



**Universitat  
Autònoma  
de Barcelona**

**DISRUPTION MANAGEMENT:  
Impact assessment on the Operational Processes**

**Memoria del Trabajo Final de  
Máster Universitario en Gestión  
Aeronáutica  
realizado por  
MARIA MONFORTE GUIXENS  
y dirigido/supervisado por  
JUAN JOSE RAMOS  
Sabadell, 02 de Noviembre de 2020**


El/La abajo firmante, JUAN JOSÉ RAMOS GONZÁLEZ.....

Profesor/a de los estudios de Máster Universitario en Gestión Aeronáutica de la UAB,

**CERTIFICA:**

Que el trabajo al que corresponde la presente memoria ha sido realizado bajo su dirección por Maria Monforte Guixens.

Y para que conste firma la presente.

A handwritten signature in blue ink, consisting of several loops and a horizontal line at the bottom.

Firmado:

Sabadell, .....2...de.....Noviembre.....de 2020



"The greatest glory in living, lies not in never falling, but in rising every time we fall."  
-*Nelson Mandela*

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This thesis is dedicated to those who work in airline operations every day, but mostly during this pandemic situation. From pilots to baggage handlers, ground staff to people behind the scenes. Thank you for taking people home every day the safest way possible and for not leaving passengers alone when they needed us the most. Even in this uncertain time, we fought together to sustain the heartbeat of airlines worldwide.

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# 1 Introduction

Disruptions are an intrinsic part of airline operations; they occur on a daily basis and they are mostly uncontrollable. From the moment a flight schedule is published until a flight lands at its planned destination, there are numerous factors that can impact the end-to-end process.

The way airlines deal with these factors and their readiness to react to them is instrumental to ensuring every customer has a seamless travel experience because of the airlines ability to be reactive in a decisive manner during its day to day operations. Furthermore, every decision made will directly determine the airlines operational costs and influence the business growth.

Although there is no magic formula to avoid these uncontrollable scenarios, airlines define and establish internal processes to manage these situations. While the scale of the disruption will differ, does an individual set of core processes apply to all scenarios?

## 1.1 Motivation

During my 11 years working in airline operations, I have seen airlines overcoming very different types of disruptive situations, including but not limited to:

- Weather events affecting the operation of a specific airport
- Engine failure during takeoff
- Natural disasters
- Emergency landings in remote places
- Bomb threats
- Aero political situations
- Global pandemic

All of them being dimensionally different and having a varied impact on the operation, I observed that operational airline staff are not trained for every specific situation and all events tend to show consistency in operational reaction and process implementation.



## 1.2 Objectives

This thesis aims to research the most frequently used processes to solve an operational disruption and explore if, despite the scale or dimension of the disruption, a predefined set of actions are applied to recover the operation and mitigate the impact.

<b>Objective 1</b>
Understand what airline disruption management is and what the operational core processes of an airline are
<b>Objective 2</b>
Research if regardless the scale of the disruption, the same set of processes are applied to achieve a successful schedule recovery
<b>Objective 3</b>
Propose key recommendations to enhance process compliance

### 1.3 Thesis structure

<p style="text-align: center;"><b>Objective 1</b></p>	<p>As the number of academic publications is limited, the following sections includes non-academic material such as past thesis, web pages and information gathered through the authors experience in the field.</p>	<p style="text-align: center;"><b>Section 2 &amp; 3</b></p>
<p style="text-align: center;"><b>Objective 2</b></p>	<p>Two different scale scenarios will be compared in order to analyze if the thought process and disruption management procedure changes while solving the event disruption.  Quantitative research will be gathered compiling data from OAG and flight radar platform.  Information collected through operational experience helped the author to gain the initial knowledge of the thesis topic and links for the research utilizing the Delphi methodology.  A combined Delphi method is evaluated:</p> <ul style="list-style-type: none"> <li>- Context</li> <li>- Consensus</li> </ul> <p>In the first iteration the aim is to find via a questionnaire the context, obtaining as many ideas, point of view or insights as possible from experts.  In the second questionnaire, the aim is to reach consensus and make sure the primary data gathered is consistent and reliable. To achieve this quantitative approach will be handled using the Likert scale</p>	<p style="text-align: center;"><b>Section 4, 5 &amp; 6</b></p>
<p style="text-align: center;"><b>Objective 3</b></p>	<p>With all information gathered throughout the thesis with the experts and the primary and secondary data, the author, will determine if consensus is found and objectives are achieved. The author will propose a recommendation in order to enhance process compliance.</p>	<p style="text-align: center;"><b>Section 7 &amp; 8</b></p>

## **2 Literature review. Disruption Management in the airline industry**

(Amadeus, 2016)

### **2.1 Concept and State-of-the-practice (ACI, 2013)**

A disruption is defined as a problem which interrupts an event, activity or process (Merriam-Webster, n.d.) Disruption management is the decision-making process in order to return the disrupted status to a normal operation. (Erfan Hassannayebi (Tarbiat Modares University, 2016)

In Aviation an operational disruption is defined as all deviation from the published schedule . An efficient management is critical in order to increase the airline capability to rapidly adapt and respond to disruptive events. This includes enabling continuity of operations, allowing shortest periods of time to return to published schedules within a brief timescale, without compromising safe operations. (ACI, 2013)

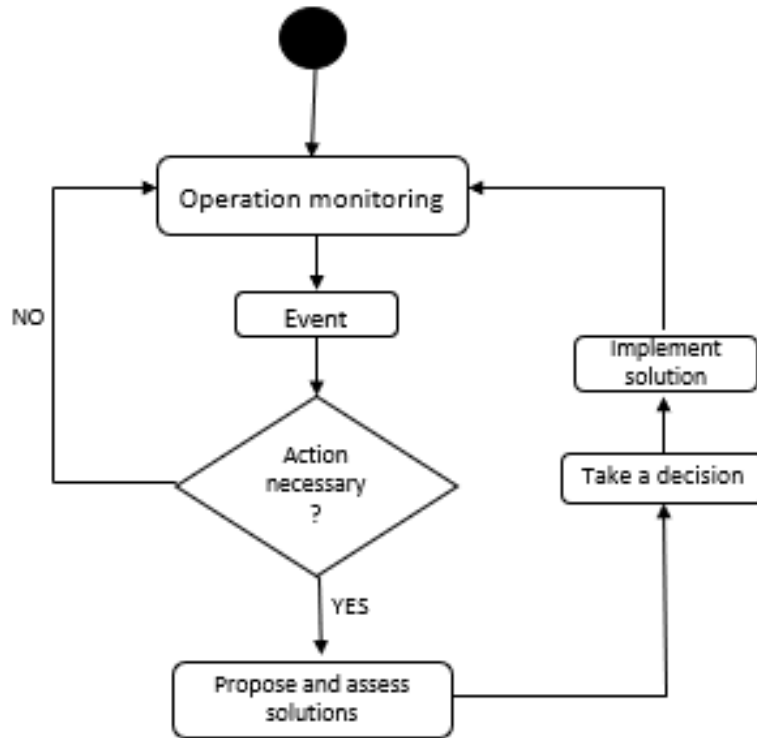
When any disruption takes place, airlines have to find the minimal cost for aircraft reassignments and crew reschedules, always taking into account the available resources. Simultaneously satisfying all the operational and safety rules. (Amadeus, 2016)

Different authors over the years have been trying to identify what is the best practice on recovery and disruption management creating models and methods to identify best processes and solutions. Find below some of these models and methods:

- Clarke Michael Dudley Delano, on his paper Irregular airline operations provides the first overview of the state-of-the-practice in operations control centers in the aftermath of irregular operations. The overview is based on field studies at several airlines. The author provides an extensive review of the literature within the airline disruption management and proposes a decision framework that addresses how airlines reassign aircraft to scheduled flights after a disruptive situation. (Michael Dudley, 1998)
- Kohl N on his paper disruption management—perspectives, experiences and outlook published in 2007 provides a general introduction to the airline disruption management and includes a description of the planning processes in the airline industry. The paper reports on the experiences obtained on the management of an airline's large scale disruptions. This research and development project is called DESCARTES, and it is supported by the European Union. (Airline disruption management—Perspectives, experiences and outlook, 2007)
- Jerzy A. Filar created a model for adaptive rescheduling of flights in emergencies through a survey, incorporating issues but from the airport's perspective. (Fila, 2007)
- Yu and Qi on his book Disruption management: framework, models and applications consider disruption management from a more general perspective. It includes chapters on disruption management for flight and crew scheduling as well as chapters on disruption management for several other applications. (Qi, 2004)
- Ball M, Barnhart C, state that irregular operations and control give insight into the infrastructure and constraints of airline operations, as well as the air traffic flow management methods and actions. Simulation and optimization models for aircraft, crew and passenger recovery are also discussed. (Ball, 2010)

## 2.2 Disruption management process

Despite existing different methods, the current disruption management process for most of the airlines consist in five steps as seen in below Figure 1.



**Figure 1.** Airline disruption management process

**Source:** Castro and Oliveira (Oliveira, 2014)

- Operation monitoring: in this first step all activities related to the flight are controlled to ensure no deviation from normal operations is occurring. Not only whilst the flight is enroute, but also during ground activities.
- When an event takes place, an assessment is performed to evaluate if an action is necessary. Two scenarios can happen at that point, if no action is necessary as there is no impact on the operation, the monitoring continues. When action is required, then the problem needs to be solved.
- Propose and assess solutions: when all information is gathered, different solutions need to be assessed in order to pick the option which has the least impact, taking into consideration variables such as cost, passenger experience and safety. At this step, the airline processes will be implemented according to the disrupted scenario. It will be further explained in the next chapters.
- Take a decision: once all different proposals have been evaluated, a decision is implemented.

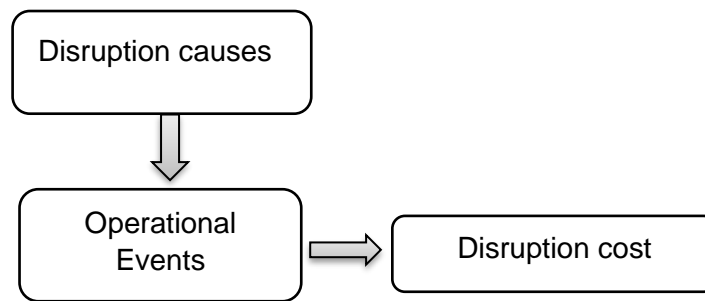
- Implement solution: The final step is to apply the solution to the disruption. It is important to understand that most decisions will have an impact on the operation, and therefore, always the solution with the least impact will be chosen. This way, the airline will minimize the impact on any deviation to the schedule. Usually, proposed solutions will have an implication to other flights, having to start the process described in Figure 1 all over again for the new impacted flights.

This last situation when a decision will impact another flight, creating new disrupted situations and having to start the process again, is known as the knock-on effect. It is the airline Operations responsibility to mitigate and minimize the effect and impact in other flights being able to action any deviation on the published schedule and being able to return to normal operations in the least possible time.

There are a lot of ambiguities related to disruption management. Disruption processes are not clearly defined, nor organized into a system that will make them recognized as a measure of airline operational efficiency.

To be able to identify and have a more comprehensive disruption information system, its basic elements need to be defined for a better understanding of the changes taken in operations. These elements are essential for the creation of Operational processes and disruption information systems, which will integrate operational and cost data, and establish missing links between strategy and operations.

There are three basic determinants of disruptions called disruption properties:



**Figure 2.** Disruption properties

**Source:** Castro and Oliveira (Oliveira, 2014)

When these core disruption properties are linked, they create a foundation for disruption management, allowing airlines to identify changes in planned operations (operational processes) and their cost consequences leading to a better understanding of the root cause of these deviations.

Operational events are the result of unexpected factors manifested through changes in flight schedules, including those related to altered aircraft and airports. Operational events are the backbone of a disruption information system and show how an airline responds to changed circumstances. (ACI, 2013)

The airline schedule, which is the base for the annual budget plan, is the result of the company's collective effort to provide the best service possible to their customers and make the most of the available resources. Every change and adjustment in the planned schedule may shift actual cost away from the planned targets. Which is known as the disruption cost.

### **3 Airline Operations**

#### **3.1 Concept and functions. Operation Control Center**

Airline operations is the department of an airline in charge of monitoring and solving operational problems related to aircrafts, crew members and passengers during the disruption management process or operational recovery (Oliveira, 2014). Ensure operational smoothness is one of the core missions that an airline company has, and it is carried out through an Operation Control center.

The primary role of an Operational control center is to use combined resources and knowledge of different stakeholders to maintain the published schedule and limit the effect of disruptions to the schedule. Other tasks they have to carry out include: minimize commercial implications through proactive monitoring and the planning and coordination of Irregular Operations with all relevant partners/stakeholders (Oliveira, 2014).

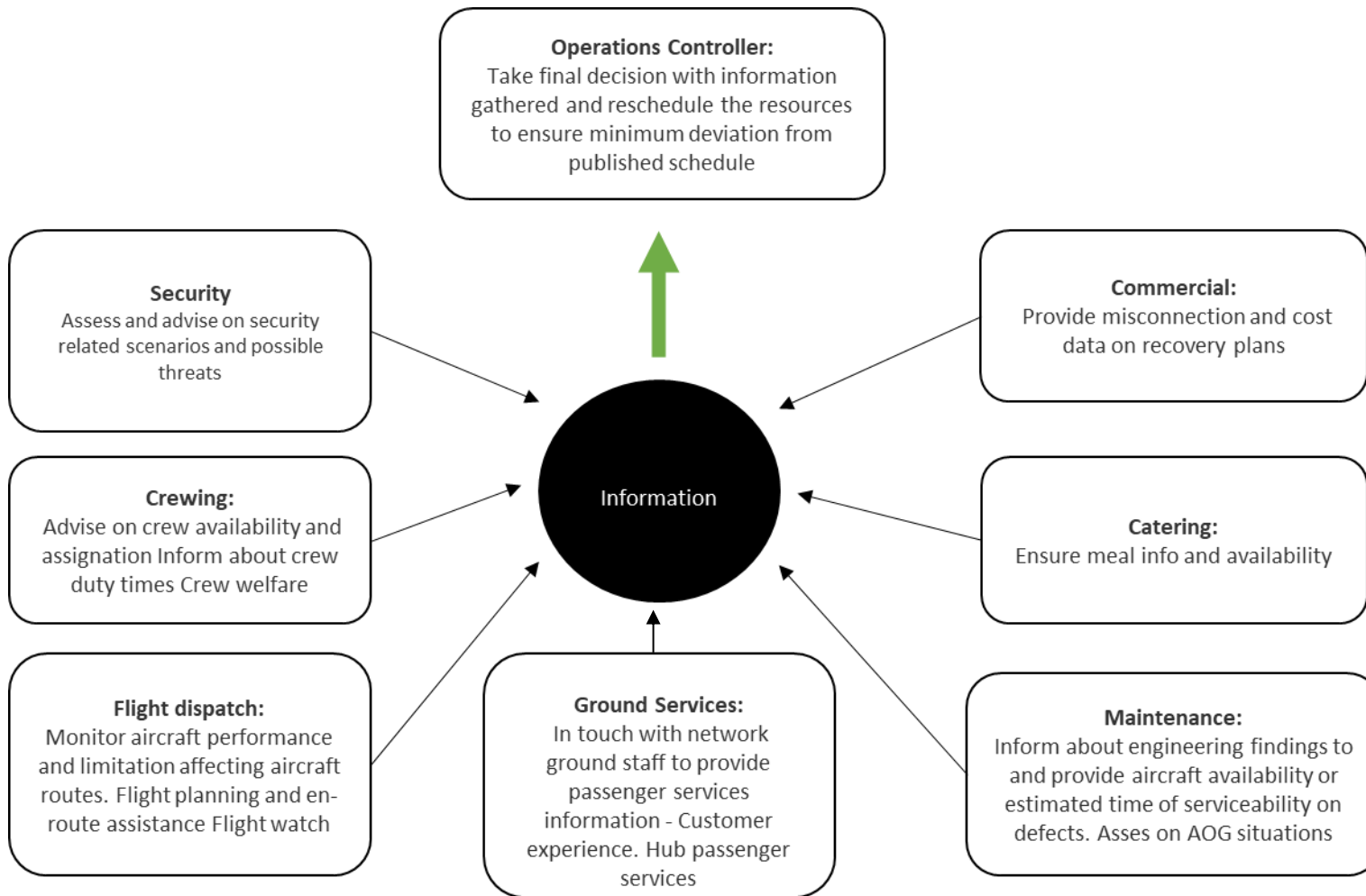
Flights shall be planned and operated within the airline's policies and regulations, which are stated on the airline operations manual; while also remaining within the ambit of the civil law and regulations, following basic principles such as:

- Safety and security
- Maintenance
- Regulatory compliance
- Commercially beneficial
- Schedule integrity
- Passenger comfort and satisfaction

The airline operation control center function is to maintain regular operations. Regular operations management is about governing flight operations with the aim that passengers arrive at their scheduled destination safely and punctually. (ACI, 2013)

#### **3.2 Stakeholders**

Within an Airline operation control center there are key stakeholders to enable collaborative decision making and communications, improving the quality of operational plans and ensuring On-time Performance. The responsibility of each stakeholder is to gather, share operational information and communicate recovery plans to their respective departments as seen in the next figure.



**Figure 3.** Information Flow Diagram for the Airline Operations Control Center

**Source:** Compiled by the author

- Crewing: They are responsible for managing the day-to-day activities of the crews and serve as a key partner in the operational decision taking. They are responsible for ensuring that Key performance indicators such as Safety, compliance, fatigue risk, cost, operational integrity and crew satisfaction are upheld. They are also responsible for monitoring operational crew compliance and changes to crew rosters.
- Ground services: They monitor the global operations and alert the airport network of potential issues in order to ensure smooth and timely communications during disruptions, guaranteeing this way that proper proactive action plans are instigated.
- Security: To provide link for operational support, advice and guidance to the network on security matters. They are also responsible to carry out risk assessments and provide advice on security operational issues.
- Catering: They are in charge of supporting catering operational integrity worldwide. This department has a 24/7 specialist that ensures catering operational integrity worldwide. Catering is responsible to provide daily operational support and timely inputs to ensure smooth operations. This department is also responsible to track, plan, manage and provide guidance and detailed instructions for irregular operations they also ensure that catering-related service providers consistently maintain equal exchange of equipment and remedial actions taken for irregularity and non-conformity.
- Passenger commercial: Their responsibility is to effectively track and record passenger misconnection caused due to flight disruption in case of delays, diversions and flight cancellations. Which will disrupt passengers in reaching their final destination, therefore, being responsible to find the most feasible solution.
- Cargo: They are responsible to steer and optimize the utilization of their freighters in order to ensure profitable operations through efficient planning of space and payload monitoring. They also need to take into account immediate connections, in case of any delays or disruptions and coordinating with interdependent personnel to contribute directly to the amount of revenue generated on each flight.
- Maintenance: They need to ensure that all causality and light maintenance checks conducted on the aircraft are carried out to the highest possible maintenance and safety standards in the most productive and cost-effective manner using all available resources at Engineering's disposal. Ensure the operation is supported continually achieved by controlling the deferred defects that exist on the fleet and minimizing the effects that technical difficulties experienced have on the schedule thereby ensuring the highest standard of support service and technical dispatch reliability are provided. Manage and control all Outstation AOG situations and Technical Delays to ensure rapid recovery of aircraft with minimal disruptions to the schedule offering technical advice to crews via communication.



- Flight dispatch: The primary function is the preparation of every flight which involves the creation of a legal flight plan showing the estimated fuel burn and reserves and declaring alternative and diversion airports. In addition, dispatchers are responsible for monitoring the weather, operational status of navigation aids, etc.

Operational controller: are the primary contact for pilots and flight crews who receive dispatch releases and weather briefings, coordinate operating plans, and provide feedback on operational status. Operational controllers are the sole operational group within the control center with the authority and responsibility to resolve problems that develop during both regular and irregular operations. With the inputs of all stakeholders, they are in charge of maintaining an updated version of the airline system resource schedule which includes all irregular operations that happen during a disruption. (Oliveira, 2014)

### 3.3 Operations Management

#### 3.3.1 Regular operations

Regular operations management is about governing flight operations with the ultimate aim that passengers arrive at their scheduled destination safely and punctually. The process includes, monitoring flights, changing aircraft or schedule to meet commercial and regulatory demands, preempting schedule disruption, and schedule/aircraft resource optimization. There is a constant focus on minimizing commercial implications through proactive monitoring, planning & coordination of irregular operations with all relevant stakeholders - identifying opportunities to further optimize schedule in advance using suitable strategies and available tools to achieve a commercial advantage. (Grandeau, 1995)

#### 3.3.2 Irregular operations

Also known as IROPS, Irregular Operations are circumstances beyond the control of the airline which will lead to a flight to not operate as scheduled. Can include, but are not limited to; weather, air traffic management, VIP movements, crew legality, slot issues, delayed aircraft deliveries, technical issues, acts of terrorism, acts of nature, force majeure, strikes, riots, war hostilities/disturbances, governmental regulations/demand.

In order to manage the operations better, airlines create processes to improve recovery options and procedures to follow in order to return as soon as possible to schedule, minimizing all impacts.

### 3.3.2.1 Core processes

There are eight basic types of operational events/processes crucial for capturing the information about changes in planned cost, revenue, flight punctuality and regularity: Their time-span and frequency could vary significantly, from short delayed measured in minutes or hours, to less frequent but more costly disruptions, which could be days or even longer. Capturing the relevant data about the events, their causes and consequences and organizing them help to create and improve processes through different scenarios and solutions. (Aircraft operational costs and turnaround efficiency at airports, 2000)

Operations is responsible for the day-to-day Operational Control of the published operating schedule for the current day until the end of the current published schedule period. This is done within established safety and operational compliance, resource, and cost guidelines whilst safety being the top priority.

Below, we can find the 8 set core processes for an airline ( for legend description to process maps refer Annex 1):

- Flight delay

The term delay is quite simple and generally applied when an event occurs later than it was planned, scheduled, or expected to happen. Airlines look at delays from several perspectives. Primarily, they look at delays as compared to their scheduled times. In general, are the variance from the schedule – that is, the actual gate arrival or departure, this simple calculation airlines define on time performance. (bts.dot.gov, 2020)

The service may be delayed beyond its scheduled time of departure due to any of the following reasons:

- Technical defect
- Passenger or crew illness
- Baggage or passenger reconciliation
- Security issue
- Adverse weather
- Restrictions at departure airport or destination airport.

The delay business process is one of the most important processes to be defined by an airline, since most of the disruption's scenarios lead to a delay. To minimize this and its impact is the responsibility of the operations controller.

- Flight diversion

A diversion is when an aircraft is intentionally steered away from its originally planned course, whether permanent or temporary. All flights shall be operated in accordance with the published schedule. (Nghiwete, 2007) However, flights may divert, while en-route, for the following reasons:

- Operational conditions at planned destination being prohibitive or rendering a landing improbable to a high degree
- Technical defects detected in flight, requiring immediate landing at next suitable aerodrome
- A passenger on board requiring immediate medical assistance
- A disruptive passenger on board causing serious security or safety issues
- Meteorological conditions encountered or reported en-route, requiring alteration of intended routing
- 

- Flight return to stand.

A Return to Stand is when a flight that is off blocks returns to the stand due to one of the following: (OAG, 2016)

- Passenger or crew illness
- Technical defect
- Baggage or passenger reconciliation
- Security issue
- Adverse weather

The most important part of the process is to determine the cause of the return to stand to be able to act quickly and therefore minimizing the impact on the flight. For that reason, the course of action will be different depending on the situation.

- Flight cancellation

ICAO defines cancellation as the annulment of a previously published scheduled or non-scheduled flight, or a segment thereof, before departure. (ACI, 2013)

Flights can be cancelled either due commercial or operational reasons. When a flight is cancelled due a commercial reason (due low passenger load), operations controllers need to analyze if the revenue generated by operating the flight meets operational cost. The revenue generated will not only be passenger wise, but also cargo revenue that operating the flight will generate. If despite the request, by cancelling the flight, it's going to generate a loss of revenue, operations controllers need to provide that feedback to the commercial team.

Also, it is important always to consider the 80/20 rule, only applied for European flight, as per Council Regulation (EC) No 95/93. This Regulation stipulates in article 10, paragraph 2 that at least 80% of the slots which have been allocated to an airline have to be operated to be entitled to the same series of slots (80/20 rule) in the next equivalent scheduling period.

- Aircraft change

An aircraft change is defined as, the transfer from one aircraft to another aircraft belonging to the same or different airline without a change in the flight number. Known also as a change of equipment or change of gauge (thelawdictionary.org, n.d.)

- Additional flight / Relief flight

Relief Flight is a flight that has been organized to recover disruption and Additional/ Positioning Flight is a planned service that has been added to the current schedule.

From the commercial point of view, an additional flight can be requested in order to generate extra revenue to the company. Once again, it always needs to be checked if the revenue which is going to be generated covers the operational cost.

- Flight rescheduled

Airline flight schedules are published months in advance therefore there will inevitably be occasions when flight times may change. When changes are made to the times of a scheduled flight causing a delay, more than 24 hours in advance from schedule time of departure, and the affected flight is classified as a Rescheduled Flight, provided following conditions have been met:

- New permissions can be granted by destination
- Overflying permissions can be granted for the new schedule
- Commercial team can confirm that all passengers can be informed of the revised flight times.
- Destination can handle the aircraft Ground handling and airport agrees to new timings

When these conditions cannot meet, then, the flight will be considered as delayed.

- Flight rerouted:

Rerouted Flight is a published scheduled or non-scheduled flight planned to a destination other than the scheduled destination prior to departure. Flights may be re-routed for commercial and/or operational reasons, e.g. to accommodate additional revenue, accommodate disrupted passengers or move AOG parts and engineering staff. (CAAUK, 2004)

## **4 Methodology**

### **4.1 Methodology selection**

Whenever research is performed it is necessary to have a look at the appropriate methodology for each objective. In general, there are two types of data; qualitative and quantitative. This section will set out which of the method is most applicable to achieve the more reliable results to reach the aim and fulfil the objectives. For the selection of the appropriate method, it is important to be aware of the different sources of data that are available.

The European Union statistics unit, and national statistics bureaus record several indicators regarding air transport. However, the majority of these indicators, are related to airports as private airlines want to protect their business by not publishing specific data related to it. Information on this thesis will be based on a case studio comparing data found about Qatar Blockade in 2017 and its impact in aviation industry in Qatar, and COVID-19 pandemic effect in flight operations. Quantitative data found on AOG and flight radar24 is only giving the impact it based on number of flights operated and traffic reduction through that period. This will help to understand two different scale scenario and its impact. Also recovery will be mentioned based on the graphs and information found.

One of the main sources for qualitative data is by the use of surveys to the mass public. Unfortunately, public is not aware about the use of process by airlines and is not known by the public how airlines solve disruptions.

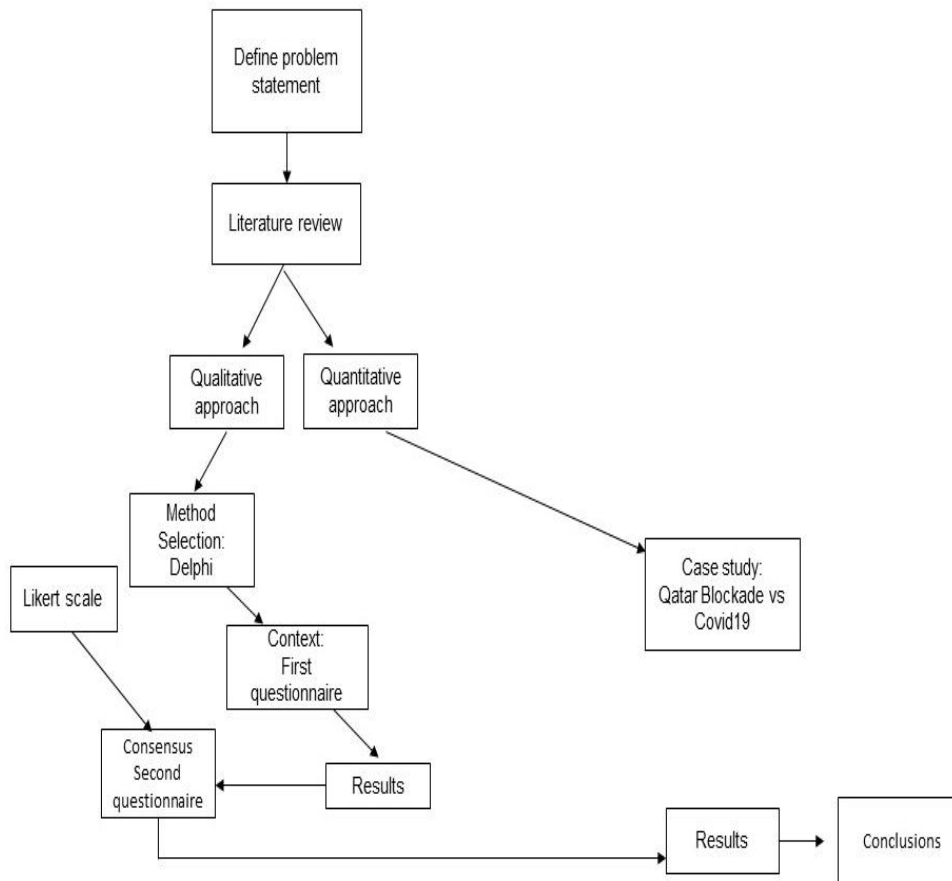
Hence, the most accessible source of information comes from industry professionals and/or specialists that work in this niche of air transportation. To come to a single point of view on this, the different parties will need to come to a consensus on the view that is agreed upon. A research method that incorporates these characteristics is the Delphi technique. This technique assesses different opinions through various rounds of surveys conducted with industry professionals.

### **4.2 Overall structure**

In order to start this thesis, a problem within the industry needed to be found. This problem did not have to be extensively researched so; the author could bring new information to the academia. The literature review reflected all the past work researched about this topic and brought all the information that the reader needs to know in order to familiarise with the topic researched.

The Delphi technique and Likert scale were methods used in order to gather all the information and quantified it. Additionally, data gathered was tested in order to verify if it consistent and reliable through descriptive statistics and the Pearson correlation matrix was exercised to find any redundancies in the data collected. Those methods are explained more in-depth in the following chapters.

#### 4.2.1.1 Flow chart



**Figure 12.** Thesis structure flow chart

**Source:** compiled by author

#### 4.2.2 Delphi Technique

First of all, throughout major names in the Delphi literature who have an in-depth knowledge of this method, an initial understanding will be approached.

According to Linstone and Turoff (Turoff, 2002), who are major names in the Delphi literature, this method can be defined as “a method for structuring an effective communication process within a group, to allow individuals, as a whole, to deal with a complex problem”.

The method was first used in the 1950’s by the Rand Corporation (Profillidis, 2019) (Williamson, 2022). The founders of this technique, Dalkey and Helmer state that the main goal to achieve is to “obtain the most reliable consensus of opinion of a group of experts (...) by series of intensive questionnaires interspersed with controlled opinion feedback.”

According to (Williamson, 2022) the key elements necessary to develop a Delphi are:

- Panel of experts;
- Incomplete or vague information about the problem;
- Qualitative data collection;
- Consensus of opinion;
- No direct interaction between the participants, ensuring anonymity; and
- Two or more iterations to perform;

However, new approaches have been studied according to the use of this technique, as gathering diverse opinions on a topic is also a result (Melander, 2018). Reaching consensus is not always the main goal (Linstone, 1975).

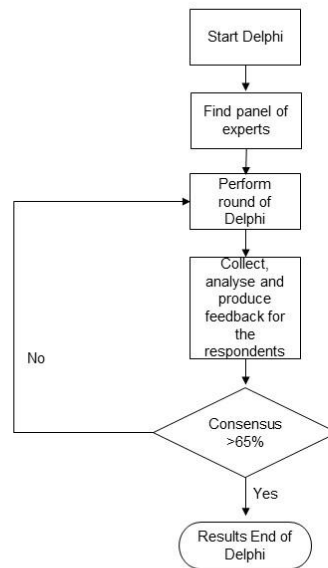
Some of the advantages and difficulties that this technique presents are stated below:

<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Answers from a panel of experts bringing know-how, insight perspective and prestige to the issue;</li> <li>• Stronger results as there is a reached consensus of several experts rather than individual judgments;</li> <li>• Participants can be dispersed in different regions;</li> <li>• Awareness of the different points of views regarding the issue from diverse backgrounds;</li> <li>• Panel of experts have the opportunity to learn regarding the issue and from the other experts;</li> <li>• Anonymity encourage experts to undertake a more intimate viewpoint</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• Time consuming, slow and long-lasting ;</li> <li>• Lack of face-to-face interaction might weaken eagerness and stimulus;</li> <li>• Written questions or responses, language and cultural background might lead to a misunderstanding due to the lack of interaction;</li> <li>• Results can be impartial and subjective as the researcher is the only person assessing the results;</li> <li>• After the first round, participants may be influenced by other panelists, causing lack of diverse results ("bandwagon effect").</li> </ul>

**Table 1.** Advantages and disadvantages of the Delphi technique

Source: compiled by author (Linstone, 1975) (Turoff, 2002)

#### 4.2.2.1 Flow chart



**Figure 13.** Delphi Technique flow chart

**Source:** Compiled by author (W. Alaloul, 2015)



#### 4.2.2.2 Stages during the process

The first step of this method is to establish a panel of experts. In this case, it was crucial to know the views and perspectives of specialists. Having people with in-depth experience of the market and from different backgrounds sharing their knowledge and opinion about operational processes, helped to identify and conclude with the objectives previously presented.

Experts	Field/Department of work	Years of experience in aviation	Current position
1	Airline Operations	15 yrs	6 yrs - Operations Manager
2	Air Cargo	5 yrs	1 yrs - Freighter Analyst
3	Airline Operations	13 yrs	5 yrs - Processes Analyst
4	Airline Operations	10 yrs	6 yrs - Network Operations
5	Airline Operations	26 yrs	23 yrs - Network Operations
6	Airline Project management	10 yrs	5 yrs - Project Manager

**Table 2.** Panel of experts of the Delphi

**Source:** Compiled by the author

According to (Williamson, 2022) the specialists were located in different areas and the first questionnaire was sent via email after having establish contact with the experts, either personally, via LinkedIn or email. The geographical spread and nature of the industry increases the possibility that companies approach the issue in a different way, thus having different perspectives and solutions to the problem. In other words, the heterogeneity of participants 34 decreases the similarity of the responses; enhancing discussion and enriching the outcome.

In the first round each panelist was expected to provide a response to the questions the researcher proposed. As stated before, reaching consensus is not always the main goal. Therefore as there is a lack of academic research of the problem analysed, the aim of the first round of the Delphi was to gather as many diverse opinions of the experts as possible (Melander, 2018). Then, an analysis was thoroughly performed. The key points of the first round of answers were identified and a feedback, next to the responses of all the experts, was shared in case the participants wanted to re-assess their answers.

In the second round, once all the different reasons were identified, the experts were requested to weight the degree of importance of the issue initially discussed.

Experts were informed that up to two iterations could be required. In this case, the experts had to complete a total amount of two surveys. The panelists were also informed that their answers would remain anonymously, in order to not be influenced by other panelist, who could be stronger minded participants.

In the second round questionnaire respondents had to agree or disagree and had the aim to reach consensus using the Likert scale, therefore the author combined quantitative and qualitative data (Melander, 2018). Level of consensus was analysed taking into account the scale from Profillidis and Botzoris. (Profillidis, 2019)

Percentage (%)	Level of consensus
>65	Strong consensus
50-65	Consensus
40-50	Weak consensus
<40	No consensus

**Table 3** Degree of consensus among experts

**Source:** Compiled by author (Profillidis, 2019)

Data analysis on the second questionnaire, was used to identify that data was consistent and reliable by Likert Scale.

The Likert scale was introduced as a scale of attitudes in Likert's "A Technique for the Measurement of Attitudes (Likert, 1932) it is a bipolar scale running from one extreme through a neutral point to the opposite extreme and consist of the sum or average of scores from responses to a group of survey questions.

In questionnaire two, a survey with 10 assumptions will be asked to a panel of experts to observe respondents' subjective feelings on particular issues.

Those will be measured by 7 levels of agreement:

- Strongly agree;
- Agree;
- Somewhat agree;
- Neither agree nor disagree;
- Somewhat disagree;
- Disagree;
- Strongly disagree

Survey seeks to measure whether people feel favorable, neutral or unfavorable to each statement (Culture amp, 2020). To analyze the results of questionnaire two, the author will classify the responses of the experts in two groups to provide more clarity in the results, since distance between levels of agreement answers is often subtle and influenced by an individual's interpretation, or approach to using the scale - some people are less likely to use extreme points of scales for example. (Culture amp, 2020)

Agree	Disagree
Strongly Agree	Strongly Disagree
Somewhat agree	Somewhat disagree
Agree	Disagree

**Table 4.** Levels of agreement clustered for Analysis

**Source:** Compiled by the author

## 5. Case Study

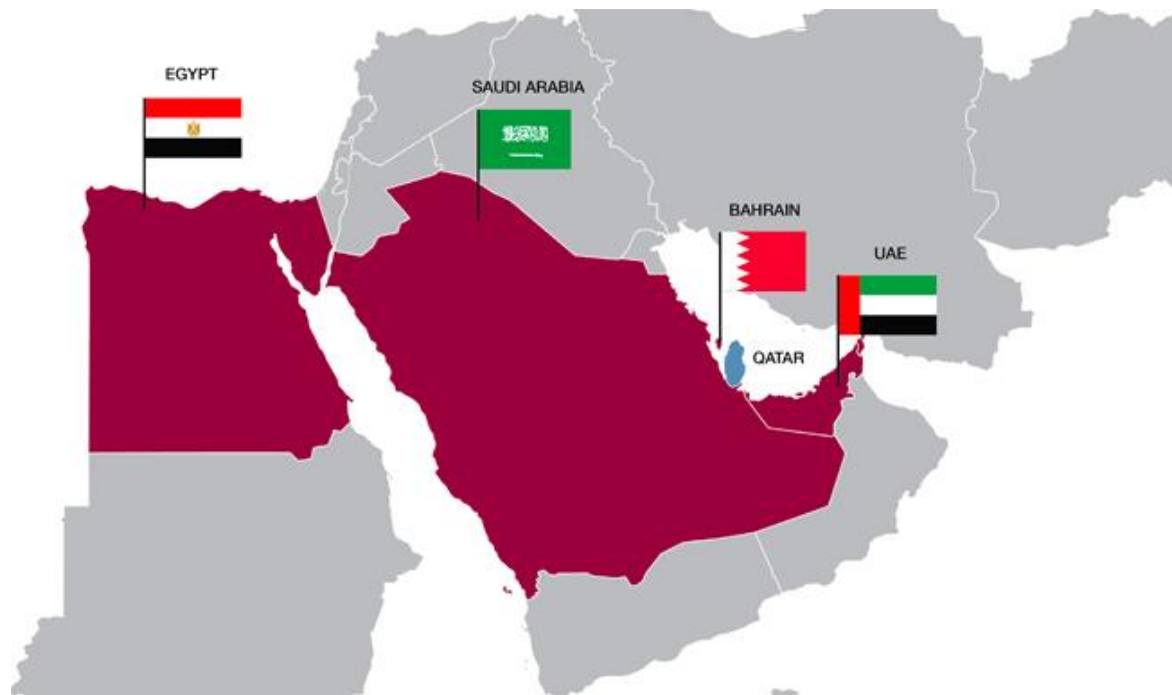
In order to understand two different scale disrupted scenarios, the author, wanted to gather as many quantitative data as possible, related to the impact of a regional disruption, The Qatar Blockade 2017, and global one, the current COVID19 pandemic for Qatar Airways.

All the data commented has been found in OAG and flight radar 24.

### 5.1 Regional disruption. Qatar Blockade

As Qatar Government of Communication office describes, GCC Crisis happened when on 5<sup>th</sup> June 2017, the Kingdom of Saudi Arabia, The UAE, Egypt, and Bahrain announced they were cutting diplomatic ties with Qatar, and announces air, sea and land blockade.

AS we can see in the below map, due Qatar geographical location, the country was left with no exit possible by the surrounding neighborhoods, as in order to depart from Qatar, the aircraft either had to overfly Bahrain airspace, Saudi Arabia airspace or UAE airspace.



**Figure 14.** Map of countries involved in the Blockade

**Source:** GCO Qatar. (GCO, 2017)

The condition imposed by those 4 countries, to open their airspace to Qatari aircrafts was based on 13 political and media demands Qatar had to accept. Qatar rejected the blockading countries' demands as "The demands constitute an attack on Qatar's sovereignty" and the accusations made had no basis in fact. The blockaders' unilateral measures are denounced by the Office of the United Nations High Commissioner for Human Rights (OHCHR).

In 2018, ICAO board agreed on the necessity of the commitment of all parties to the highest standards of safety and security as well as emphasizing the full cooperation between States that have signed the 1944 Chicago agreement.

The plaintiff nations complained that only the ICJ (International Court of Justice) has the authority to decide on the dispute, arguing that the case goes beyond solely civil aviation matters. However, July 2020, that complaint was not upheld by the ICJ judges, who ruled that the ICAO is competent to hear the case. Now that the jurisdiction is within the ICAO, the national airline, Qatar Airways "will pursue its case for appropriate compensation of the financial injuries inflicted... as a result of the illegal airspace blockade.

Despite the outcome of this situation still needs to be decided, the impact that it had to Qatar Airways was unprecedented and actions needed to be taken immediately.

In May 2017, Qatar Airways was operating to **five destinations into UAE:**

- Dubai International (DXB) – Up to 20 different frequencies with different capacities. This was the most affected route.
- Dubai Al Maktoum (DWC)
- Sharjah International Airport (SHJ)
- Ras al Khaima (RKT)
- Abu Dhabi (AUH)

**One destination in Bahrain:**

- Manama International airport

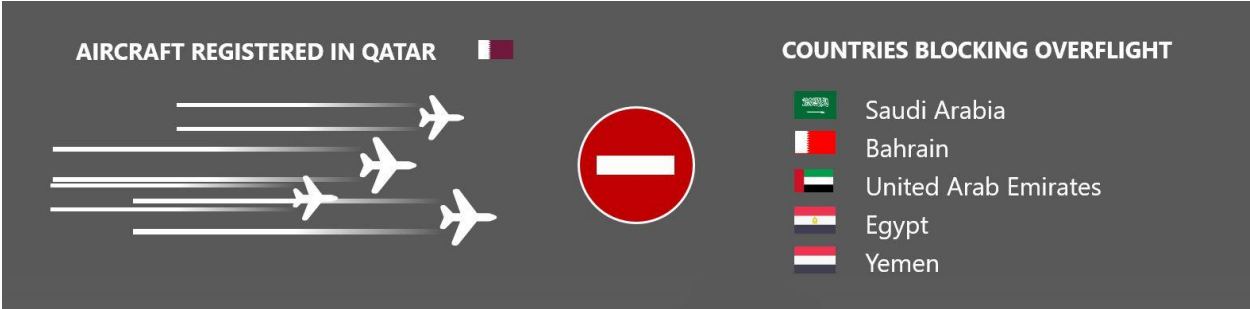
**Nine destinations in Saudi Arabia:**

- Dammam International Airport (DMM)
- Riyadh International Airport (RUH)
- Medina International Airport (MED)
- Jeddah International airport (JED)
- Abha Airport (AHB)
- Taif Airport (TIF)
- Hofuf Airport (HOF)
- Gassim Airport (ELQ)
- Yanbu International Airport (YNB)

**Three destinations in Egypt:**

- Cairo International Airport (CAI)
- Alexandria International Airport (HBE)
- Luxor International Airport (LXR)

With no notice, Qatar Airways had to cancel 18 regular flights to Egypt, Saudi Arabia, Bahrain and the UAE which were significant routes for Qatar given their shorter flying distance to North Africa and Europe.

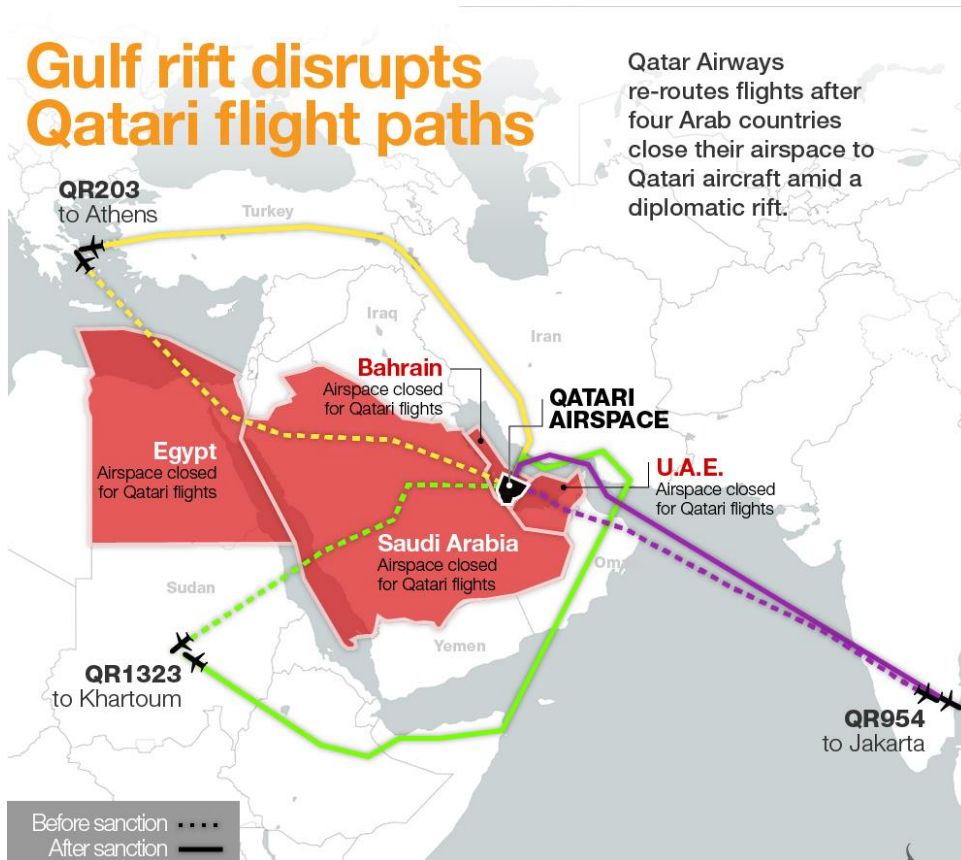


**Figure 15.** States prohibiting Qatari Aircraft to use their airspace

**Source:** Flight report 2018 (Kevin, 2018)

Since the blockade, flights that previously flew through the blockading countries' airspace have left and arrived at Hamad International Airport via waypoints on the border between Bahraini and Iranian airspace.

As we can see in below map, flights for North Africa and Europe have had to fly over Iran, Iraq and Jordan. Longer flights to the north and west use Turkish airspace as well. Thus, the new routes have established Iran as an important partner of Qatar to ensure flight safety and have boosted Iran's air traffic by 20 per cent as well as its revenue from fees for using its airspace.



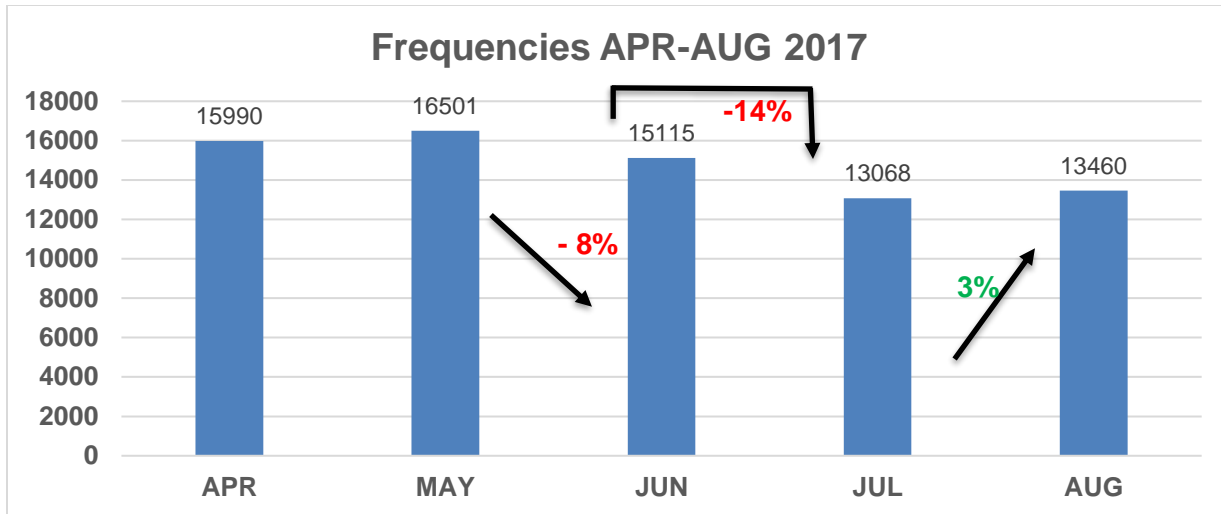
**Figure 16.** Example of new routes due airspace blockade

**Source:** (Aljazeera.com, 2020)

### 5.1.1 Data analysis

As mentioned in section 5.1, the blockade event happened on the 05<sup>th</sup> of June. As it happened early in the month, all the flights on the same day and for the rest of the month got disrupted. This can be seen very clearly on Figure 17 below, where the frequencies got reduced by an 8% between the months of May and June.

During the month of June, Qatar Airways had to not only cancel flight to eighteen destinations, but also had to re-assess their entire schedule, which impacted in further delays and cancellations. These cancellations represent a 14% of frequency reduction between June and July.



**Figure 17.** Qatar Airways frequencies from April to August 2017

**Source:** compiled by the author, AOG data

The company reacted fast against the new imposed restrictions and decided to counteract by launching new destinations. The resilience of the company can be seen in above figure, as they managed to increase within 2 months by a 3%.

Overall, in 2017, they managed to launch 10 new destinations within Europe, Middle East, and Asia. Proximity destinations were the ones targeted as operationally, where not much restricted with more overflying hours, and increasing the costs, as more fuel would have needed to be used. In 2018, they decided to approach Australasia and Far East. All of above destinations can be seen in Figure 18 below.



**Figure 18.** Qatar airways new destinations 2017-2018

**Source:** (Kevin, 2018) (World Health Organization , 2020)



## 5.2 Global disruption. Covid 19 pandemic

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus (WHO).

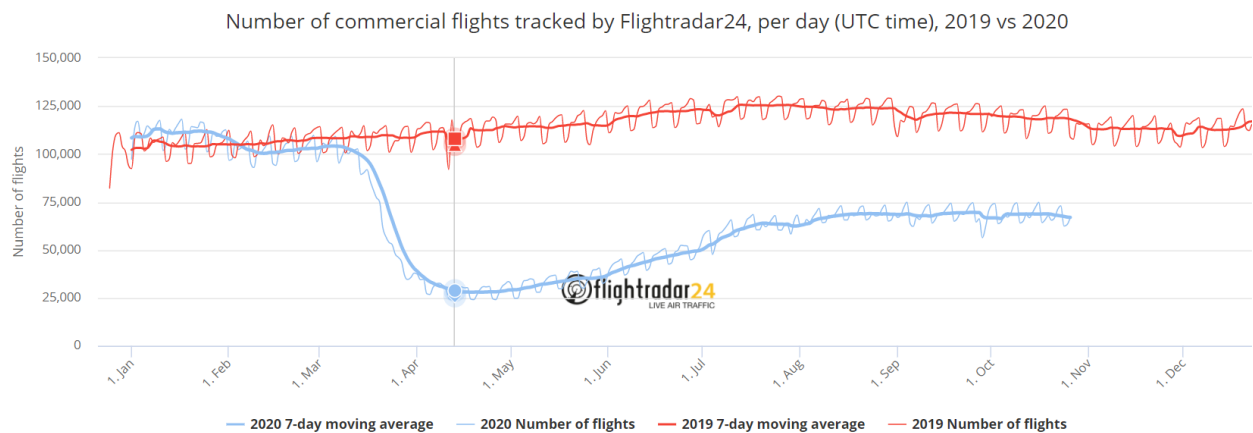
This virus is impacting significantly the aviation industry due to the imposed restrictions by the government countries. Some of these restrictions has caused consequences such as:

- Reduction of passenger numbers
- Cancellations
- Empty flights and airports
- Manpower cuts

All of the above, resulted in airline bankruptcies and experts on the sector do not foresee any improvement until 2024, being the worst crisis ever encountered in the history of the aviation industry (CNN, 2020; the Guardian, 2020; The independent, 2020).

### 5.2.1 Data Analysis

Despite not knowing when this pandemic really started, the first wave began approximately in March 2020 and reached its peak in April. Although there was a small increase during the months of June and July, when compared to 2019, commercial flights were down by a 62% and 38.7% respectively as seen in the figures below (Flight Radar, 2020).

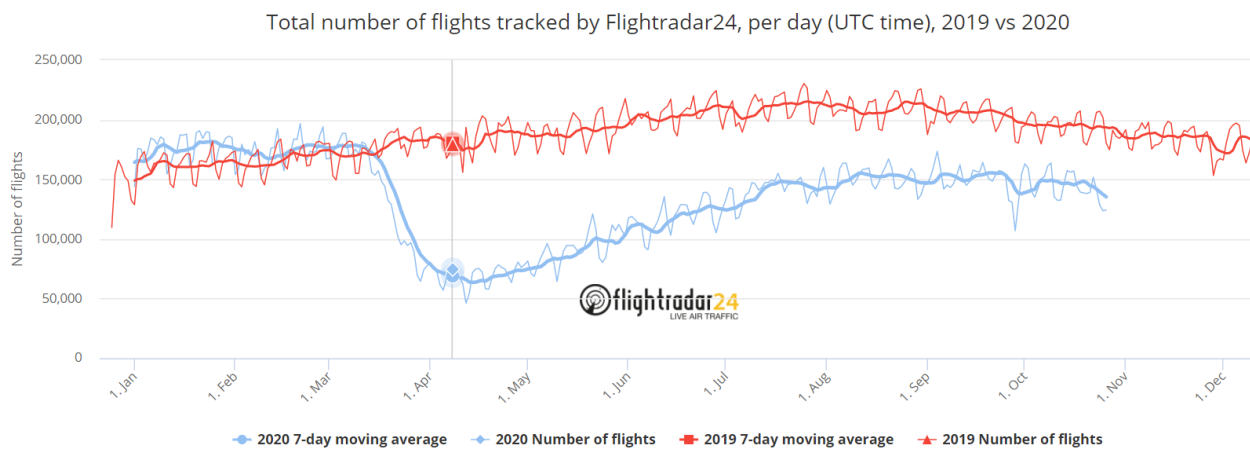


**Figure 19.** Number of commercial flights only tracked 2019 vs. 2020.

**Source:** FlightRadar24,2020 (FlightRadar, 2020)

In order to counteract the financial shortfall due to the lack of commercial operations, airlines have decided to use their fleet for cargo operations. All the shipments of Personal Protective Equipment (PPE) sent to countries were distributed by air freight, not only by their respective airlines but also being chartered by freight forwarders in order to boost their capacity. The positive effect of using passenger aircraft for cargo, is the increased aircraft utilisation rate, minimizing this way the number of parked aircraft. This strategy aims to balance the financial loss of the airline, trying to avoid bankruptcy and more manpower cuts until the commercial sector recovers.

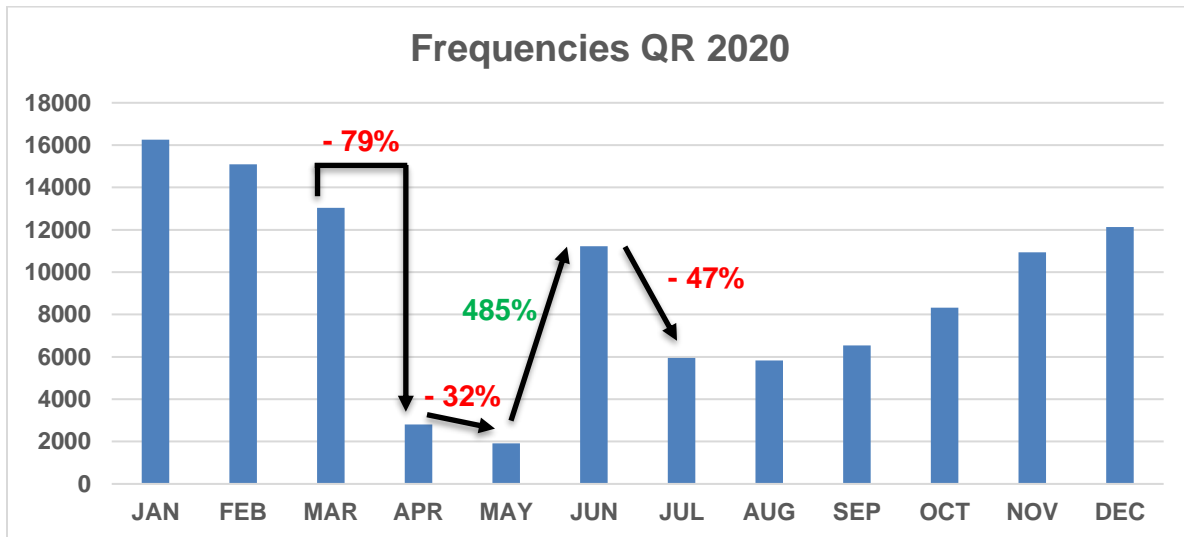
In Figure 20 below, it can be seen that the overall number of flights its higher than in Figure X, with just commercial flights. Total flights were only down by 42% and 32% respectively, reducing the gap between years compared to only the commercial sector.



**Figure 20.** Number of total flights tracked 2019 vs. 2020.

**Source:** Flightradar24, 2020 (FlightRadar, 2020)

As previously the author used as an example of regional disruption how Qatar Airways got affected when the blockade occurred, next it will be analysed the impact of Covid-19 for the same airline.



**Figure 21.** Qatar Airways frequencies 2020

**Source:** Compiled by the author (OAG, 2020)

As seen in figure 21, in April Covid-19 peaked and the frequencies from March to April plummeted a -79%. All flights in May continued cancelled and further restrictions imposed, next to the lockdowns experienced by countries lead to an additional drop of the 32%. However, in June, due to all the people stranded overseas, and with a lot of frequencies reduced by other airlines, Qatar Airways saw the opportunity to create repatriation flights (charters) in order to take people back to their home country.

Once the majority of the repatriation flights finished, the airline suffered another decline on their frequencies, falling a 47%. As the data was extracted from OAG the end of September, the months of October, November and December represent the flights on the schedule that the company has planned to operate for the winter season of 2020, with a very optimistic approach.

## 6 Delphi Results

### 6.1 First questionnaire

The first round of questions of the Delphi method aims to obtain a global and realistic vision about how core processes are used during a disruption. Therefore, the questions that have been asked to experts have been designed to obtain detailed information about their point of view. The main objective was to obtain expert responses based on their experience and insight of the industry, in which they could cover all issues in-depth.

After analysing the results obtained, it is clear that there is a consensus in the majority of the answers (questions and answers can be found in the annex 2)

#### 6.1.1 Question one

The first question was asked to determine if airline have the proper documentation regarding processes and which ones are considered the more utilized on the day-to-day basis.

The results show an unanimity, as there was a 100% of consensus, pointing out that for airlines is a must to have appropriate documentation when dealing with a disruption. Not all the experts specified which processes are the most utilized or recurrent, but all six of them agree that they are being used daily when handling a disruption.

Expert 2,3 and 6 mentioned delay as a core process. Also, expert 2 states that re-routes and re-times, cancellations and diversions are some of these processes being the latter the most utilized. Expert 6 shares with expert 2 that cancellation is one of the most used for airlines. While expert 3 mentions its diversions.

Expert 1,4 and 5 did not specify which processes are considered the core ones.

		Question					
		1					
Experts	1	Yes	-				
	2	Yes	Delay	Cancellation	Diversion	Re-route	Re-time
	3	Yes	Delay		Diversion		
	4	Yes	-				
	5	Yes	-				
	6	Yes	Delay	Cancellation			

**Table 5.** Question 1 summarized processes mentioned

**Source:** Compiled by the author based on answers from the experts.

### 6.1.2 Question two

Question two was asking the experts why they think core processes compliance is important to be able to return the schedule back to normal when a disruption is happening.

All experts consider that compliance of SOPs is essential to guarantee schedule integrity.

Expert 1 believes that compliance is critical because it gives you a structural and legal framework within which you are safe to operate. Although, processes need to be well-designed and defined accurately as experts 2 and 3 indicate. Without accuracy, compliance becomes challenging as employees know that documentation is not up to the industry standards and hence would not help the operation, jeopardizing passenger, and airline safety as expert 1 pointed out.

Expert 6 believes that disruptions are out of our control. Expert 4 defines it as God like events and in such volatile and variant environment, processes are needed, and must be accurate in order to ensure a consistent outcome in the minimum possible time and with the least possible cost for the airline as expert 2 explained.

We need to take into account brand image as expert 4 points out. Every decision that is made within operations is done with the customers interest at heart. The quicker you mitigate the disruption; the less customers are affected, as expert 6 states. As a customer, when you have a good experience with an airline, there is higher chances that they will fly again with the airline, not just because of the service but also for their performance. Nowadays, social media plays an especially important role in the image of a company. As expert 4 indicates quoting Warren Buffet, it takes 20 years to build a reputation and about five minutes to lose one. Therefore, when it comes to developing and growing a business, reputation matters, and will ensure its business continuity.

### 6.1.3 Question three

In question three, the author was asking the experts their point of view regarding the operational impact differences depending on the scale of a disruption. And specifically, comparing in detail, the Qatar blockade and the Covid19 pandemic, explained before on section 5.

While experts 2,4 and 5 have positioned themselves in a very clear manner, expert 1 and 3 have arguments from both perspectives and expert 6 was not familiar enough with the situation in order to provide an answer.

Expert 1 and 2 agree on one hand that the operational integrity of an airline gets affected exactly the same regarding of the scenario faced, but expert 1 believes that the scale of the scenario just determines the length of time required for an airline to return to normal operations and expert 2, believes that the same core procedures need to be applied repetitively, over and over again in order to mitigate the impact of a global disruption due to its scale.

Expert 3 shares a similar point of view as believes that when the blockade happened, the airlines affected had to rethink their entire network at once.

There was only one post scenario situation, were the companies, operationally, had to work towards it and once adjusted, they included it as part of their normal operations. The difference compared to the pandemic facing today, is that, when it happened, there was a continuous instability that made the scenario change day by day and adjustments to the operation had to be done on a daily basis.

Expert 3 and expert 5 agree that the Covid19 disruption is on a much larger scale compared to the Qatar blockade as it has affected the operations of all the airlines globally instead of only affecting a specific part of the operation and few countries only.

#### 6.1.4 Question four

In question four, experts were asked their opinion regarding the success of airlines ability to manage a disruption and if the geographical location plays a part in it.

Results shows that expert opinions are divided equally. 50% of them believes that location plays an important role while handling a disruption, however, expert 1,3 and 5 think otherwise.

Expert 1 disagrees with the question as states that an airline's survival depends to their ability to react to a crisis. Moreover, expert 1 firmly believes that an airline has to be adaptable and malleable to any situation.

Expert 3 thinks geographical location plays a part depending on the scale of the disruption. In a regional scale, it makes a difference depending on where the airline is based, as it affects the operation to a different degree. In a global disruption, the differences are minor as the affected areas are all over the world.

Expert 4 determinedly thinks that geographical location is a key contributor to the extent of a disruption. Although expert 4 also states that any disruption can be managed as long as there are processes which define every stakeholder's role within the company.

#### 6.1.5 Question five

Question five wants to know the expert's opinion about the significance of fleet variation in the context of a disruption.

Expert 1, 4 and 5, declare that Emirates is a clear example of fleet variation during a disruption. Expert 4 and 5 agrees that fleet commonality makes a big difference in saving costs, as the less fleet variation, the easier it will be to handle a disruption. Meanwhile, expert 1, believes that Emirates, has a significant disadvantage as their fleet is comprised of only two aircraft types and all the pandemic did, was to accelerate the decline in A380's, leaving Emirates to operate with only 777 fleet.

Expert 6 understands fleet variation as the ability to change/adapt aircrafts depending on the circumstances. Expert 2 agrees with that statement, as for the expert fleet variance during a

disruption signifies that you can take into account different types of aircraft within your fleet that potentially can replace the aircraft suffering the disruption in order to ensure business continuity.

#### 6.1.6 Question six

This question wanted to know the expert's opinion regarding the best possible way to counteract a disruption. At the same time, the author is looking to understand if the experts think divide and conquer is a better suitable method than just one person handling all the disruption.

The answers show a 100% consensus on dividing and conquer technique as the disruption would be solved faster.

Expert 5 mentions that depending on the scale of the disruption the way to approach it would vary. Although, the expert believes the best way would be to divide and conquer, because the level of stress and workload will be more evenly handled and will result in a better outcome, also points out, that to just allocate everything to one person would never work if we are talking about a major disruption. Expert 1 and 4 agree with that statement as they believe that handling the disruption can be an effective way of channeling information and providing only one point of contact, although disruption could overwhelm one person and mistakes could be made, as expert 2 also affirms.

Expert 1 also states that effective leadership, intelligent division of work amongst the operators and skilled teamwork and communication will allow the disruption event to be handled quicker. Expert 3 adds, that in that case, handling the disruption becomes a team task, were staff can crosscheck each other's activities for validation, and it is ensured that all staff have similar workload.

Expert 2 wants to point out that once processes are well-designed, any person within the department should be able to do the same job with the same outcome as result, avoiding the 'critical person syndrome'.

When first questionnaire was finished, we can observe a clear consensus in most of the answer. (However not clear on some subjects)

Question seven will be analyzed and explained in recommendations.

As second question cannot be answered in a positive or negative way, is not considered in the table below

		Questions				
		1	3	4	5	6
Experts	1	Yes	No	No	Yes	Divide and conquer
	2	Yes	No	Yes	Yes	divide and conquer
	3	Yes	Yes/No	Yes/No	Yes/No	divide and conquer
	4	Yes	Yes	Yes	Yes	divide and conquer
	5	Yes	Yes	No	Yes	divide and conquer
	6	Yes	-	Yes	Yes/No	divide and conquer

**Table 6.** consensus

**Source:** compiled by the author



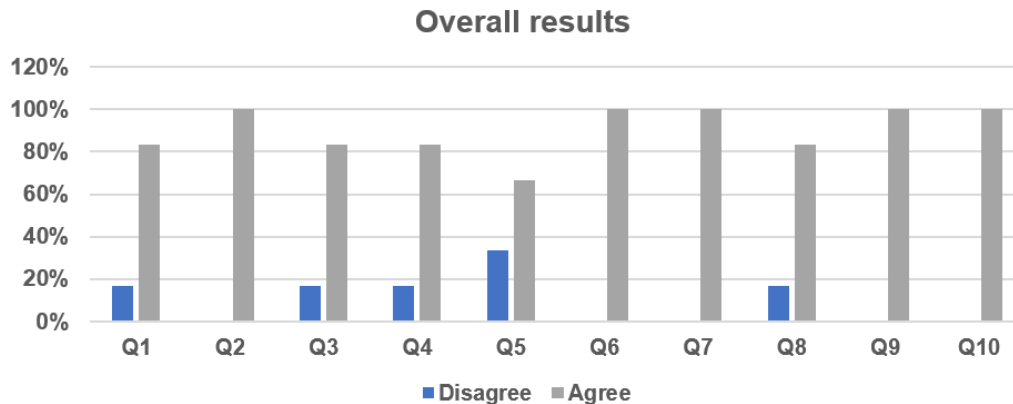
## 6.2 Second questionnaire

In the second iteration of the Delphi technique, six participants answered the questionnaire. The survey aimed to establish if the experts agreed or disagreed on statements that were identified in the first questionnaire made by the rest of the group of experts. As some of the experts had different point of views for some of the questions, and were not firm with a clear answer, the author wanted on this second questionnaire for the experts to narrow down the results in order to see if consensus is reached.

The questions formulated to the panel of experts can be find in the annexes.

In the graph below, as explained on section 4.2.2.2, in order to see clearer results, the author decided to cluster the seven possibilities from the Likert scale down to two possibilities: either agree or disagree.

It can be seen that a 100% of consensus was reached in 5 out of the 10 questions that were asked. In the following sections, all the results will be described more in depth. (table with survey results can be find in annex 3)

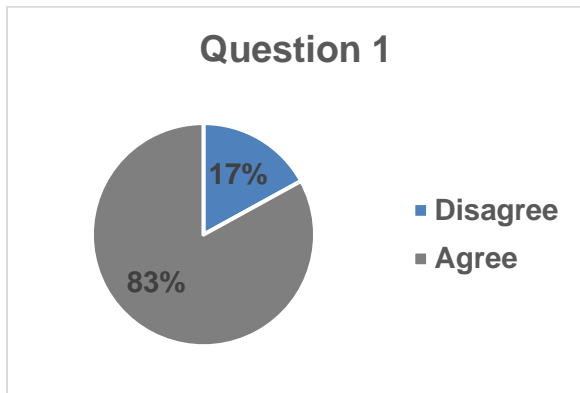


**Figure 22.** Overall results

**Source:** compiled by the author based on survey results

### 6.2.1 Question one

After determining airlines does have internal core processes that are followed in case disruption, the author wanted to re affirm the point to be able to narrow their opinion. In the first questionnaire, they determine that exist, however, second questionnaire aims to decide if those can be applied for any kind of disruption. While 83% of experts agree, expert 6 differs to their opinion considering they cannot be applied for any kind of disruption.

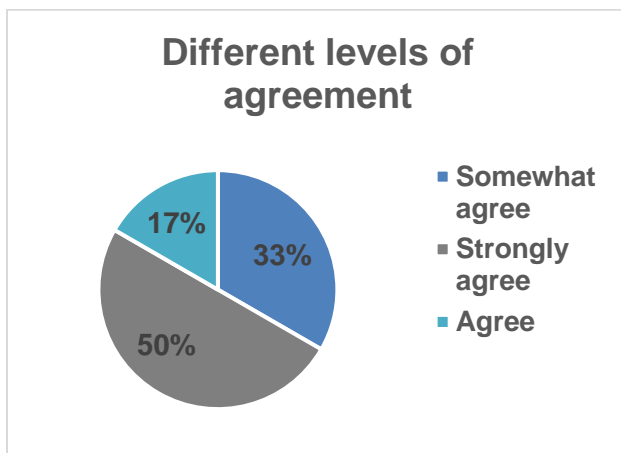


**Figure 23.** Question one percentage of agreement

**Source:** Compiled by the author with the survey data obtained.

### 6.2.2 Question two

Second question is wanting to proclaim that compliance to processes does help airlines to recover back to their schedule. In the first questionnaire question 2 referred to process compliance, and while different opinions where explained, all of the experts highlighted the importance due various reasons. Once again, in questionnaire two, this statement gets affirmed with 100% agreeing. While two experts agree and one only agree, majority strongly agrees. Nevertheless, there is a clear consensus.



**Figure 24.** Different levels of agreement

**Source:** Compiled by the author with the survey data obtained

### 6.2.3 Question three

Question three is wants to ask the exact same as question one, but instead of stating “any kind of disruption”, differences between Regional and Global.

Same result as question one is obtained, and is same expert, the number 3, which disagrees with it. This shows a clear pose of expert number 3 in the subject.

However, as 83% shows an agreement, we can consider as per the Delphi Method, that we have a consensus.

### 6.2.4 Question four

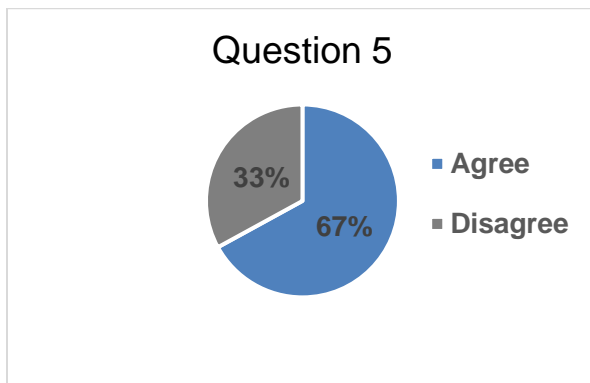
Question four is related to question number five in the first questionnaire. While there was a consensus of opinion thinking that there is a significance of fleet variation in the context of disruption, two experts show different points of views which make them doubt on their answer as they could see it from different point of view.

In questionnaire two, the author wants to know if this variance commented, helps to manage a disruption. Even having consensus as 83% agrees, there is still one expert who contrasts that opinion. It happen to be expert 5 which in first questionnaire agreed that there is a significances, however, he doesn't agree that it does help to manage a disruption as he states in first questionnaire “ The less fleet variation, the more easy it will be to handle disruptions”

### 6.2.5 Question five

The fifth question is the one that creates more controversy as opinions varies. The author states that the operational impact and schedule recovery time is bigger while comparing a global disruption with a regional one.

67% of the experts, think that the affirmation is correct as they agree at some level. However, 33% of them disagree with the statement. Those are expert 1 and expert 5.



**Figure 25.** Question five results

**Source:** Compiled by the author with the survey data obtained

#### 6.2.6 Question six

Question six will be analyzed as a part of the recommendations.

#### 6.2.7 Question seven and eight

Both of questions are relate to process compliance. Seven wants to know if experts agrees that process compliance is directly related to the accuracy of those. All expert agrees as we find a 100% consensus with the statement. Moreover, and going further with the subject, the author wants to narrow their opinion knowing if the compliance will help the airline to mitigate the operational impact and ensure faster recovery. Although finding a consensus, one expert disagrees with the statement.

#### 6.2.8 Question nine and ten

With the ninth statement “The way a disruption is managed by an airline will create a reputation by industry and the public eye” has a 100% consensus. This is a point that expert 1,4 and 6 repeated during first questionnaire, and hence, the author wanted to know the other expert’s opinion.

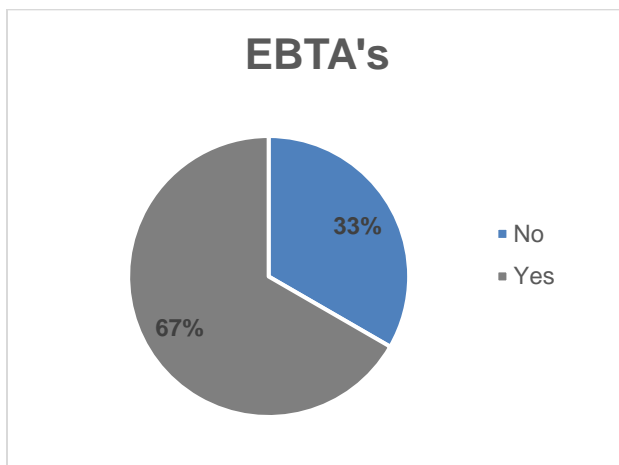
Question 10 aims to know the expert opinion with one of the main subjects of the thesis, the handling difference between two different scale scenarios. 100% consensus is found, the experts think that the difference is the number of times a core process is repeated.

## 7 Recommendations

### 7.1 Evidence Based Training (EBT)

According to ICAO, EBTs is a training and assessment based on operational data that is characterized by developing and assessing the overall capability of a trainee across a range of core competencies rather than by measuring the performance in individual events or maneuvers. (ICAO, 2013)

The author is proposing as a recommendation EBTs in order to enhance process compliance and verify its accuracy in the workplace. At the same time, this tool helps to train staff for unprecedented situations based on real time scenarios, preparing the employees to face any type of disruption in the most efficient way.



**Figure 26.** Results regarding EBTs

**Source:** compiled by the author

33% of the experts did not believe that EBTA's are a good methodology to follow when testing unprecedented disruptions. Expert 3 thinks EBTA cannot train for specific situations and expert 1 adds that nothing generates stress like a real-life event. Therefore, concluding that EBTA's will never manage to re-create the unexpected situations faced in the real world. However, both experts agree that, EBTA's are useful for managing and handling stress in order to channel it into effective workmanship. Expert 3 also believes, EBTA's does help to create a pattern of thought and allows employees to understand the requirements in case a disruption happens, creating situational awareness in those common cases that the staff have to deal with frequently.

With a 67% of agreement, the author can state based on the table in section 4, that there is a strong consensus with this proposal and therefore, this recommendation is accepted by the experts. .

Expert 2 firmly believes that EBTA's are a good methodology and will make the trainings more effective as the situations presented will be more realistic and easier for the employees to connect with. Meaning, therefore, an increased comprehension, retention and later on, application on the job which would help facing unprecedented disruptions such as the Qatar blockade or Covid19. Expert 4 and 5 also think EBTA's provide some good insights and an excellent way to test processes, helping to enhance people's skills and awareness level.

## 8 Conclusions

The conclusions, limitations and further research of this thesis would be explained following its initial objectives

### 8.1 Objective 1

---

**Understand what airline disruption management is and what the operational core processes of an airline are**

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#### 8.1.1 Conclusion

Disruption Management is a collaborative process of decision making which involves several stakeholders. Therefore, accuracy on the processes that have to be followed when handling a disruption is key to mitigate the impact for the airline, trying to avoid a knock-on effect.

#### 8.1.2 Limitations

Disruption management has a broad understanding depending on the country, airline, and department. Moreover, it was complex to find the definition of disruption management from an operational point of view.

The actions to counteract irregular operations are mostly defined from a commercial point of view and standardization of these processes are described differently in every airline on their manuals. Therefore, finding information on the topic it has been challenging.

#### 8.1.3 Further research

The author found different academic articles regarding how to automatize some of the core processes in different models they created. Further research should be done in order to understand more in-depth the above models and if automatizing processes in operations would be safe and reliable.

## 8.2 Objective 2

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**Research if regardless the scale of the disruption, the same set of processes are applied to achieve a successful schedule recovery**

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### 8.2.1 Conclusion

Based on the primary data and secondary data that the author gathered, it can be concluded that regardless the scale of the disruption the same set of core process can be applied in order to ensure schedule recovery.

However, the impact of a disruption varies based on the dimension. While in the blockade the number of frequencies got reduced 14%, during Covid19 the frequencies dropped a 78%. Although, in both scenarios the same set of processes were applied in order to recover from the operation as seen in below table

	Regional Disruption Qatar Blockade	Global Disruption Covid-19
Delay	✓	✓
Cancellation	✓	✓
Return to stand	✓	✗
Diversion	✓	✗
Aircraft change	✓	✓
Additional flight	✓	✓
Flight re-schedule	✓	✓
Flight re-route	✗	✓

**Figure 27.** Core processes comparison between scenarios

**Source:** Compiled by the author



## 8.2.2 Limitations

Covid19 is an event that started approximately in February and some of its impacts can already be quantified but not entirely as it is still ongoing. While the blockade happened in 2017 and a complete analysis has been able to be performed.

Due to the time limitations, a better qualitative approach should have been found as the Delphi technique resulted long lasting and very time consuming. The research on this technique, identifying the panel of experts required a long time.

The author tried to find experts within the aviation industry with different backgrounds and that resulted sometimes in vague answers from some of the experts, as they were not familiarized with the questions asked. This resulted in less answers, which led to a small sample of experts and therefore the results found are less reliable than if the questionnaire would have been answered by a bigger group of experts on the topic.

## 8.2.3 Further research

As stated above, in the limitations section, Covid19 it is still a current and uncertain situation, therefore in a few years from now, the analysis that can be performed would be more in detailed that the one given on this master thesis.

For further research, the sample of experts on the Delphi could be increased as well as the number of iterations done. Therefore, trying to verify if with a bigger sample, the outcome would be the same or would remain unchanged.

## 8.3 Objective 3

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### **Propose key recommendations to enhance process compliance**

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### 8.3.1 Conclusions

The author proposed EBTs as a recommendation to enhance the process compliance and verify the accuracy of the processes.

Overall, a 67% of the experts accept this recommendation, and therefore, the author can state that there is a strong consensus with this proposal. Based on the expert's opinions, it can be concluded then, that EBTs provide some good insights and an excellent way to test processes, helping to enhance people's skills and awareness level.

### 8.3.2 Limitations

All the information found by the author regarding EBTs was regarding cockpit safety and emergency situations for the flight crew with the aim to prevent incidents and accidents from happening.

### 8.3.3 Further research

As stated above, EBTs within the aviation industry are utilized for the Flight crew. Therefore, further research could be undertaken in order to find out if EBTs could also be helpful if applied in other departments and industries

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## Annexes

1. DATA FOR COVID19 AND QATAR BLOCKADE WILL BE PROVIDED SEPARATELY
2. DELPHI FIRST QUESTIONNAIRE Q&A

### **EXPERT 1**

1. Do you think airlines have proper documentation on operational processes to follow in case of disruptions? Which processes would you consider as core processes or more recurrent ones?

Yes, each airline will have to have a specific set of procedures that can be followed during times of disruption. They will be general enough that they can be applied to any kind of disruption because ultimately the goal for disruption management is protection of passengers, schedule recovery and obviously the reputation of the airline in handling and managing it. The quicker it can be resolved, the better. Within this general application of disruption management can be specific additions or amendments that deal with specific and unusual types of disruption. This is why the procedures have to be adaptable like the staff. The general procedure remains the same because the goal never changes, but you are allowed flexibility within that framework to operate and as I previously mentioned, it's those airlines that adapt the quickest within their disruption framework, that succeed.

2. Why do you think core processes compliance is important to return the schedule back to normal in case of a disruption?

Compliance to core processes is critical because it gives you a structural and legal framework within which you are safe to operate. Airline staff as always want the best for their customers and every decision that is made is done so with the customers interest at heart. However, that has to exist within a standardised set of rules and regulations otherwise it could jeopardise passenger and airline safety.

3. Do you think that there are any operational impact differences in different scale disrupted scenarios such as Qatar blockade (regional disruption) VS covid19 pandemic (Global disruption) ? Detail your answer.

in a word, yes. Any scenario that affects the operational integrity of an airline has the same impact, the scale of the scenario just determines the length of time required for an airline to return to normal operations. If you compare snow closing an airport to COVID-19. The impact of snow on airline is cancellations which result in passengers being stranded, but snow is transient and therefore the recovery time for the airline is maybe 1 or two days. COVID19 has resulted in cancellations too, only on a much larger scale and the recovery time is going to be years. So, in my view the impact is actually time. The most successful airlines are the ones that reduce the length of time that an operational event has on their program. How adaptive are they to current trends and how quickly can they respond to shifting global needs for travel.

4. **Does geographical location play a part in the success of airlines ability to manage disruption?**

No. An airlines ability to react to a crisis is what ensures its survival. They have to be adaptable and malleable to any situation. The current pandemic has been very good at showing which airlines have been able to adapt and, despite still financial hardship, has at least maintained and attempted to fill the aviation void through repatriation flights, charter flights, cargo flights.

5. **In your opinion, what is the significance of fleet variation in the context of disruption?**

Highly significant. A good example of this is Emirates airline. Their fleet comprised of two aircraft types, the 380 and the 777. Even before the pandemic the A380 requirement and effectiveness was on the decline all the pandemic did was accelerate that and now Emirates is only left with the 777. When compared against Qatar Airways, which has a fleet ranging from the 319-380, the adaptability and usability of the fleet can be coordinated with the passenger load, the destination the cargo requirement.

6. **What is the best way to counteract disruption? Divide and conquer (e.g. split the tasks up) or allocate to one person to handle it all? What are the positives and negatives of each?**

In an operations environment, when handling disruption, giving one person the job of handling the disruption can be an effective way of channeling information and providing one point of contact. However, when arguing against that, disruption could overwhelm one person and mistakes could be made because the workload is too great. Operations, or Integrated Operations Control is, by definition, team oriented. No one person or department can do it. That is why I believe the best way to do it is divide and conquer. Effective leadership, intelligent division of work amongst the operators and skilled teamwork and communication will allow the disruption event to be handled quicker. It is not just about handling the event in real time, but the recovery time as well. By dividing and conquering the problem, different teams can handle different events along the disruption timeline and the end result is a return to normal operations faster.

7. **Do you think Evidence based training ( EBTA's) is a good methodology to test processes in place in front of an expected disruption? If so, EBTA's recurrence would help unprecedented disruption such as Qatar Blockade or COVID19 ?**

First of all, nothing generates stress like a real-life event. EBTA's will never manage to recreate the unexpected that real world situations can. Managing and handling stress so you can channel it into effective workmanship is what the EBTA should be about. EBTA's are useful in that regard, and then you can apply you stress management to real world disruption scenarios.

## **EXPERT 2**

### **1. Do you think airlines have proper documentation on operational processes to follow in case of disruptions? Which processes would you consider as core processes or more recurrent ones?**

Yes, I do think airlines have proper documentation to follow in case of a disruption. SOPs (Standard Operating Procedures) are strict procedures, defined after much research, covering every normal, abnormal and emergency situations with the purpose to ensure the most successful outcome from the disruption. Within the core processes that are used almost daily in operations we have delays, cancellations, diversions, technical issues, re-time of a flight, crew calling in sick, crew exceeding duty periods...

### **2. Why do you think core processes compliance is important to return the schedule back to normal in case of a disruption?**

In case of a disruption happening, first the type of disruption needs to be identified in order to be able to apply the adequate SOP and consequently, follow the steps that will ensure the desired outcome, which is recover our schedule integrity and ensure business continuity in the minimum possible time and with the least possible cost. As stated above, I think processes are needed as they ensure a consistent outcome in a volatile and variant environment. Processes aim to achieve the highest level of operating efficiency in the company.

### **3. Do you think that there are any operational impact differences in different scale disrupted scenarios such as Qatar blockade (regional disruption) VS covid19 pandemic (Global disruption)? Detail your answer.**

I think well-designed core processes are the ones that need to strictly be followed and regardless of the people who follow them (obviously with prior training) and type of disruption, they will ensure the same outcome. Therefore, I don't think there weren't any operational differences between the Qatar blockade and Covid19. Just due to the abnormal situations faced, more procedures were happened to be applied.

For example, in the case of Covid19, most countries restricted crew to layover as in order to enter the country they would have to get quarantined for a period of time. In this case, if the company still wants to fly to these affected countries, they would need to send a double set of crew (one to operate one sector, and another fresh one to operate the return sector). Crew has something called FTL (Flight Time Limitations) in order to avoid fatigue and ensure a safe flight. If those are exceeded, they become illegal. Therefore, if we have a disruption and due to a technical issue the aircraft requires to be grounded for more time than the crew limitations state, they will become illegal and another set of crew will have to be sent and in the meanwhile the crew affected if no other flights are available will have to remain within the aircraft.

In this case, the steps to be followed in case of an AOG (Aircraft On Ground) and crew being illegal will be the same in normal times, the blockade or Covid19. Just, in some situations there might be more complications to be faced due to restrictions the company is undergoing. Obviously, this documentation can be revised on a case by case scenario in order to make sure that the company will be ready and prepared in case same situation arises in the future.

Another consequence of Covid19 due to the huge decrease of passengers that airlines are experiencing, airports are using these times to undergo maintenances in their runways

and closed them either partially (for a period of hours during the day) or completely. In case of any diversion or any sort of disruption happens in that airport or in close proximity of it, this amplifies the degree of severity the airline might be facing and produces a snowball effect in their schedule.

#### **4. Does geographical location play a part in the success of airlines ability to manage disruption?**

Yes, of course! If let's say an airline is flying to Male or Fiji, will have more problems at the moment to handle a disruption, than if it happens in Munich. For example, in the case of a diversion, when approaching Male, as you are surrounded by water and islands only have a main airport, you might have to divert into a secondary airport (which will not have the facilities needed to handle your aircraft), fly to the nearest country, Sri Lanka in this case (approx. at 01:20 minutes) or depending of the severity of the diversion even have to plan a ditching. In case your airline is flying to Munich but the airport is closed, the aircraft can easily divert to Hannover or any secondary airport (with more resources than secondary airports in islands or developing countries).

In the case of Qatar airways, due to the blockade they are suffering, and they are restricted to land and overfly certain countries such as UAE, Bahrain or Saudi Arabia. In case Hamad International Airport is closed (DOH) then, the airline cannot divert to the above countries and have limited options. They can either plan to land in their secondary airport (old airport) or to Iran and Kuwait as those are the closest countries where they are allowed to operate.

#### **5. In your opinion, what is the significance of fleet variation in the context of disruption?**

In my opinion, I would say it is when during a disruption you can take into account different types of aircraft within your fleet that potentially can replace the aircraft suffering the disruption in order to ensure business continuity. For example, if I have a flight departing to Frankfurt which is operating on a B777 and the aircraft suffers a technical problem, we could potentially swap the tail of that FRA flight with an A350 which next flight it is not happening until 4-5 hours later with very minor consequences, if any.

#### **6. What is the best way to counteract disruption? Divide and conquer (e.g. split the tasks up) or allocate to one person to handle it all? What are the positives and negatives of each**

The best way to counteract a disruption is by divide and conquer. Once processes are well-designed, any person within the department should be able to do the same job with the same outcome as result. This will help to diversify the workload evenly within the team and avoid the 'critical person syndrome.' Moreover, during a disruption different stakeholders need to be contacted, therefore, its better if the team split the tasks as the disruption will get solved faster. Otherwise if all the work is handled by the same person, it would be less efficient and have a higher risk of making a mistake as the pressure would be also higher. To sum up, good teamwork is the guarantee of good results.



**7. Do you think Evidence based training ( EBTA's) is a good methodology to test processes in place in front of an expected disruption? If so, EBTA's recurrence would help unprecedented disruption such as Qatar Blockade or COVID19**

I firmly believe so. Today's accidents occurring on the workplace are most likely caused by human error. In this life we have always said that the only way to learn is the hard way, which means by making mistakes and once we have faced it once, as emotional beings we do not want that feeling to be repeated. This is why, in order to further mitigate the risks, EBTA's will make the trainings more effective, as the situations presented will be more realistic and easier for the employees to connect with. Meaning, therefore, an increased comprehension, retention and later on, application on the job which would help facing unprecedented disruptions such as the Qatar blockade or Covid19.

**EXPERT 3**

**1. Do you think airlines have proper documentation on operational processes to follow in case of disruptions? Which processes would you consider as core processes or more recurrent ones?**

Documentation is an ongoing activity that airlines must do continuously to ensure accuracy. However, frequently documentation is not a core activity within the business so documentation becomes outdated. In the case of disruptions, the challenge is to produce standard documentation on situations that have not happened or that are difficult to generalize. That may make the applicability of certain disruption processes difficult in certain occasions, especially in those rare scenarios that deviate from the standard.

I would consider core processes those that happen frequently or that have the biggest impact (brand, cost) for the airline. These include frequent scenarios with lower impact such as delays, diversions, etc, but also infrequent scenarios with higher impact, where operations are severely disrupted, such as hub closure, permanent closure of critical airspaces, etc

**2. Why do you think core processes compliance is important to return the schedule back to normal in case of a disruption?**

Processes compliance is closely related to accuracy of processes. Investing time and effort in documenting accurately the processes increases the importance of process compliance and reduces uncertainty (all situations are taken into consideration and can be properly solved). If processes are not properly documented, compliance becomes challenging as those who have to comply know that documentation is not accurately done and hence compliance is not required and does not help to the operation.

3. **Do you think that there are any operational impact differences in different scale disrupted scenarios such as Qatar blockade (regional disruption) VS covid19 pandemic (Global disruption) ? Detail your answer.**

There are few significant differences. In the case of Qatar blockade, there was an event that required to rethink the entire network at once. In that case there was just one post scenario situation and the whole operation worked towards adjusting to it. In the case of a pandemic, there was continuous instability that made the scenario change day by day and adjustments to the operation had to be done on a daily basis due to the changes.

A regional blockade, in a global airline, affects a specific part of the operation. In the case of the blockade, those flight overflying the blockading countries or with destination those countries. In the case of a global disruption, the operation is affected globally and in different ways difficult to forecast.

4. **Does geographical location play a part in the success of airlines ability to manage disruption?**

In a regional disruption, it makes a difference depending on where the disruption happens and where the airline is based, as it affects the operation to a different degree.

In a global disruption, the differences are minor as the affected areas are all over the world and impact is the same regardless on where the airline is based. The only differences would come from different local regulations

5. **In your opinion, what is the significance of fleet variation in the context of disruption?**

Fleet flexibility is key to disruptions where the demand has a big impact. In those disruptions where the demand fluctuates, having a flexible fleet allows the airline to adjust the operation to different destinations according to specific demand fluctuations. However, if the disruption does not affect demand, having different fleet can challenge the operation due to different characteristics of fleet and route requirements (can different fleet reach different destinations, do fleet have enough capacity for accommodate demand, etc)

6. **What is the best way to counteract disruption? Divide and conquer (e.g. split the tasks up) or allocate to one person to handle it all? What are the positives and negatives of each**

Although there is no magic potion to deal with disruptions, splitting up tasks might have more positives than one person handling it all. In that case, handling the disruption becomes a team task, where staff can crosscheck each others activities for validation, and it is ensured that all staff have similar workload. If one person handles it all, there

is a big risk of competing individuals and the workload might not be balanced within the team.

7. **Do you think Evidence based training ( EBTA) is a good methodology to test processes in place in front of an expected disruption? If so, EBTA recurrence would help unprecedented disruption such as Qatar Blockade or COVID19 ?**

EBTA cannot train for specific situations as scenarios will always be unique. However, EBTA does help to create a pattern of thought and allows employees to understand the requirements in case a disruption happens. It does help create situational awareness in those common cases that the staff have to deal with frequently.

#### **EXPERT 4**

1. **Do you think airlines have proper documentation on operational processes to follow in case of disruptions? Which processes would you consider as core processes or more recurrent ones?**

Disruptions are considered to be a part of daily routine, and majority of the airlines are well equipped to handle any sort of disruption, be it act of God like events, or controllable events. I also think the handling of events has improved significantly through operational processes in recent times, however, there are still some gaps which are yet to be filled. In our industry, we must take the industry leading measures in order to ensure that we have happy customers, and for that you need to start focusing on process excellence. Business process automation is a straightforward, effective way to get started on that path. Business process automation is the use of technology to execute recurring tasks or processes in a business where manual effort can be replaced. It is done to minimize costs, increase efficiency, and streamline processes.

2. **Why do you think core processes compliance is important to return the schedule back to normal in case of a disruption?**

I think core process compliance is important since the whole compliance is immediately associated with laws, constraints, inspections, audits and penalties for those who don't follow the rules. It's seen as the necessary evil, a mandatory exercise that sucks up valuable time, effort and resources from people who would much rather be working on projects that innovate, inspire, and motivate. In case of an airline disruption, if there is no compliance then the entire group of people will not feel the same responsibility and would not take bonus to get the job done in order to minimize the impact. In our industry, if we don't have happy customers, then there is no salary for the employees. We must have robust approaches in order to react quickly to bring the flying schedule back to normal. Although it takes a while pending the situation, for instance, if the long haul flights have been impacted then then recovery would be longer as compare to the short haul flights. Overall, the business compliance is critical to establish customer trust and brand loyalty. As it's said by Warren Buffett, ***it takes 20 years to build a reputation and about five minutes to lose one.***" (Heim, Anna. 2018) when it comes to developing and growing our businesses, reputation matters!

3. **Do you think that there are any operational impact differences in different scale disrupted scenarios such as Qatar blockade (regional disruption) VS covid19 pandemic (Global disruption)? Detail your answer.**

I definitely think it has more operational impact when dealing with any disruption especially when Qatar blockade is taken into an account, since there is very limited flexibility in the system when there's an operational disruption. On the side note, we're dealing with the pandemic which makes it even harder to tackle any sort of disruption due to many new restrictions and where strict compliance is required. Being the major player in the market, or the in region, where the stakes are so high so you need to be extra vigilant as you don't want to end up in the media for any wrongdoings. Qatar blockage has definitely put more pressure on the airline especially on the national carrier of Qatar, but due to their resilient approach, the airline has emerged stronger and managed their disruption in a very professional manner.

4. **Does geographical location play a part in the success of airlines ability to manage disruption?**

I think it does a vital role, but any disruption can be managed as long as there are processes which defined their role of every stakeholders within the company to overcome any disruption. For instance, any business must be ready to handle any sort of operational event, be in disruption, or something out of the ordinary. If we take the United States for example during their hurricane seasons, all airlines operating in and out of the Gulf Coast of the US, are well aware of the problems during the hurricane event, and they take good measures to protect their brand and the well-being of their customers and employees. On the other hand, if we take Qatar Airways' example, due to regional instability, it will be harder to manage the disruption due to not having many alternate airports which puts extra pressure on the scheduling side of Qatar Airways.

5. **In your opinion, what is the significance of fleet variation in the context of disruption?**

Having a fleet commonality makes a big difference in saving costs and other factors, for example, Southwest Airlines have always made profit and they are continuing to do so and we can also have a look at Dubai based Emirates Airlines, having only 2 types of fleet makes it easier to handle any disruption, and also saves a lot on the training cost, maintenance cost and other costs.

6. **What is the best way to counteract disruption? Divide and conquer (e.g. split the tasks up) or allocate to one person to handle it all? What are the positives and negatives of each?**

The best way to deal with any disruption is to be well positioned yourself with company policies and procedures. Any disruption handling hovers around the company best policies

which offers solutions. Although many companies do not seem to learn from their previous mistakes, nor from their previous handling of events. It is more prudent to be well aware of your manuals, processes and also to use your past experiences. In an operations control center of airlines, there are many stakeholders who play their vital parts in order to bring the schedule back to normalcy as soon as practical. Therefore, dividing the tasks really helps in simplifying the process and especially when dealing with disruptions. For example, during an operational event, one could at the scheduling part of it and how to protect the flying program, the second person could look at the handling of a disruption and its implications and be a one point of contact to answer the common questions. I also don't think allocating one person to look after the huge tasks unless the operational event does not have a big magnitude. The some of positives of splitting the tasks, are – the disruption is well managed as everyone will be using their expertise to come up with the solution, time saving, well managed resources. As far as the criteria is concerned where allocating to one person to handle it – it will cause confusion, the person will be overworked, therefore he/she may not be able to provide all best solutions, and there are more chances of having to miss out on critical information due to pressure.

**7. Do you think Evidence based training ( EBTA) is a good methodology to test processes in place in front of an expected disruption? If so, EBTA recurrence would help unprecedented disruption such as Qatar Blockade or COVID19 ?**

I think EBTA's does provide some good insights and an excellent way to test processes, however it still lacks what the real-time scenarios. EBTA is designed to promote a major industry-wide safety initiative. EBTA arose from the need to develop a new paradigm for competency-based training and assessment of airline pilots based on evidence. Given the popularity of EBTA's, many airlines are using this to train the operational staff as well in order for them to ready in case of an operational event which they may or may not have seen experience it. EBTA's should be designed using the best talent and people who are experienced in handling with daily operational event and then we can use this training to train others and pin point the weak points and work on them. I think every operational event, be it big, or small has its own challenges and solutions. I agree that the EBT sessions do offer help and improves the current existing processes but it should be designed differently than pilots group. If we look at Qatar's blockage or COVID situation, I don't think EBT would offer all the help, but it would help us identify the weak points which can easily be fixed by overwriting the new processes and implementing new strategies

## **EXPERT 5**

- 1. Do you think airlines have proper documentation on operational processes to follow in case of disruptions? Which processes would you consider as core processes or more recurrent ones?**

Most airlines refer to Part A documentation for operational processes, where all core processes on how to handle disruptions can be found.

- 2. Why do you think core processes compliance is important to return the schedule back to normal in case of a disruption?**

To deal with disruptions, it needs to be a well coordinated processing, in order to experience least financial and operational impact. Core process compliance is very essential.

- 3. Do you think that there are any operational impact differences in different scale disrupted scenarios such as Qatar blockade (regional disruption) VS covid19 pandemic (Global disruption) ? Detail your answer.**

Yes. The Covid19 disruption is on a much larger scale compared to the Qatar blockade. The Qatar blockade involves 4 countries and their airspace, compared with Covid19 that is on global scale.

- 4. Does geographical location play a part in the success of airlines ability to manage disruption?**

I don't believe so. What matters is the company's own infrastructure and level of professionalism.

- 5. In your opinion, what is the significance of fleet variation in the context of disruption?**

The less fleet variation, the more easy it will be to handle disruptions

- 6. What is the best way to counteract disruption? Divide and conquer (e.g. split the tasks up) or allocate to one person to handle it all? What are the positives and negatives of each?**

The best way would be to divide and conquer, because the level of stress and workload will be more evenly handled, and the handling of the disruption can be done in a more structured and organized way, which will result in a better outcome. To allocate everything to just one person would never work if we are talking about a major disruption even, however with smaller scale disruptions that might be the best solution, because that one

person will be solely capable in handling the situation, while the other colleagues will be able handle the rest of the operation as 'business as usual'.

**7. Do you think Evidence based training ( EBTA's) is a good methodology to test processes in place in front of an expected disruption? If so, EBTA's reoccurrence would help unprecedented disruption such as Qatar Blockade or COVID19 ?**

EBTA's can definitely help to enhance people's skills and awareness level and be more prepared for any unprecedented disruption.

## **EXPERT 6**

**1. Do you think airlines have proper documentation on operational processes to follow in case of disruptions?**

From my experience in a lowcost airline, I would say yes. However, the problem is not on having proper documentation but on how to align the legacy systems and operational processes with new customer demand/needs. Some examples below:

- a. Quick disaster recovery plan and execution. Disruptions happen very often (delays, cancelations...) and airlines should have the flexibility and capability to respond very quickly. Responding quickly is not only on approving/activating and documenting a policy but also making it a real. What does mean? For example, allowing customers to change flights on their app not matter which is the sales channel used or having enough teams in call center to cope with all calls from customers.
- b. Disaster recovery vs customer satisfaction/experience. Most of airlines don't think about the flight experience impact of the disruptions. For example: not able to be seated in similar seat than the one booked/paid by client, families separated or wifi not available in the new aircraft.
- c. Lack of communication. When disruptions happen, customers don't know which is the source of truth (airline app, airport info screens,SMS from the airline...).

Which processes would you consider as core processes or more recurrent ones?

In my opinion, I would say safety processes are the core for all airlines.

As I mentioned before, I think the most recurrent disruptions are delays or cancellations so cancelations/delays processes are the most likely to happen. The reasons behind these disruptions could be very diverse: weather conditions, operational delay in origin/departure airport, air traffic control restrictions, air traffic saturation, pandemic, crew not available, erupting vulcano, AOG...

**2. Why do you think core processes compliance is important to return the schedule back to normal in case of a disruption?**

Because the quicker you mitigate the disruption, the less customers are affected which means higher likelihood that they fly again with the airline. The reality is that disruptions happen and are out of our control so the airlines need to be excellent at disruption management to convince their customers that if something will go wrong they'll care about you.

**3. Do you think that there are any operational impact differences in different scale disrupted scenarios such as Qatar blockade (regional disruption) VS covid19 pandemic (Global disruption) ? Detail your answer.**

I'm not familiar on the specific operational differences from each scenarios but I guess the impact from pandemic has been huge just thinking on all connections from all code shared.

**4. Does geographical location play a part in the success of airlines ability to manage disruption?**

Yes, due to 2 main reasons:

- Airport facilities and capacity. It's not the same operating at saturated airport than in a not used to saturations. The expertise from operational perspective of teams working on a saturated airport can't be transferred automatically to other teams (they learn with the experience) but also the good conditions from a non saturated airport are impossible to transferred to the saturated one (unless they increase capacity).
- Weather conditions.

**5. In your opinion, what is the significance of fleet variation in the context of disruption?**

I understand that fleet variation is to ability to change/adapt aircrafts depending on the circumstances. In terms of profitability, I think it makes totally sense to adapt aircraft type with flight occupation. However, as I mentioned before airlines need to look at this from a different angle: customer centric view.

**6. What is the best way to counteract disruption? Divide and conquer (e.g. split the tasks up) or allocate to one person to handle it all? What are the positives and negatives of each?**

I would go for a divide and conquer approach because disruptions can't be stressful if one person handles it all. In addition, working as a coordinated team could help leaders to identify other ways of thinking or alternatives to solve the disruption.

The cons for this divide and conquer approach could be longer decision making process or lack of communication. For that reason, it's important to set up the rules of the game (what is the information we need to make decision? Who are the decision makers? When and how often the decisions are made? How is the communication process during disruption?)



**7. Do you think Evidence based training ( EBTA) is a good methodology to test processes in place in front of an expected disruption? If so, EBTA recurrence would help unprecedented disruption such as Qatar Blockade or COVID19 ?**

Airline industry has lot of media exposure and radical changes/testings in disruptions could have a huge impact on airline brands. However, I'm a clear advocate for the "failing fast approach" for a reduced scope (one flight/route with reduced occupation rate). If you don't test your assumptions, you never know if it would work in reality. How would you know if it went well after the experiment? Asking feedback to your stakeholders (teams in operations involved) and users (customers) and also look if the success metrics are being improved for the experiment.

#### 4. SECOND QUESTIONNAIRE DATA SUMMARY AND SURVEY

Answers based on Likert Scale										
Col %	Questions									
	1	2	3	4	5	6	7	8	9	10
Somewhat agree	0.0%	33.3%	0.0%	16.7%	0.0%	33.3%	33.3%	0.0%	0.0%	16.7%
Somewhat disagree	0.0%	0.0%	0.0%	16.7%	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%
Disagree	16.7%	0.0%	16.7%	0.0%	16.7%	0.0%	0.0%	16.7%	0.0%	0.0%
Strongly agree	16.7%	50.0%	50.0%	33.3%	33.3%	16.7%	50.0%	16.7%	100.0%	16.7%
Agree	66.7%	16.7%	33.3%	33.3%	33.3%	50.0%	16.7%	66.7%	0.0%	66.7%
Count	Questions									
	1	2	3	4	5	6	7	8	9	10
Somewhat agree	0	2	0	1	0	2	2	0	0	1
Somewhat disagree	0	0	0	1	1	0	0	0	0	0
Disagree	1	0	1	0	1	0	0	1	0	0
Strongly agree	1	3	3	2	2	1	3	1	6	1
Agree	4	1	2	2	2	3	1	4	0	4

Col %	Questions with answeres clustered									
	1	2	3	4	5	6	7	8	9	10
Agree	83.3%	100.0%	83.3%	83.3%	67.7%	100.0%	100.0%	83.3%	100.0%	100.0%
Disagree	16.7%	0%	16.7%	16.7%	33.3%	0%	0%	16.7%	0%	0%

Count	Questions with answeres clustered									
	1	2	3	4	5	6	7	8	9	10
Agree	5	6	5	5	4	6	6	5	6	6
Disagree	1	0	1	1	2	0	0	1	0	0



## EXPERT 2

Q1. Click to write the question text

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
1. Each airline core processes can be applied to any kind of disruption	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Compliance of core processes helps airlines to recover back to their schedule	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When any disruption happens, either global or regional, same processes will be followed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Fleet variation helps to manage a disruption	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Operational impact and schedule recovery time is bigger for a global disruption compared to a regional one	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Evidence based training helps airline to react to unpredicted scenarios	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Processes compliance is closely related to accuracy of processes	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Processes compliance help airline to mitigate the operational impact and ensures faster operational recovery	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The way a disruption is managed by an airline will create a reputation by industry and the public eye	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The difference, whilst handling different scale disrupted scenarios, will be the times a core process is repeated	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Location Data

**Location:** ([25.292495727539](#), [51.532104492188](#))

**Source:** GeolP Estimation



## EXPERT 3

Q1. Click to write the question text

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
1. Each airline core processes can be applied to any kind of disruption	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Compliance of core processes helps airlines to recover back to their schedule	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When any disruption happens, either global or regional, same processes will be followed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Fleet variation helps to manage a disruption	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Operational impact and schedule recovery time is bigger for a global disruption compared to a regional one	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Evidence based training helps airline to react to unpredicted scenarios	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Processes compliance is closely related to accuracy of processes	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Processes compliance help airline to mitigate the operational impact and ensures faster operational recovery	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The way a disruption is managed by an airline will create a reputation by industry and the public eye	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The difference, whilst handling different scale disrupted scenarios, will be the times a core process is repeated	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Location Data

Location: [\(25.292495727539, 51.532104492188\)](#)

Source: GeolIP Estimation



## EXPERT 4

Q1. Click to write the question text

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
1. Each airline core processes can be applied to any kind of disruption	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Compliance of core processes helps airlines to recover back to their schedule	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When any disruption happens, either global or regional, same processes will be followed	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Fleet variation helps to manage a disruption	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Operational impact and schedule recovery time is bigger for a global disruption compared to a regional one	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Evidence based training helps airline to react to unpredicted scenarios	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Processes compliance is closely related to accuracy of processes	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Processes compliance help airline to mitigate the operational impact and ensures faster operational recovery	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The way a disruption is managed by an airline will create a reputation by industry and the public eye	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The difference, whilst handling different scale disrupted scenarios, will be the times a core process is repeated	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Location Data

Location: [\(25.292495727539, 51.532104492188\)](#)

Source: GeolIP Estimation



## EXPERT 5

Q1. Click to write the question text

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
1. Each airline core processes can be applied to any kind of disruption	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Compliance of core processes helps airlines to recover back to their schedule	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When any disruption happens, either global or regional, same processes will be followed	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Fleet variation helps to manage a disruption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Operational impact and schedule recovery time is bigger for a global disruption compared to a regional one	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Evidence based training helps airline to react to unpredicted scenarios	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Processes compliance is closely related to accuracy of processes	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Processes compliance help airline to mitigate the operational impact and ensures faster operational recovery	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The way a disruption is managed by an airline will create a reputation by industry and the public eye	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The difference, whilst handling different scale disrupted scenarios, will be the times a core process is repeated	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Location Data

Location: [\(25.292495727539, 51.5321044492188\)](#)

Source: GeolP Estimation



## EXPERT 6

Q1. Click to write the question text

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
1. Each airline core processes can be applied to any kind of disruption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
2. Compliance of core processes helps airlines to recover back to their schedule	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When any disruption happens, either global or regional, same processes will be followed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
4. Fleet variation helps to manage a disruption	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Operational impact and schedule recovery time is bigger for a global disruption compared to a regional one	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Evidence based training helps airline to react to unpredicted scenarios	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Processes compliance is closely related to accuracy of processes	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Processes compliance help airline to mitigate the operational impact and ensures faster operational recovery	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The way a disruption is managed by an airline will create a reputation by industry and the public eye	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The difference, whilst handling different scale disrupted scenarios, will be the times a core process is repeated	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Location Data

Location: [\(41.476501464844, 2.3209075927734\)](#)

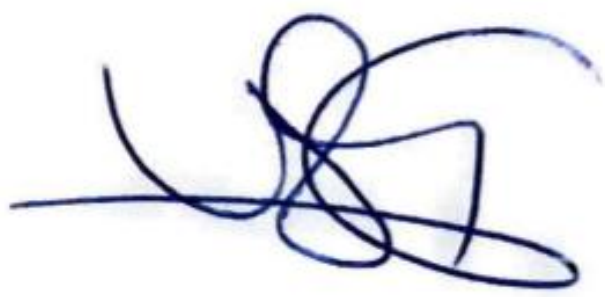
Source: GeolP Estimation







2006

A handwritten signature in blue ink, consisting of several overlapping loops and a horizontal line extending to the left.

The aim of this thesis is to identify and understand what disruption management is and why in-place implementation strategies are important for airline operations. This is achieved by analysing the most important processes to ensure a successful operational recovery regardless of the scale of the scenario in place.

Taking into consideration two different scale scenarios, the author inquires to a panel of experts their point of view about operational processes and disruption management, to be able to determine if the accuracy of those will make the disruption management process successful for the airline, regardless the dimension of it.

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Esta tesis pretende identificar qué es una alteración en las operaciones de vuelo de una compañía aérea y porque su implementación es primordial. Se han analizado los procedimientos más importantes, puesto que gracias a ellos, indiferentemente de la magnitud de un incidente, la aerolínea puede recuperar su estabilidad en la programación.

Teniendo en cuenta dos situaciones de distinta magnitud, se ha querido averiguar las opiniones de diferentes expertos, tanto en procesos operacionales como en alteraciones en la programación. Para poder concluir así, si siempre aplicando los mismos procesos, indistintamente de la magnitud de la perturbación, se consigue un resultado exitoso.

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Aquesta tesi vol identificar que és una alteració en les operacions de vol d'una companyia aèria i perquè la seva implementació és fonamental. S'han analitzat els processos més importants, ja que, gràcies a ells, indiferentment de la magnitud de la situació, l'aerolínia pot recuperar l'estabilitat en les operacions.

Tenint en compte dues situacions de magnitud diferent, es vol cercar les opinions d'experts, en referència als processos operacionals i a les alteracions en la programació, per poder concloure així, si aplicant sempre els mateixos processos, indiferentment de la magnitud del esdeveniment, es pot aconseguir una estabilitat exitosa a la programació..