to address both. H&P believe that the holistic point of view in terms of identifying these liabilities will be a decisive approach.

"Certainly, there is near-term damage to both Boeing's reputation and its business," said Jim Corridore, director of industrials equity research at CFRA Research. "But how long lasting and how deep this impact is depending on the outcome of the investigation and how Boeing reacts".

Boeing has received orders for more than 5,000 737s and 2,639 of them, more than half are for the MAX 8. About 350 have been delivered so, at \$122 million a plane, the 2,300 MAX 8s still to be built total \$278 billion. That is three times Boeing's annual revenue of just over \$100 billion, and that revenue is under threat as airlines line up to postpone purchases.

Already, 236 planes might be in doubt, from carriers Virgin Australia, Garuda, Lion, Russia's Utair and VietJet.

Richard Aboulafia, an aviation analyst with the Teal Group, said of the investigation, however, he believes that a company that made billions in revenue last year will ultimately be able to find a fix and recover from this crisis. Though the deaths in the plane crash are a "tragedy," he said, "I just don't think it's that serious a problem from a company health standpoint. The worst-case scenario is in the hundreds of millions" in monetary losses. "If they find the cause (or causes) of the 737 MAX's problems, so swiftly, and develop a suitable set of solutions, then Boeing should be fine," he said. "Boeing has no time to waste, though. At this point, it is possible some airlines may be considering scaling back their 737 MAX orders, and airlines that have not yet placed orders need to be convinced the MAX is safe or they will buy from Airbus".

Fitch Ratings said in a note that it wasn't ready to downgrade Boeing yet. "Groundings and delivery delays would likely need to last beyond several months for the company's rating to be affected," the company wrote. But analysts say diversification will save Boeing. "So much of their new business is coming from drones, from the unmanned aerial vehicles," said Hillary Kramer, Portfolio Manager at Kramer Capital in the US. "It's so much more than just airplanes, and so much more than just 737s".

#### 4.3. FAA reputation

As investigators in France begin to examine the black box flight recorder from Ethiopian Airlines flight 302, questions are being asked about aviation regulators on the other side of the Atlantic. In particular, why was the US so slow to ground its fleet of Boeing 737 MAX 8s after two crashes in four months, which between them claimed more than 300 lives? And why was US President Donald Trump who made the announcement and not the Federal Aviation Administration (FAA)?

Veteran airline industry Peter Harbison, from the Centre for Asia-Pacific Aviation, believes the FAA's reputation has been seriously damaged. Mr. Harbison told the ABC the fact that the US was the last major country in the world to ground its 737 MAX 8s — and that it was the President who announced it — implied it was a business, as well as a safety, decision.

FAA Nominee Steve Dickson formerly a Delta Airlines executive, said: "The FAA's safety reputation is in tatters, with current safety officials facing multiple investigations for improper certification of the 737 MAX after two crashes and inadequate emergency evacuation testing, criticism for long delays and defaults in safety rulemaking, lax enforcement of existing safety regulations, ineffective management of air traffic control modernization, mounting congestion delays from lack of airport management and construction, and no Senate-confirmed senior management".

#### 4.4 Thailand regulation, safety protocol and preliminary actions taken after the accident

H&P is a law firm with a well-known practice in Aviation Law, therefore we would like to make some brief comments on the protocols followed in Thailand after the accidents of Jakarta and Ethiopia. First of all, the regulation in Thailand concerning civil aviation is compiled at the Air Navigation Act B.E. 2497 and the Notification of the Revolutionary Council No. 58 B.E. 2515.

These regulations entitle the Ministry of Transport, the Civil Authority of Thailand and the Department of Airports to supervise the aerospace sector in a country such as Thailand where the tourism is one of the most important contributors of the GDP.

The Air Navigation Act, B.E. 2497 (1954) in Chapter 7 and sections 61 to 64 stipulates the proceeding in case an accident would take place in Thailand. In this case the accidents took place outside of Thailand (Indonesia and Ethiopia) but there was a direct effect on one of the airliners registered in Thailand.

Last 12<sup>th</sup> of March 2019, the Civil Aviation Authority of Thailand (CAAT) gave a statement relating to the accidents of Boeing 737 MAX 8 as follows: “There is no Boeing 737 Max 8 operating under Thai carriers. There is one Thai airline operating Boeing 737 Max 9, which is a different type [...] CAAT temporarily suspended the operations of 737 Max 9 aircraft of Thai Lion Mentari Co. Ltd for passengers’ safety precautions”.

On this regard, the power goes beyond as Section 41/83 stipulates that “When it is evident that any Aircraft or an Aircraft of any type is unsafe for operation, the Director General shall order that such Aircraft, the Aircraft of such type or other Aircraft of similar types be prohibited from flying, and shall require the Aircraft registrant to rectify such Aircraft until safety for operation is met”.



23rd Floor, Two Pacific Place  
142 Sukhumvit Road, Klongtoey,  
Bangkok, 10110 Thailand  
Tel: + 662 684 6863  
E-mail: [info@herrera-partners.com](mailto:info@herrera-partners.com)  
[www.herrera-partners.com](http://www.herrera-partners.com)