

EYJAFJALLAJÖKULL AND THE 2010 CLOSURE OF EUROPEAN AIRSPACE: CRISIS MANAGEMENT, ECONOMIC IMPACT, AND TACKLING FUTURE RISKS

ELIN THORA ELLERTSDOTTIR

Senior Sophister

The 2010 eruptions at Eyjafjallajökull in Iceland struck fear into the hearts of airline executives and news presenters alike. In this essay, Elin Thora Ellertsdottir describes the poor response of the relevant authorities to this crisis and the extent of the economic fallout. She concludes by making a compelling case for better preparation in the future, because the prospect of another eruption is not a matter of if, but when.

Introduction

In April 2010, global attention shifted towards Iceland, a remote northern island resting on the Mid-Atlantic Ridge. Eyjafjallajökull had erupted for the first time since 1823, spewing a massive ash cloud and causing the largest shutdown of European airspace since World War II (Oxford Economics, 2010). Every second, the eruption unleashed 750 tonnes of volcanic matter into the atmosphere, with its ash plume rising over 30,000 feet (Budd et al. 2011). The crisis highlighted society's demand for unaffected mobility, as well as aviation's vulnerability to natural hazards (Langmann et al. 2011). An estimated seven million passengers were left stranded, with the shutdown's effects extending to trade, business, and general production. The response to the crisis was widely considered a policy fiasco, in need of critical improvement in the event of another eruption. Subsequently, a conference was held in Reykjavik, outlining the future dangers posed by Iceland's vigorous volcanic activity and the need for preparation (Oxford Economics, 2010).

In the following sections we examine the immediate response to the disaster, as well as its management. Furthermore, we explore the economic consequences of the airspace closure, specifically for the airline industry, destinations, and international trade. Finally, we assess the lessons learned from aviation's first crisis since it became the pillar of international transport. We address the risks of future eruptions disrupting air travel and investigate potential ways to minimise the negative impact.

However, we begin by outlining aviation's first hazardous encounter with volcanic ash and the subsequent safety measures taken.

Background

The first recorded danger to aircrafts from volcanic ash was during the eruption of the Indonesian volcano of Galunggung. A British Airways jet lost engine power and dropped over 12,000 feet before restoring power and landing in Jakarta. The cause of the near-catastrophic incident was confirmed to be high concentrations of volcanic ash in the atmosphere. All of the aircraft's warning systems had failed to warn the crew of the imminent danger (Prata and Tupper, 2009). Subsequently, a study into the threat of volcanic ash clouds was conducted, which reached the conclusion that volcanic ash in the troposphere could cause jet engine failure, with the potential for loss of life (Casadevall, et al., 1996). Furthermore, global wind circulation's ability to rapidly spread ash over large distances, paired with the unpredictable nature of volcanic activity, heightens the hazard to aviation (Prata and Tupper, 2009).

In response to the incident of 1982, the International Airways Volcano Watch (IAVW) was formed by the International Civil Aviation Organization (ICAO). The watch monitors volcanic ash in the atmosphere and issues warnings to the aviation community. This is achieved through nine Volcanic Ash Advisory Centres, which are strategically distributed around the globe. The centres are operated by the local weather forecasting organisations of the countries in which they are situated. They collect and circulate information regarding ash clouds that may endanger aircrafts (Abeyratne, 2012).

Crisis Response and Management

The Eyjafjallajökull eruption on April 14th occurred beneath a layer of glacial ice, which contributed towards the transformation of lava into small glass particles believed to be harmful to aircraft engines. The glass-rich volcanic ash was carried by strong north-westerly winds, prompting European aviation authorities to shut down air traffic for fear of public safety (EVACEG, 2010). Scottish and Norwegian airspace was the first to close down on the evening of the eruption. By April 18th, the skies reaching from Norway to the Canary Islands, and Ireland to Ukraine were virtually closed, with less than a fifth of flights operating (Budd et al. 2011). The extensive shutdown lasted until April 21st, with air traffic resuming close to normal levels on April 22nd (Sammonds, et al., 2010).

The United Kingdom took the lead in managing the crisis, because of its relative proximity to Iceland and its location within the path of the ash cloud. Due to lack of preparedness, their management of the disaster was purely reactive (Alexander, 2013). Authorities faced difficulties due to the absence of data outlining the ash tolerance of aircrafts. Furthermore, there was a lack of consensus among international safety regulators, airlines,

aircraft engineers and manufacturers as to what constituted a safe concentration of ash. Many considered the complete closure of airspace to be an overreaction and demanded a revision of normal procedures in order to 'get Europe going' (Budd, et al., 2011). On April 20th, in response to this demand, the European Union's Transport Ministers adopted a short-term solution. They declared that a volcanic ash concentration of up to 2 mg/m³ was deemed 'safe' for flight operations, provided that certain risk mitigation measures were applied (IVATF, 2010). However, the 'safe' concentration was determined arbitrarily during the course of the emergency and faced criticism for having no basis in science (Alexander, 2013).

The seven million passengers stranded by the volcanic ash crisis were facing significant delays and monetary costs. This was mitigated by the European Regulation 241/2004, which established the responsibility of airlines to compensate passengers in the event of a flight cancellation (European Union, 2004). However, low-fare carriers vehemently contested this guaranteed right to compensation by airlines. They felt the regulation was not drafted in consideration of a natural hazard, and that it imposed an unfair strain on the aviation industry during the unprecedented crisis. The airlines were adamant that since the situation was out of their control, the burden of compensation should not lie with them. Still, the European Commission remained convinced that 'if airlines carried passengers they had a responsibility to not abandon them' (Alexander, 2013, p.13).

Economic Impact

The air traffic suspension resulted in over 108,000 flights being cancelled (Alexander, 2013). The 8-day period of April 15th to April 22nd accounted for 104,000 of those cancellations, which amounted to 48 per cent of expected traffic during those days. Overall, low-fare air transport was hit the hardest, losing 61 per cent of flights over the main period. This could be due to a less flexible business model and higher geographical exposure. In contrast, business aviation was the least affected, owing to its adaptable business model where each flight is customised to the needs of a small number of people. Apart from Iceland, the three countries worst affected by the crisis were the UK, Ireland, and Finland. Over five days, these countries experienced a 90 per cent decrease in air traffic. Correspondingly, the worst affected airports were in Manchester, Edinburgh, Dublin, and Helsinki. Despite air travel being negatively impacted in Iceland for thirteen days, the overall effects on its aviation sector were not as serious as in Finland. This can be attributed to Iceland having been able to sustain a number of flights to North America (Eurocontrol, 2010).

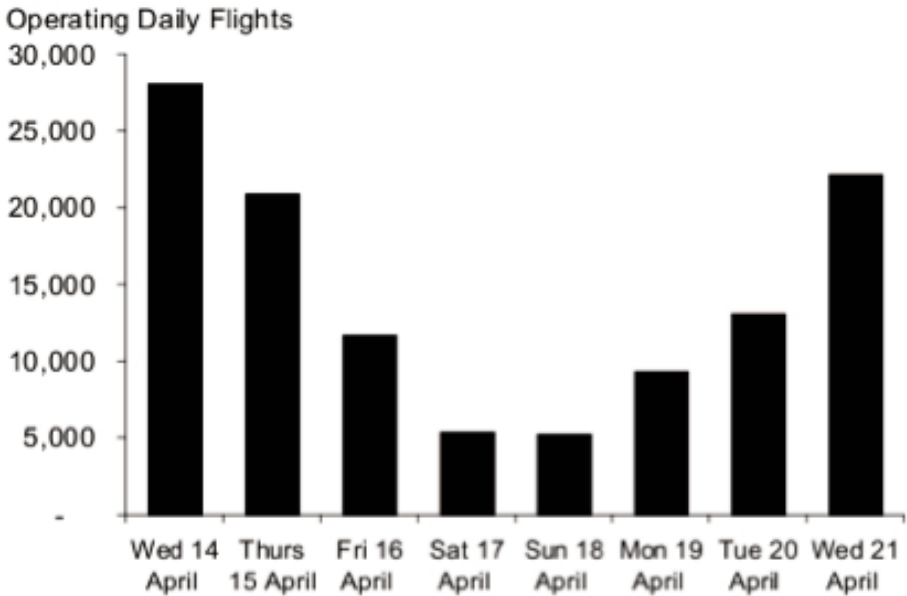


Figure 1: Air traffic in Europe during the crisis (Eurocontrol, 2010)

The global GDP losses, resulting from the prolonged inability to move people or goods, are estimated at approximately 4.7 billion US dollars. This figure incorporates net airline industry and destination losses, along with general productivity losses (Oxford Economics, 2010). Furthermore, the seven million people grounded across Europe resulted in extreme pressure on buses, trains, taxis, and car hire. Some hotels stood empty while others were at capacity, leaving crowds of people without accommodation (Alexander, 2013). A study conducted in Norway indicated that shortly after the crisis most travellers felt uncertain about the impact on future travel. The occurrence of another eruption could cement this uncertainty, causing people to choose destinations reachable by other modes of transport besides air travel. Still, research indicates that, currently, the disruption has not deterred people from flying (Brechan, 2010).

The Airline Industry and Destinations

Due to numerous offsetting factors, it is difficult to determine the overall economic impact on the airline industry. For example, the International Air Transport Association (IATA) evaluates that the shutdown caused the demand for aircraft fuel to fall by 1.2 million barrels, saving around 110 million US dollars (Mazzocchi, et al., 2010). Nevertheless, Oxford Economics (2010) estimates the total financial impact at about 1.4 billion US dollars. British Airways and Air France-KLM reported a loss of 20 million pounds per day during

the five most disruptive days (Mazzocchi, et al., 2010). The extensive losses suffered by the airline industry in a week of suspended flights, indicate that a longer shutdown could easily send aviation companies into bankruptcy (Alexander, 2013).

An estimated gross impact on European destinations suggests a cost of 2.8 billion US dollars. However, offsetting factors, such as the spending of stranded passengers and the money spent on alternative means of transport must be considered. While some hotel operators reported losses of approximately 10 million US dollars per day, others described a large amount of customers willing to pay high rates. Taking these factors into account, the economic impact on European destinations is estimated at 867 million US dollars. Thus, the accumulative negative impact on the airline industry and destinations comes to 2.2 billion US dollars for the main crisis period (Oxford Economics, 2010).

International Trade

The air transport disruptions had serious consequences for international trade. Although some trade can be postponed, other products such as perishable goods and important parts and equipment cannot withstand a delay in transportation. Deferring the trade of these products results in lost revenue for producers and potentially for customers relying on their delivery. Many African countries are the producers of perishable goods such as flowers, fruit, and vegetables. The World Bank president in 2010, Robert Zoellick, estimated that African countries could lose 65 million US dollars as a result of the airspace shutdown. In April 2009, Africa provided over half of the monthly value of fresh-cut flowers imported into the EU, amounting to 46 million US dollars. Accordingly, a weeklong cancellation of flights could indicate losses of about 11 million US dollars for the flower industry in Africa. Furthermore, in the same month Africa accounted for over 90 per cent of the monthly value of fresh fruit and vegetables exported to the EU. A week of air travel disruption suggests losses of around 3.9 million US dollars (Oxford Economics, 2010).

An increasing number of firms require their suppliers to provide them with crucial 'just-in-time' electronic parts and machine components, which are usually high in value but low in weight. This demands the quick and reliable delivery promised by aviation. Eurostat data indicates that in April 2009 three quarters of the monthly value of components imported into the EU came from Asia-Pacific. Following the ash crisis, the Korea International Trade Association estimated the losses for local domestic companies at 112 million US dollars during the height of the crisis (Oxford Economics, 2010).

Tackling Future Risks

“The havoc arising from the eruption of Eyjafjallajökull has been presented in many circles as being a consequence of the event being both unprecedented and unexpected – neither is the case.” (Sammonds et al. 2010, p.8)

A historic examination of Iceland’s volcanic activity indicates the frequency of eruptions is at 20-25 per century (Langmann et al. 2011). Among Iceland’s volcanoes, Katla is one of the most dangerous. Historically, an eruption in Katla has followed within a few years of Eyjafjallajökull. Her eruption would be capable of grounding European air traffic to a much larger extent than Eyjafjallajökull (Alexander, 2013). Further ash hazards to Europe include the volcanically active regions of Italy, the Canary Islands, and the Azores (Sammonds et al. 2010). This warrants the formation of extensive contingency measures in order to minimise the economic and social effects of air travel disruptions (Langmann et al. 2011). Furthermore, the unpredictability of volcanic activity calls for clear and concise rules regarding the safe conditions to operate flights (Alexander, 2013). In order to correctly assess risks, the following factors need to be taken into account: the type and age of the aircraft, the engine make, the flight path, pilot behaviour, the frequency of service, and ground maintenance capabilities. The risk analysis could be managed by an independent expert panel, in charge of determining safe conditions. This could avoid the detrimental effects of a ‘no fly’ blanket approach and facilitate a balance between precaution and pragmatism, while avoiding the influence of commercial pressures and vested interests (Sammonds, et al., 2010).

Further improvements need to be made with regards to international decision-making. While the International Airways Volcano Watch is a strong warning mechanism, actual decision-making tends to happen at a national rather than a continental level. This led to a fragmented response to the Eyjafjallajökull crisis. In the event of air transport disruptions, Europe should have coordinated crisis response strategies, which provide a substitutive mode of transport. Moreover, it is important to prepare flexible strategies in order to have a clear idea of the options available to minimise disruptions. For example, in the event of air traffic grounding, political and business meetings could be conducted in a virtual manner through video links. In any case, it is necessary for businesses with substantial international components to plan for situations where air transportation could be unavailable, and design alternative arrangements (Alexander, 2013).

Conclusion

At the 2008 meeting of the International Airways Volcano Watch Operations Group, the threat of Icelandic ash clouds to the aviation industry was acknowledged. The group noted that volcanic eruptions in Iceland ‘could have a major impact on aircraft operations over

the NAT [North-Atlantic] Regions since Icelandic volcanoes were situated close to important air routes' (IAWOPSG, 2008: 6.2.2). This acknowledgement, paired with the British Airways experience with volcanic ash in Indonesia, makes it difficult to understand why authorities were not better prepared. Their response was entirely reactive and rendered an ineffective management of the crisis. This resulted in seven million passengers stranded, economic losses of around 4.7 billion US dollars, and severe consequences for international trade. However, the Eyjafjallajökull crisis presents an opportunity to prepare. In the future, effective contingency planning needs to find a balance between three key factors: plans, procedures, and improvisation. An element of hazard forecasting is also important, and could help minimise the detrimental effects of volcanic eruptions. In 2010, unpreparedness resulted in simple risk aversion, which brought about significant economic and social costs. Another volcanic ash crisis is inevitable, the question is: will we learn from our mistakes?

References

- Abeyratne, R., 2012. *Strategic Issues in Air Transport: Legal, Economic and Technical Aspects*. Berlin: Springer Verlag.
- Alexander, D., 2013. Volcanic Ash in the Atmosphere and Risks for Civil Aviation: A Study in European Crisis Management. *International Journal of Disaster Risk Science*, 4(1), pp.9-19.
- Brechan, I., 2010. Air travel disruption after the volcano eruption in Iceland: Consequences for Norwegian travellers and businesses in Norway. Institute of Transport Economics, report 1120/2010. Oslo, Norway.
- Budd, L., Griggs, S., Howarth, D., and Ison, S., 2011. A Fiasco of Volcanic Proportions? Eyjafjallajökull and the Closure of European Airspace. *Mobilities*, 6(1), pp.31-40.
- Casadevall, T.J., Delos Reyes, P.J., and Schneider, D.J., 1996. 'The 1991 Pinatubo eruptions and their effects on aircraft operations' in C.G. Newhall and R.S. Punongbayan (eds) *Fire and Mud: eruptions and lahars of Mount Pinatubo, Philippines*. Seattle: University of Washington Press, pp. 625-236.
- Eurocontrol, 2010., Ash cloud of April and May 2010: Impact on Air Traffic. STATFOR/Doc394 v1.0, 28/6/10.
- European Union, 2004., Regulation (EC) No. 261/2004 of the European Parliament and of the Council of 11 February 2004 Establishing Common Rules on Compensation and Assistance to Passengers in the Event of Denied Boarding and of Cancellation or Long Delay of Flights, and Repealing Regulation (EEC) No. 295/91. *Official Journal of the European Union*, Brussels, 17.2.2004: L. 46/1-L46/7.
- EVACEG (European Volcanic Ash Cloud Experts Group), 2010. 'Recommendations for the improvement of volcanic ash clour crisis prevention and management.' Ministerio de ciencia e innovación.
- IAVWOPSG, 2008., 'Report of the fourth meeting of the International Airways Volcano Watch Operations Group.' IAVWOPSG/4-Report. Paris, France, 15-19 September 2008.
- IVATF (International Volcanic Ash Task Force), 2010., 'Volcanic Ash Operations'. IFALPA, The Global Voice of Pilots.

Langmann, B., Folch, A., Hensch, M., and Matthias, V., 2011. Volcanic ash over Europe during the eruption of Eyjafjallajökull on Iceland, April-May 2010. *Atmospheric Environment*, 48, pp.1-8.

Mazzocchi, M., Hansstein, F., and Ragona, M., 2010. The 2010 Volcanic Ash Cloud and Its Financial Impact on the European Airline Industry. CESifo Forum No. 2, pp.92–100. Oxford Economics, 2010. The Economic Impacts of Air Travel Restrictions Due to Volcanic Ash. A report prepared for Airbus.

Prata, A.J. and Tupper, A., 2009. Aviation hazards from volcanoes: the state of the science. *Natural Hazards*, 51, pp.239–244.

Sammonds, P., McGuire, B. and Edwards, S. (eds) 2010. Volcanic Hazard from Iceland: Analysis and Implications of the Eyjafjallajökull Eruption. London: UCL Institute for Risk and Disaster Reduction.