

Essay on sandstorm at dubai international airport

[Engineering](#), [Aviation](#)



Executive Summary

Recently, the Middle East has experienced high rates of bad weather conditions that among others have caused sandstorms around the region. These conditions continue to affect various socio-economic activities with massive deadly consequences especially for airline companies (Seinfeld and Spyros, 2006). For instance, in 2008, sandstorms caused low visibility conditions caused very many cars to pile up on the Dubai-Abu Dhabi border. It is estimated that around 25 people lost their lives in this incident. In late 2013, the same incident did not only cause injuries to a dozen people but also hampered activities around Dubai airport for three days.

Sandstorms also pose massive commercial threats to any airport exposed to them. For instance, considering bad weather conditions, dense, dusty storm, as well as strong winds, it is very difficult to fly in such circumstances. The airports are forced to halt their flights or divert them to the nearby airports (Xinhua, 2005). Such inconvenience will discourage the customers from using these flights again due to the delay they experience. Although it is not the fault of the airline company, the people travelling would still insist that, the airport had enough time and capacity to detect and avert the sandstorm.

The airport authorities must design a mechanism to circumvent the effects of sandstorm due to the harm it causes to their business. It is evident that the usual weather forecast cannot foretell the nature of sandstorm conditions. Weather forecast is not in a position to foretell the precise scale of wind at the airport at a particular time. A special mechanism to monitor such events should be put in place to provide exact details that enable the authorities to

handle the situation (Stow, 2012).

This report seeks to discuss such measures and how possible they can be embedded into airline's list of activities. It will describe what a sandstorm is and its possible effect on the airport. It will also entail issues that may arise when sandstorms hit the airport, and how the authority can keep the airport operational during such occurrences. The report will also discuss the necessary measures that the airport can take to embark on normal operations once the weather is normal. In a way of recommendations, I will also give a brief summary of what I have learned from this event and what I can do in the future. Finally, the report will outline various issues that the airport faces during a sandstorm. I hope that the report would be adoptable, and it will go a long way to minimizing the harm that sandstorms cause to the Dubai airport.

Chapter 1

Background

Description of a sandstorm

Sandstorm is a natural phenomenon involving strong winds that blow large quantity of dust and sand particles from the ground. The dust and sand are carried over a long distance, which causes hefty environmental impacts along the way. Sandstorms cause economic losses, present serious public health risks and at worst cause human death (Xiao-Chuan and Junhan, 2011).

For instance, over 25 people lost their lives in Dubai back in 2013 when sandstorms wreaked havoc across the United Arab Emirates (UAE).

Sandstorms are caused by two major factors, which include dry and loose surface, as well as strong and persistent wind. An advancing storm

connected with a gust form causes a swirling sand to form in the air. These storms will carry with it materials by suspension of particles in the air. The particles can be suspended up to 20, 000 feet high. It can also carry materials by saltation where the sand particles vibrate with the increase in the velocity of the wind. The vibrating particles then dislodge other sand particles from the ground into the air. Finally, it can do so through a process known as creep whereby large particles of sand are blown into the air. The rate at which sandstorms have attacked Dubai in recent times is alarming. It has become a common event for aircrafts to experience a sandstorm in this region. Dubai airport is one of the institutions that bear the brunt of this phenomenon. It is forced to stop its service or divert its aeroplanes to other safer airport to avoid any dangers posed by the sandstorms. The airport, therefore, has to incur extra expenses in detecting and handling this bad weather conditions (Seinfeld and Spyros, 2006). It must ensure that its staff especially the engineers is set to handle the risks that the sandstorms pose to the aeroplane engines. Failure to take these precautionary measures exposes the airport to unimaginable economic loss that may take so long to recover. The situation is also so dire that failure to handle it properly may tarnish the brand identity of the airport as one of the safest landing zones in the world.

Effects of sandstorm

Sandstorm causes massive havoc to the environment and especially to the aviation activities around the airport. Other risks include but not limited to:

- Reduced visibility that lowers the speed of an aeroplane causing delays for several hours.

- The aeroplane also ingests sand and dust particles into their engines. The sand then blocks the engine causing corrosion.
- Passengers complain of this delay as it takes a psychological toll over them.

The airport needs to develop some preventive measures to avoid similar occurrences in the future. Dubai airport should study meteorological conditions and soil surface in order to come up with such a mechanism.

Chapter 2

Issues Caused by Sandstorms to Airports

Sandstorm can cause various issues to an airport. A good example of these issues is reflected in the incident concerning a flight operated by Air Algérie. The flight that was carrying 116 people from Burkina Faso heading to Algeria disappeared from the radar during a sandstorm. Dust or volcanic ashes flying in the air due to the sandstorms cause such incidences. It is important that the pilot remain alert to avert disastrous consequences that may occur.

Other issues that may arise include:

- Rerouting of the flight due to poor visibility.
- Disturbances in the airport operations.
- Massive cancelation of scheduled flights to and from the airport.
- Mechanical problems including erosion, corrosion, Pitot - static tube blockage, or engine flame out in flight.

Rerouting of the flight due to poor visibility

Meteorologists define visibility as the measure of the distance at which an object is can be clearly seen by the viewer. It has a major impact on all forms

of transport system including road, water, and air. In aviation terms, it refers to the range over which a pilot on the centre line of the runway can view the runway surface markings or the lights demarcating the runway.

In a clear day, visibility is estimated to be 70 kilometers to 100 kilometers. This can however be reduced by weather conditions that fill the air with impurities. Such conditions include air pollution, high humidity, and heavy rainfall. In arid and semi-arid areas, low visibility is majorly caused by sandstorms. Visibility that is lower than 100 meters is reported as zero (Xinhua, 2005). At this condition, any mode of transport cannot be conducted without massive risks to those on board. Various measures are used to direct travelers during such instances.

For instance, most planes are fitted with advanced equipment that enables them to take off and land even in very low visibility situations. However, the equipments cannot withstand the low visibility caused by a sandstorm. An example of such a situation is when on 11 March 2005, an Airbus A321-200 belonging to the British Mediterranean Airways tried to make an unstable approach below applicable minima in a dust storm so as to land in Khartoum Airport. The flight was later diverted to Port Sudan since the visibility was too low to allow it to land at the airport.

Xinhua (2005) posits that low visibility may make the pilot see clearly the buildings around the airport as well as the lights in the airport. However, the pilot will not be able to see the runway clearly to make a safe landing. The best solution to this problem is always to divert the flight to a nearby airport.

Flight cancellation

The dust storm and strong winds will pose great dangers to any flight in the Dubai airport. The airport authority may, therefore, decide to divert these flights to the nearby airports or cancel them all together until the weather conditions recedes.

Erosion

The plane's engine is affected by dust particles that bounce on propeller blades. The particles cause damages and size augmentation causing gas flow deterioration and loss of engine performance. The damage is even bigger when the impact is caused by large dust particles due to their irregular sharp edges (Stow, 2012).

Corrosion

Corrosion occurs when these particles hit on hot surfaces of the engine such as combustor walls or turbine blades. Corrosion lowers the performance of the engine and may create difficulties during flight take off. The dust also forms glass deposit with rough surfaces that causes a thermal corrosion of engine's component by blocking the cooling holes.

Pitot

The dust particles may also affect the pitot-static tubes. The effect results when there is a false flight speed-reading due to a blockage caused by the dust particles on the pitot-static tubes (Stow, 2012). The effect is even more disastrous in low-level flight especially during takeoff or landing.

In flight flame out

The glass deposits formed by the dust particles on hot parts of the engine can affect the airflow. It may lead to turbine blade stalling causing the engine to burst in flames.

How to keep the airport operational during sandstorms periods

The airport management or the pilot in charge of the flight can initiate the solution to sandstorm disaster. When the flight is approaching the airport to land, the pilot may consider turning the aircraft into the wind and tie it down. The vents and tubes should be covered appropriately to prevent entry of dust particles into the engine. The engine should also be checked, and all vents cleared of any sand and dust (Xinhua, 2005). The flight deck should be vacuumed to remove as much dust as possible to ensure the safety of the plane and its engine. If these measures are implemented then the airport will be able to carry out its operations effectively during sandstorms period.

Chapter 3

Recovery Method for the Airport

The airport management needs to develop mechanisms on how to tackle future sandstorms situation. Ideally, the mechanism must entail measures necessary to avert the situation or avoid the consequences that may attach due to the situation.

- The first defence mechanism would be to create awareness within the airport staff about local climate and the weather forecast. The knowledge would be essential in determining flight schedules when sandstorms are most prevalent.

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- The airport engineers should continuously blow sand out of aircraft engine surfaces. They should also engage in research on physics of erosion and corrosion to modify the aeroplanes' engines design, define routing and approaching procedure, as well as maintenance procedure (Stow, 2012).
- The airport should also purchase a new engine with design that can tolerate large particle mass ingestion. The new design will allow for particle detection before aircraft takeoff in order to undertake rerouting procedure.
- The airport authority should also develop a system of monitoring and forecasting sandstorms. It should cooperate with the geodesy and hydraulic survey section of Dubai Municipality (DM). Seinfeld and Spyros (2006) argue that the two entities should work on the project of developing a mobile application that alerts the airport authority about an impending sandstorm. The system is capable of giving an alert six to eight hours in advance before a sandstorm occurs.

These measures would enable the airport to continue its operation once the weather conditions recede. They will also position the airport quite appropriately to handle similar future occurrences. It is imperative that the airport can recover from this setback as quickly as possible before it loses its customers' trust as a safe destination they can rely on in all their travels around the UAE.

Summary and Recommendations

What I have learned

I have learnt that sandstorms pose environmental risks to human, plant, and animal lives. The same may cause irreparable harm to the safety and maintenance of airport operations if it is not handled with adequate care

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(Xiao-Chuan and Junhan, 2011). When dust particles are ingested into the aircraft, they lower the performance of the engine that ultimately affects the aviation industry.

I have also learned that sand storms are prevalent in desert and semi-desert areas. The frequency of their occurrences is much more than that of a volcanic eruption. The sandstorms affect airport operation in the UAE with massive health, safety, and financial implications.

Recommendations

- The airport authorities should conduct frequent maintenance and operation plans. The methods used to do this should however be revised in the case-by-case manner so as to ensure they cater for the prevailing circumstance when sandstorms occur.
- Flight paths and flight management during sandstorms periods be reassessed to ensure they are updated and relevant to handle the situation.
- Finally, I would recommend that every passenger should take precautionary measure to ensure that their health and safety is not jeopardized by such circumstances.

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