Comparative Qualitative Research Distinguishing Safety Features Among Aviation Safety Action Programs in the United States Airlines

by

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ABSTRACT

Over the years, aviation safety has been influenced by continuous implementations of both proactive and reactive policies by both regulatory boards and also, aviation service providers. This achievement has been possible mainly because of the safety management tools like the Aviation Safety Action Program (ASAP) which derives its roots from the much earlier Aviation Safety Reporting System (ASRS). Federal Aviation Administration (FAA) provides guidelines and procedures for installation and development of an ASAP, for every airline in the United States. In this study, how different United States air carriers apply ASAP in their organizations is investigated.

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aviation operations while maintaining a focus on conducting verifiable research. I feel very fortunate to have had the opportunity to work with each of them.

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GLOSSARY OF TERMS

AC	Advisory Circular
ALPA	Air Line Pilots Association
ASAP	Aviation Safety Action Program
ASRS	Aviation Safety Reporting System
ATOS	Air Transport Oversight System
CFR	Code of Federal Regulations
ERC	Event Review Committee
FAA	Federal Aviation Administration
FOIA	Freedom of Information Act
FOQA	Flight Operations Quality Assurance
ICAO	International Civil Aviation Organization
LCC	Low Cost Carrier
LOSA	Line Operations Safety Audit
MEC	Member Executive Council
MOU	Memorandum of Understanding
SA	Safety Assurance
SC	Safety Council
SMS	Safety Management System
VDRP	Voluntary Disclosure Reporting Program

CHAPTER 1

INTRODUCTION

Comparative Qualitative Research Distinguishing Safety Features among ASAPs in the U.S. Airlines was an attempt to obtain a deeper understanding of the ASAP and its implementation among the U.S. Airlines. While the primary objective of the study was to investigate how different U.S. carriers apply an ASAP in their organizations, the following literature review section is a detailed background that enabled the establishment of ASAPs we know today. This section explored into ASRS which was the first attempt to introduce safety reporting culture into the industry, and the efforts made by federal, industry and labor unions to make it a successful program. In the later part, literature focused on the Altitude Awareness Program (AAP) and its role in introducing ASAP into the aviation industry. The understanding of ASAP in terms of the FAA was analyzed and presented in the following subsection emphasizing on guidelines and procedures for installation of an ASAP in an organization.

With thorough knowledge of the ASAP, its background and the FAA's point of view, the study then focused on comparing the ASAPs implemented among different air carriers. For the purpose of sample selection of the airlines to be compared, two steps were considered. First, the airlines have been categorized into two types: Legacy (Case I) and LLC (Case II). The next step was about selecting the airline for the comparative study based on average annual flights (2011-2015).

Data required for such comparison could be obtained from official public documents called MOUs drafted for the installation of the ASAP for the various airlines.

After a detailed study and analysis of the ASAP MOUs, the airlines in each of the category were compared separately based on the MOU elements.

Observations and discussions have been made based on the comparative tables drafted from the analysis of the ASAP MOUs. Results have been stated based on the observations and discussions. Scope for further research and the existing challenges to acquire research literature and data has been discussed at the end of the qualitative comparative analysis.

CHAPTER 2

LITERATURE REVIEW

On December 1, 1974, a tragic incident triggered the formation of a system for safety reporting in the aviation industry. This incident involved a Trans World Airlines (TWA) Flight 514 which was inbound to Dulles Airport and had to travel through rough turbulent skies which led the flight crew to misinterpret the approach chart. As a result, this aircraft descended below the minimum safe altitude which is specified for that particular area and collided with a Virginia mountain top. However, it was revealed in the later investigations that before this TWA crash, another United Airlines flight narrowly escaped a similar collision when the same approach and location were used (Greenya, 1977). Both these incidents started to indicate the missing spoke in the wheel – safety reporting. This marked the beginning of the concept of safety reporting and its importance in the aviation industry. (Reynard, 1986) Within the context of aviation, safety can be defined as "the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management" (International Civil Aviation Organization, 2013).

Dr. Davies of Canadian Anesthesiologists' Society defined safety reporting as the process of inputting the data related to the incidents which might have a possibility in harming persons or damaging the property. (Davies, 2015) In order to understand the concept of safety reporting, according to him, we must clearly understand its purpose. The purpose of safety reporting in the aviation industry is to ensure that an organization

receives safety related information which could then be used to manage and improve safety within that organization. (Davies, 2015; Cicero, 2008)

According to Mahajan, one of the first ever investigations of critical incidents in aviation was done by Flanagan as early as the 1940s (Mahajan, 2010). The primary objective of his investigation was to improve safety and performance among the military pilots (Flanagan, 1954). It is also important to understand that the safety department or organization would have had different sources of data such as reports from their staff, surveillance technologies, and other administrative databases. Among these sources, reports from the working community were regarded as the most critical (Davies, 2015). A good quality report must be presented in such a way that it should allow a detailed analysis of the chain of events that lead to the incident. This report must be able to capture the clinical incidents highlighting the areas of information necessary to understand the cause of the event (Mahajan, 2010).

According to NASA, as the reports were collected, analyzing them carefully to identify the risks involved in the system and recommending the necessary changes within or outside the system in to minimize the risk were the primary duties of an analyst. Implementing the recommended changes and acknowledging the reporter about the reception of the report was the next crucial step in the ASRS (NASA, 2015).

To improve feedback, the organizations could also convey that the corrective changes were brought about by the information attained from the reports, which would have the potential to develop a positive attitude among the working staff about reporting (Reed, 2014). In addition, if the processed information could be shared among the various organizations, both federal and privately owned, at both the national and international

levels, the safety culture would spread easily and effectively (Bower, 1966). The whole idea was about spreading the safety related knowledge with the help of processed information from the reported data. Disseminating safety information in this manner should have considered the inter-dependencies between the various organizational departments and systems (Bailey, 1977).

The safety department or organization could be successful only when the employees were able to report freely and to the best of their knowledge, being aware that the reporting system was non punitive and safe. In this way, a mature safety environment could be constructed within the organization (Westrum, 2004). Also, when the employees were trained to be proactive in safety discrepancies, and rewarded by the organization when they do so, the organization could build an even stronger safety culture (Westrum, 2004; Davies, 2015).

Development of Aviation Safety Action Programs - Aviation Safety Reporting System

ASRS is one of the safety tools initially founded to retrieve first hand data relating to safety incidents and accidents. It is in fact the world's largest confidential voluntary aviation reporting system. This government program can be referred to as an example of how interagency co-operation can create a successful, stable and most efficient agent for safety improvements in an ever-changing political scenario (NASA, 2014; Billings, 1976).

The ASRS was founded in 1976 through a Memorandum of Agreement between the FAA and NASA. It was during this time that the proactive safety or process based safety was gaining importance. Therefore, the priority was to design a system to

eliminate the unsafe conditions during the flight operations and also to prevent avoidable accidents and incidents in the entire National Aviation System (NAS) (Billings, 1999).

But there were some immediate concerns for the FAA to implement the new system into the aviation community. In the ASRS, pilots, air traffic controllers, flight attendants, mechanics, ground personnel, and others involved in the aviation operations submit reports to the ASRS when they are involved in, or observe, an incident or situation in which aviation safety may have been compromised. Although all submissions are voluntary, the FAA realized that it's regulatory and enforcement rules would make the aviation community reluctant to trust and utilize the new platform (Reynard, 1986; Eisenbraun, 1981).

In order to find a solution to this problem, the FAA then approached NASA to act as a highly respected third party that would administer the program and attend to the interests of both sides. NASA accepted the FAA's proposal to begin this interagency co-operation program in 1976. NASA has been administering the program's details which has included: overseeing its products and services, guaranteeing confidentiality and ensuring that the analysis results were communicated to the responsible safety departments (Billings, 1999; Corrie, 1997).

Thus, the then final version of the ASRS had following objectives when it was founded (Billings, 1976):

- To prevent accidents and fatalities.
- To be a properly structured confidential, voluntary, non-punitive incident reporting system.

- Exclusion from its protections some types of incidents, such as criminal acts and intentional unsafe acts including legally defined accidents such as hijacking, bombing and so on.
- Utilization of safety data gathered from incident reporting to identify system vulnerabilities and gain a better understanding of the root causes of human error (complementary to the data generated by mandatory, statistical, and monitoring systems)
- To ask, and frequently answer, the question of why. There is no substitute for knowing why a system failed or why a human erred.

The ASRS can also be defined as a system that combines number of different air carriers throughout the U.S. aviation body. The sole purpose of this system was to "collect, analyze, and respond to voluntarily submitted aviation safety reports in order to lessen the likelihood of aviation accidents" (NASA, 2015).

The data collected was used to identify the inadequacies and discrepancies in the NAS which could then be referred to responsible authorities. This valuable data collected by ASRS could further be used by the federal administration in support to policy formulation and planning thus improving NAS as a whole (Connell, 2000). The very foundations of the human factor safety could be strengthened using data collected by ASRS (NASA, 2015). The following sections explain the important features of ASRS that helped in its success and carried forward into ASAP.

Confidentiality. The success of the ASRS program (see figure 1) could be easily related to this important factor: confidentiality (NASA, 2015). As noted above, involving NASA as an administrator has successfully resolved the reluctance

from the potential participants in the system who were uneasy with the possibility that the voluntary reports could be used against them (NASA, 2015).

In April 2016, the NASA ASRS celebrated its 40th year of continuous operation in service to aviation safety. During its 40- year history, the ASRS has processed over 1.3 million reports and returned valuable information to the aviation community through a wealth of safety products.

ASRS's report intake has been robust from the first days of the program, in which it averaged approximately 400 reports per month (See Figure 1). In recent years, report intake has grown at an enormous rate. Intake now averages 1,774 reports per week and more than 7,686 reports per month. These reports were voluntarily submitted by pilots, air traffic controllers, dispatchers, cabin crew, maintenance technicians, and others from all over the NAS (NASA, 2016).

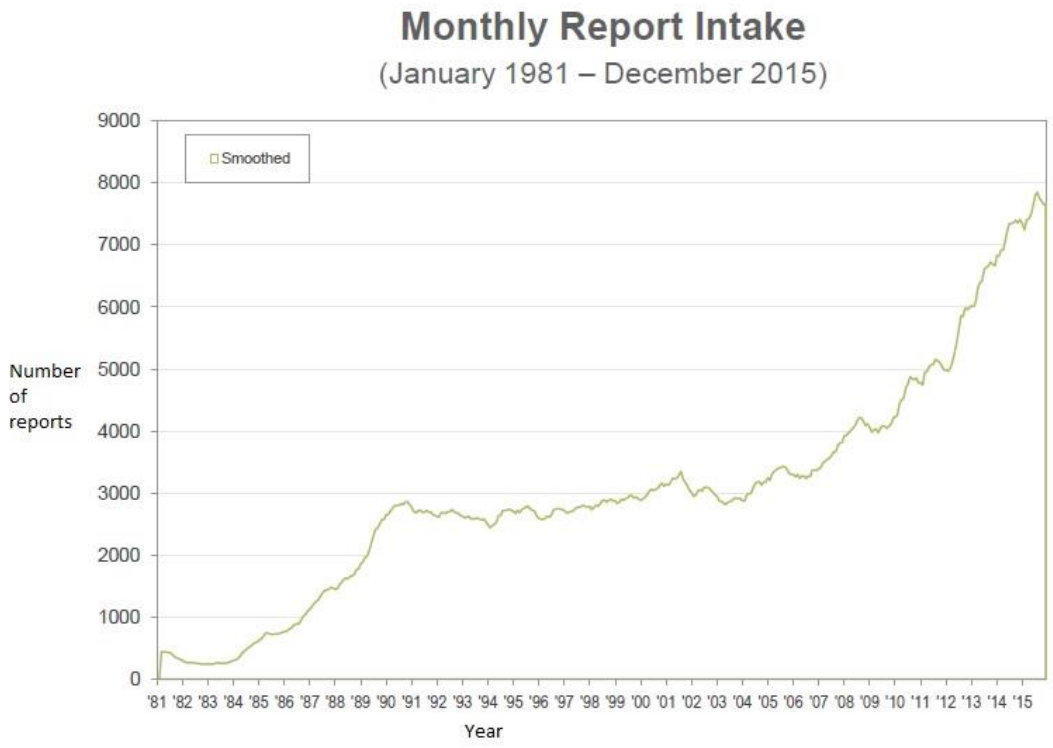

Figure 1. Monthly Report Intake for ASRS program. (Source: ASRS website)

The voluntary reports from the aviation community were stripped of the personal identification information before the contents were released for analysis. However general information such as dates, times, locations, weather conditions, etcetera were generalized or eliminated since it might have been useful in understanding the event (Billings, 1999).

Immunity. Another contributing factor for the success of ASRS was the immunity factor, which was backed by the FAA. Their immunity policy encouraged submission of all safety incidents, observations and information, specifically that could avert a major mishap (Federal Aviation Administration, 1997).

However, neither immunity, nor the confidentiality extended to situations involving accidents or criminal activity. In Advisory Circular (AC) 00-46D, FAR91.25, and paragraph 2-38 in the "Facility Operations and Administration Handbook", several limitations to the program are directly and specifically addressed:

The filing of a report with NASA……. certificate suspension will be imposed……..to NASA under ASRS (FAA AC 00-46D).

The individual reporting voluntarily may not be punished or disciplined when:

- the violation was inadvertent and not deliberate;
- the violation did not involve a criminal offense and accident, or action;
- the person has not been found in any prior FAA enforcement action for a period of 5 years prior to the date of occurrence; and
- the person proves that, within 10 days after the violation, he or she completed and delivered or mailed a written report of the incident or occurrence to NASA under ASRS.

Another section of AC 00-46D mentioned critical information about use of the reports against enforcement purposes:

PROHIBITION AGAINST……..

Federal Aviation Regulations……. action, except information concerning……. security system is designed……NASA management.

The above section of the AC 00-46D prevented any misuse of the database reports to harm the individuals in question and ensures that the voluntary reports and the employees are safe.

Reporting Procedures. Employees could report by both means of electronic and conventional writing to NASA. Required reporting forms were available for download from the website, and there were separate forms for pilots, mechanics, cabin crew, and air traffic controllers (Connell, 2011). For electronic method, employees could securely send aviation safety reports to ASRS via the internet. An additional note has been displayed on ASRS website portal:

> *NOTE: The identification strips at the.....following report transmission…… submission* (NASA, 2015).

ASRS thus notified employees that the information provided by them is de-identified while it is fed into the system.

The ASRS also categorized the data input into four major groups and has different report forms for each category. The grouping into these categories was based on the occupational background:

- General Form: Pilots, Dispatchers and other Airport Personnel
- ATC Report Form: Air Traffic Controllers
- Maintenance Report Form: Repairmen, Mechanics, Inspectors
- Cabin Report Form: Cabin Crew (NASA, 2015)

Analysis of Reports. The ASRS has successfully and securely analyzed over 1.3 million reports in its 40-year history. The analysis of reports in ASRS was a process that contains critical factors that made sure that each report maintained reporter confidentiality and at the same time enhanced the ability to determine the safety value of the reports (NASA, 2015).

The process began with the picking up of ASRS paper reports on a daily basis from the Moffett Field Post Office. The reports could also be submitted electronically, through Electric Report Submission (ERS) website or ASAP data transmissions. Based on the date of the receipt, every report was date and time stamped. The reports were then identified and categorized by the analysts according to the priority levels. If the analysts at ASRS recognized hazardous situations from the reports, they issued an alert message. The potential corrective actions along with related de-identified information were forwarded to the authoritative organizations (NASA ASRS Program Briefing, 2013). The alerting messages (See Table 1) sent out by analysts contained safety information to the organizations in positions of authority so that they could analyze the information and generate possible corrective actions (Billings, 1999; NASA, 2015).

Table 1

Outcome of Safety Alerts from ASRS (NASA ASRS Program Briefing, 2013)

Alerting Subjects	**Total Number of Alerting Messages Sent**
Aircraft Systems	718
Airports Facility Status and Maintenance	471
ATC Procedures	230
Airport Lighting and Approach Aids	151
ATC Equipment	123
ATC Operations	75
Hazards to Flight	64
Navigation	37
Aircraft Power Plants	36
Aircraft Avionics	35
Others	272

Table 1 shows the number of alerting messages sent by ASRS analysts for each alerting subject till 2015.

Development of Altitude Awareness Program

Among the aviators during the 1980s, there was a well-known common term called “altitude bust”. It is often referred for the pilot deviation from assigned altitude. However, the results of an altitude bust could vary from federal violations for crew members to fatal accidents like midair collisions. There were incidents where passengers and crew sustained injuries due to the rapid flight maneuvers to recover from the altitude deviation (Thomas M. Granda, 1991; Sumwalt, 1995).

For the FAA and other aviation researchers to understand the problem, the only available data was through ASRS. During the years 1983 to 1994, ASRS received a total of 74,544 reports involving altitude deviations. However, all ASRS reports were voluntarily submitted, and thus could not be considered as a measure of random sample for the full population like events. Thus the number 74,544 may comprise over half of all the altitude deviations which occur, or it may be just a tiny portion of the total occurrences. It was evident that *the ASRS statistics only represent the lower measure of the true number of events which have been occurring.* (Sumwalt, 1995)

This encouraged the FAA to conduct an independent study called altitude deviation data-collection program, in which the pilots and controllers of U.S. Airways were encouraged to report the altitude bust events directly to study’s researchers in addition to the usual ASRS reporting. The statistics now had a value suggesting that to reduce the flight altitude busts, there is a necessity to develop a flight-crew centered program within the U.S. Airways (Thomas M. Granda, 1991).

In order to encourage the employees of the air carriers to participate in the program, the FAA has made an effort to include incentives which includes protection

against punishment for committing the possible violations of 14 Code of Federal Regulations (CFR). This makes the reporting non-punitive and protects them from company disciplinary actions. The events reported under these programs were organized under Voluntary Disclosure Policy (Chidester, 2007).

There were other shortcomings from the ASRS program which were noticed by the service operators as well as the FAA. The FAA recognized that the information submitted to the ASRS goes directly to NASA bypassing the service provider and the regulator (FAA). It would take reasonable amount of time for the analysts at the ASRS to analyze the reports and issue a warning against a potential threat. Some threats faced by the service provider were to be identified quickly to make decisions on the possible corrective actions. So instead of depending upon ASRS, if there was a safety department within the organization backed by the regulator (FAA), the corrective actions would have been quicker to evade the potential threat achieving the safety goals of the company (Harper, 2011).

Also, ASRS reports were completely stripped of the personal identification before being sent to analysis under the Federal Aviation Regulations (FARs) that govern the ASRS. Although this regulation was brought into action to win the trust of the employees, it was difficult for the service providers to gather additional information for the design of corrective actions on their own to mitigate the threat and the risks associated with it. Service providers were able to witness the necessity of the availability of identified safety reports to understand the safety concerns directly from the employees to be able to provide a positive feedback or a corrective action (Harper, 2011).

Soon later, Several U.S. air carriers developed AAPs to prevent crew-caused altitude deviations. For example, U.S. Airways in just 14 months following the program's inclusion has recorded a fifty percent reduction in the rate of altitude deviations. This value was considered statistically significant by the FAA researchers. The success stories of these programs had spread across the other U.S. carriers who began to adopt the new aspects and safety culture within their organizations (Cacciabue, 2000).

The success of these programs had paved a way for the FAA to release a revised AC in the name of the ASAPs (AC ASAP) in the year 2000. This article established industry-wide guidelines for the airline participation in the ASAP. This guidance was a revised and collective effort of airline companies, labor associations and the FAA management (FAA, 2016).

Aviation Safety Action Programs

ASAP was basically an information program held by the partnership between the FAA, an airline and possible third parties such as labor unions (FAA AC 120-66B 2002). The common goal of all ASAPs was to enhance aviation safety through the prevention of accidents and incidents (Federal Aviation Administration, 1997). The American Airlines were the first airline to institute this program in 1994 (NTSB, 1999).

The purpose of this program was to provide airline employees and other aviation service operator employees, an opportunity to report safety related problems, including self-made errors to their respective safety departments voluntarily without the risk of incurring punitive charges. As mentioned previously, ASAP was initially started by a handful of airlines. These airlines have installed ASAP with a vision that the tools to their safety operations would require the identification of forthcoming hazardous or high risk associated potential threats. These airlines also believed that only their employees, who were operating on a daily basis in the National Airspace System would be able to provide such identification and firsthand information (Griffith, 1998). They further believed by the airlines that they themselves were able to provide information about the safety issues immediately and were in a position to develop corrective actions based on the issues that have been reported (Stolzer, Halford, & Goglia, 2011).

American Airlines were the first among the airlines to install the ASAP which was then referred to as the Aviation Safety Action Partnership. The only source for safety related information for this program was through mandatory reports filed by the pilots which were required in the event violating a FAR. The pilots used to provide a voluntary disclosed report to the airline if the reporter felt that the information was vital enough to

place themselves in the line of potential punitive action. Since the ASAP program offers incentives against the standard FAA legal enforcement policies and internal company disciplinary action, there was a supportive response from the airlines and the employees to the introduction of the ASAP (Ganter, 2000).

Although this program shared some common features with ASRS, ASAP also marks the beginning of significant departure from normal FAA enforcement actions. ASRS offered limited protection to the employees who provided safety information including the errors committed by themselves. For example, in case of pilots, ASRS offers protection from suspension of a pilot's certificate but not from potential federal punitive actions when involved in violation of the FAR. However, in ASAP the reporter for an accepted report is offered protection from federal punitive action, provided the reporter did not commit actions that implicate an intentional disregard for safety (Stolzer A. H., 2008).

Along with protection from federal punitive actions, under ASAP employees got additional incentives. These include provision of a platform for the employees to report their safety concerns that they might have experienced from an incident. This platform also provided opportunity for an employee to report ongoing problems that may lead to a high risk associated potential hazards or threats. ASAP reporting thus included different types of reports from the employees who could not only report their errors but also safety concerns that are encountered during operations which could lead to serious events (Stolzer, Halford, & Goglia, 2011).

The program gradually expanded to include other employee groups including dispatchers, flight attendants, maintenance employees, load controllers, flight following support and ground personnel (Ganter, 2000). As of October 2016, the ASAP program

constituted of 172 participants that includes commercial airlines, business aviation companies, maintenance service providers and other aviation service providers (FAA, 2016).

The following section focuses on the three major aspects that would aid in regulating the ASAP in accordance with FAA.

Federal Aviation Administration's Elements of ASAP.

Employee Review Committee (ERC). The ERC is a group that consists of representatives from different groups involved in the program. The committee members typically include:

- a management representative from the certificate holder,
- a representative from the employee labor association (if applicable), and
- a specifically qualified FAA inspector from the CHDO (Certificate Holding District Office).

The consensus of this group is responsible for review and analysis of the reports posted through ASAP and determines whether the reports meet the requirements (as mentioned in FAA AC 120-66B) in order to include them into ASAP.

Consensus of the ERC is the voluntary agreement by the committee's representatives for each decision required by the MOU in ASAP. The following example would help in understanding the necessity of an ERC in the program:

The ERC of an ASAP should make effort to reach a consensus on the recommended *corrective actions* to counter reported safety threats such as an operating deficiency or airworthiness discrepancy.

The ERC takes responsibility to determine the corrective action necessary to counter the safety-related threat based on review and analysis of the reports submitted under the ASAP. The corrective actions could be in the form of a requirement to complete a training course. For example, in case of pilots, a corrective action could be in the form of a repeated training or as serious as a requirement to complete a flight where the pilot's skills are reviewed. The corrective actions to mitigate the safety risks are the results of collective effort involving appropriate departments of the company as well as FAA that have the expertise and responsibility in the areas concerning the safety of that particular airline. Also, the FAA representative in the ERC plays a vital role in decision making in case where there is no consensus of the ERC on a particular report.

Similar to the ASRS, this group may share and exchange information that they have acquired during the analysis. ERC also deals with the identification of potential or actual safety problems from the reported data (FAA, 2002).

Memorandum of Understanding. As the name suggests, this document of the ASAP program establishes the agreement between the employees, management and the regulator. The entire program is therefore implemented in accordance with the provisions of its MOU. Each MOU would be based on the requirements of the parties involved in the formation of an ASAP. It is also important to note that ASAP reports accepted by the ERC under an active MOU may no longer require any FAA administrative action (Federal Aviation Administration, 2002).

Elements of MOU are crucial to determine the type and status of the ASAP managed by an Airline. These elements are mentioned below as stated and defined by FAA in AC 120-66B:

1. The identification of what type of operator the program applies to: Part 121 Air Carrier or a Major Domestic Repair Station.
2. The identification of the type of program and the employee group(s) to whom it pertains. The types of programs are Demonstration Program, Renewal of Demonstration Program, Continuing Program, or Renewal of a Continuing Program.
3. The duration of the program should be limited to the period of time needed to achieve the desired goals and benefits articulated in the program. Demonstration programs initially should have a duration of no longer than 18 months and should be reviewed prior to renewal. Demonstration programs that undergo changes after their initial review may be renewed for no longer than 12 months. Programs that are classified as Continuing must be reviewed and renewed every 2 years.
4. A statement that all parties to the ASAP have entered into this agreement voluntarily.
5. A description of the objective(s) including the essential safety information that is reasonably expected to be obtained through the program, any specific safety issues that are of a concern to any of the parties, and the benefits to be gained through the use of the program.

6. A description of any enforcement-related incentive that is needed to achieve the desired goal and results of the program.
7. A statement that all safety-related reports shall be fully evaluated and, to the extent appropriate, investigated by the ERC.
8. A description of the manner in which ASAP records and reports shall be kept. ASAP records and reports shall be kept in a manner acceptable to the ERC and described in the MOU.
9. A description of the process for timely reporting to the FAA all events disclosed under the program.
10. A description of the procedures for the resolution of those events that are safety-related, and procedures for continuous tracking and analysis of safety-related events.
11. A description of the ERC ASAP Report acceptance and exclusion criteria.
12. A description of the frequency of periodic reviews by the parties to determine whether the program is achieving the desired results. These reviews are in addition to any other review conducted by the FAA or any other party individually.
13. Identification of the point(s) of contact within each party who is responsible for oversight of the program.
14. A description of the process for training and distributing information about the program to certificate holder employees and procedures for

providing feedback to individuals who make safety-related reports under the program.

Out of the total 27 mentioned elements of MOU, these 14 elements are clinical to our comparative study. As of 2015, a total of 383 active Memorandums of Understanding exist across the United States (FAA, 2016).

Reporting Criteria. Similar to ASRS, neither immunity, nor the confidentiality benefits can be availed by the employees involving accidents or criminal activity. The FAA AC120-66B states the following under the "Criteria for Acceptance":

(1) The employee must submit a report in a timely manner. In order to be considered timely, a report must be submitted in accordance with either of the following two criteria:

a. Within a time period following the event that is defined in the MOU, such as within 24 hours of the end of the duty day in which the event occurred. If this criterion has been met, a report would not be rejected for timeliness, even if the FAA was already aware of the possible noncompliance with the regulations, and may have brought it to the attention of the employee;

b. Within 24 hours of having become aware of possible noncompliance with 14 CFR in accordance with the following criteria: If a report is submitted later than the time period after the occurrence of an event stated in the MOU, the ERC will review all available information to determine whether the

employee knew or should have known about the possible noncompliance with 14 CFR within that time period. If the employee did not know or could not have known about the apparent noncompliance with 14 CFR within that time period, then the report would be included in ASAP, provided the report is submitted within 24 hours of having become aware of possible noncompliance with 14 CFR, and provided all other ASAP acceptance criteria have been met. If the employee knew or should have known about the apparent noncompliance with 14 CFR, then the report will not be included in ASAP.

(2) The alleged regulatory violation must be inadvertent, and must not appear to involve an intentional disregard for safety.

(3) The reported event must not appear to involve criminal activity, substance abuse, controlled substances, alcohol, or intentional falsification.

(4) Sole-source reports that meet all of the above acceptance criteria except timely submission will be accepted under ASAP.

ASAP Information. To report safety-related events, ASAP provides a great platform for the employees of an operator. As per the FAA regulations all individual ASAP reports must be signed by each employee seeking the enforcement incentives provided by ASAP. There are usually two types of reports generally submitted under FAA (FAA, 2016):

1. Safety-related reports that appear to involve one or more violations of the FAR.
2. Reports that identify a general safety concern, but do not appear to violate a FAR.

An example for the first type of report mentioned above can be an attitude deviation which means a pilot deviating from the Air Traffic Control (ATC) assigned altitude. Whereas an example for the second type of report can be a flight-crew member's concern that there's a possible error in an operational procedure or the design of the flight checklist could lead to an error.

FAA recommends that each ASAP report must contain detailed information about a safety incident so that it can be evaluated by the analysts. In FAA order 8000-82, the following is mentioned regarding ASAP reports:

If the report is submitted by a flight crewmember, and the safety event involves a deviation from an ATC clearance, the ASAP report would include the date, time, place, altitude, flight number, and ATC frequency, along with a description of the safety-related event.

The ASAP is expected to generate a lot of safety information from the airlines' employees which may not be obtainable from any other way. This information which is obtained from the ASAP participants is the key to identify actual or potential risks throughout their operations. After the identification process, the parties of an ASAP can implement the corrective actions in order to reduce the potential for occurrence of accidents, incidents and other safety-related events (FAA, 2016).

In order to make most of an ASAP in terms of safety information, FAA recommends certificate holders to develop programs compatible data collection, analysis, storage, and retrieval systems. The retrieved safety information can be utilized as a measure of aviation system safety according to FAA experts (Harper M., 2003).

The ASAP systems are not just designed for pilots, instead the system encourages various employee groups such as flight-crew members, mechanics, flight attendants and dispatchers. The de-identified ASAP data from these employee groups is used by the parties of the MOU to identify data trends concerning safety issues. To counter these adverse trends, MOU takes responsibility in designing appropriate corrective actions to be undertaken (Harper, 2011). New data is then gathered and utilized in measuring the effectiveness of those recommended corrective actions. If better correction actions are required, they are devised and executed. This process continues until the safety goals are met. Furthermore, data is used to monitor long term success and ensure that there is no recurrence (FAA, 2016).

FAA provides freedom to ASAP participants in development of data acquisition, event categorization and risk analysis schemes. However, regarding the sharing of the safety information, FAA representatives are to make sure that the ERC counterparts and ASAP manager have a proper understanding about development and implementation of a voluntary national information sharing system. For an airline, in order to participate in voluntary sharing of ASAP information, the type of safety events and recommended corrective actions must

be organized into classified information according to the employee groups within the airline (Chidester, 2007).

For a given employee group, an airline can also adopt a national classification theme instead of creating a new one in order to participate in the information sharing at a national level. However, it not mandatory for an airline to adopt a national classification at internally within the airline if it wanted to participate in the information sharing system at national level. But the ASAP participants who wish to take part in a national information sharing will need to tailor their events to the agreed upon national scheme for a given employee group. The ASAP manager, Air Carrier Training Systems (ACTS) and Voluntary Safety Programs Branch (VSPB) possess the information about the national information sharing systems (FAA, 2016).

Research studies by Weick and Sutcliffe emphasize the importance of collection of information from operators and sharing the information throughout the communities in order to enhance safety in operations. Their study also suggest that a safe organization is the one which supports this cycle of information sharing and distribution from one operator (Weick, 2007).

Confidentiality. The only obstruction to share the ASAP information with the FAA is the aviation industry's concern over public disclosure of the information which if disclosed, there is a great potential for safety information to be misused against them. As a result, certificate holders have not permitted ASAP reports and related information to leave the certificate holder's premises and except for ASAP

information made available to review by the FAA representative who is a part of the ERC, which is held at certificate holder's place of business only**.**

Presently *no ASAP information is submitted to FAA.* The ASAP information is considered confidential by the participating certificate holders and employees who are involved in the program (FAA, 2016).

However, the FAA *does not allow* that ASAP MOUs should remain confidential under normal circumstances. FAA explains in its order released in 2003 that since the MOU involves an agreement to provide incentives like providing protection even from the federal violations, which otherwise involves enforcement actions, the public has a right to know the provisions of an MOU on the basis of which the FAA has changed its enforcement policy (FAA, 2016).

Let us now take a look at how the different aviation employee groups like maintenance adopted ASAP in order to promote safety culture within their respective organizations.

Maintenance ASAP

The late 1980s marked the beginning of social and organizational psychology, work sociology, and anthropology in the area of aviation maintenance. Maintenance Resource Management (MRM) is a collection of the above mentioned behavioral and social sciences. MRM has been gaining momentum among the employees as well as the organizations (Taylor, 2000). The social scientists working for the government and the industry were reporting that maintenance has an impact on safety of flight. In 1986, Wiegers and Rosman in their report have mentioned that about 39% of the wide-body aircrafts have been involved in accidents which began with a problem in aircraft systems and maintenance, and that "pilot error" comes later in the sequence of events that led to the accident (Wiegers, 1986). These reports and claims led to the formation of the Maintenance Resource Management Roundtables conducted at U.S. Airways (Taylor J., 1998). This MRM Roundtable consisted of a representative from the company, a representative from the International Association of Machinists and Aerospace Workers (IAMAW), the FAA Principal Maintenance/Avionics Inspector and the mechanic or mechanics who committed the error.

The MOU was signed between the company and the FAA that would establish that the purpose of the roundtable was to collect critical safety information that would not have come if not for the honest participation by the person who committed the error. This approach by the companies proved to be successful as they were able to create a proper understanding of the casual factors leading to the error instead of playing the blame game which was prevalent at that time (Graeber, 1994).

The labor union also began to trust the three-member team as they were truly implementing comprehensive and systemic solutions. As the result of the formation of this group, several key issues regarding maintenance were solved without punishing the reporting employees or FAA enforcement consequences. However, at this time, the roundtable system was only practiced at the U.S. Airways and it was not easy to duplicate the system at the other companies since their managers and other FAA inspectors were not co-operative with the adoption of such systems (Taylor J., 1998).

Aviation mechanics working for companies other than U.S. Airways therefore did not have access to a roundtable discussion. But, they had two other options, i.e., they could either submit reports to ASRS or submit a voluntary self-disclosure report to the company using the guidance from FAA. The ASRS may provide limited protection to the individual reporter but the reporter's safety concern cannot be answered by the company management or the FAA since all individual reports sent to ASRS were de-identified (NASA, 2015). The voluntary self-disclosure report in accordance with FAA AC 00-58 was perceived by the industry as primarily an organizational level disclosure rather than an individual level disclosure. It was so because the FAA AC was designed for generic reporting for federal regulation violation for all employee groups but not for maintenance employees in particular (Patankar, 2004).

Extensive research in the areas of error causation due to human factors have supported the fact that the worker who committed the error is the best source for the key information that is crucial to the development of a true comprehensive solution (Battles, Kaplan, Schaaf, & Shea, 1998; Harper M., 2003). Until and unless there is an effective non-punitive reporting system such that the reporting mechanic has an incentive in return

for disclosing his/her error, the safety concerns hovering around maintenance division were difficult to address in the rest of the industry.

Since the ASAP for pilots was already in place, FAA issued guidance materials to develop Maintenance ASAP agreements to provide a non-punitive forum for mechanics to come forward and disclose their errors to the FAA and the air carrier which would enable the implementation of systemic solutions. Additionally, due to similarity in causes, similar errors could be minimized by distributing the safety data within the organization (Patankar, 2004).

The maintenance ASAP deals with the aviation maintenance community as the sources of the safety information. The primary objective here is to develop and assess the ASAP programs among the maintenance communities of the different organizations. The nature of aviation maintenance is such that it involves humongous human-machine interaction, and therefore safety is very closely related to technology and human reliabilities on both hardware and maintenance personnel respectively. ASAP provides the perfect platform for collecting the safety information through a non-punitive reporting system (FAA, 2009).

An ASAP is a program that uses an effective system to (FAA, 2009):

- improve the maintenance system so that the remaining maintenance professionals would not commit similar mistakes,
- build a reporting culture allowing a non-punitive flow of information between the reporter and management producing a systematic solution so that others are not placed in a similar situation, and

- reduce the probability of a catastrophic accidents such as accidents involving loss of lives.

Due to its success with the maintenance division, ASAP was set to enter into other aviation employee groups such as Flight Dispatchers, Flight Attendants and Ramp Agents (Ground Support) (Patankar, 2004). Since the information involved with the ASAPs are considered confidential by the certificate holder, we do not have access to that information. However, the ASAP MOUs are cleared by the FAA to be made public (FAA, 2016). For the proposed comparative study, a qualitative research is chosen. The following section is a briefing about comparative qualitative research.

Qualitative Research

A qualitative research can be defined as an empirical or scientific way of understanding a phenomenon (R Bogdan, 1987). Many qualitative studies take form into case studies that examine certain in-depth "purposive samples" to understand a phenomenon in a better way. The best examples of such studies can be found in (Stake, 1995) and (Yin, 1989). Also, such case studies could be utilized in evaluating specific government policies as they provide more flexibility even in smaller samples. One best example for this can be Policy, Program Evaluation and Research in Disability by Racino in 1999 (Racino, 1999).

According to Taylor and Bogdan, the most commonly used data sources by qualitative researchers are public and official documents, literature fields and other research literatures (S J Taylor, 1984). The data sources must then be filtered for required information and written into a report using descriptions, charts and tables to demonstrate the study findings (Merriam, 2009).

Once the researcher has the data, the next step would be analysis of the data and recording observations by utilizing the tables and charts drawn from the data collected. This technique is called interpretive technique, which is most commonly used in qualitative research. In this technique, the subject area expert examines the data, interprets the data by forming an impression and finally reports the impression in a systematic and structured form. This phenomenon is also known as observer impression (MIT qualitative research, 2005).

CHAPTER 3

METHODOLOGY

The purpose of this section is to outline the search strategy and selection criteria applied for this comparative qualitative research. It primarily provides descriptions of types of documents, studies and research papers reviewed, and the comparative methods used.

Literature Search Strategy

Relevant research containing safety reporting and aviation safety were identified by searching several multidisciplinary databases including medical databases. A total of 27 databases were searched for publications from 1940s through the present, with key articles obtained from NASA ASRS public database, ProQuest, MEDLINE and the FAA public document database. A complete list of the databases searched is included in Appendix C.

Also, in order to make sure that the relevant studies were not missed, the search terms were maintained to be broad enough. Some of these terms were “safety and airlines”, “pilots’ safety”, “safety in aviation maintenance”, “safety awareness programs” and “reporting among airlines” anywhere in the title or the document. For the purpose of restricting the search for U.S. Aviation Industry, language restriction was implemented. (only English language was preferred). Peer reviewed papers were preferred to a maximum extent. Studies were eligible in consideration for the literature only if:

a. the focus of the paper was on safety reporting, and
b. there was at least one reference in the paper pertaining to aviation industry.

Communication with researchers from the other universities and organizations has revealed that there is a lot of scope for literature regarding aviation safety in unpublished research. In order to capture the knowledge from these unpublished work, personal contact was made with research analysts at ALPA, ASRS, NASA and research professors at universities such as Embry Riddle Aeronautical University, Daytona Beach and Purdue University.

However, the policy and guideline information about the ASAP had to be retrieved from the FAA website portal. Similarly, policy and guideline information about the ASRS had to be retrieved from the ASRS web portal which is maintained by NASA.

Comparative Study

Since the U.S. Aviation Industry was vast, a small sample was required to run the comparative analysis. In order to get a good sample size, the airlines were categorized into Legacy Carriers and LCC. As a part of sample selection the average annual flight operations (2011-2015) was selected as a factor. This data was retrieved from U.S. Department of Transportation website. Based on this, two of the legacy carriers American Airlines and United Airlines were selected. Similarly, Virgin America, Spirit Airlines and Frontier Airlines are selected from the Low Cost Carrier bunch. To study the implementation of ASAP among the selected airlines, a common criterion was required which is followed by all the airlines. The FAA regulated MOUs are chosen for two reasons:

a. Standardized document that describes certain safety features of the ASAP program.

b. Publicly available document and hence not violating the confidentiality of the ASAP information.

Data collection regarding MOUs was most difficult part of the study. Only two MOUs were made available to public on the internet which belonged to United Airlines and American Airlines. Rigorous attempts were made to correspond with the ASAP managers of the selected airlines. After several failed attempts, personal contacts from the labor organizations (anonymity requested) and the airlines helped retrieving pieces of information sufficient enough to generate a MOU from the FAA web portal itself. This method was applied to Virgin America, Spirit Airlines and Frontier Airlines.

Further, only some of the elements were picked from the MOUs which were comparable with the other airlines. The elements are then listed out and recorded in the form of tables to visually distinguish the safety features of the respective ASAP programs. Observations based on these comparative tables were made explaining how airlines differed from each other in implementing ASAPs. Discussion based on these observations followed based on the prior knowledge of the ASAP and the concepts of safety reporting. Hypothesis Statement, and case wise results are stated in further sections.

CHAPTER 4

COMPARITIVE STUDY

To fulfill the primary purpose of this study, the comparative qualitative research study shall be conducted among different U.S. carriers. The purpose of this qualitative research is to understand the application of the phenomenon (ASAP) among the carriers in the United States.

The source of information to understand the phenomenon i.e., ASAP are the official MOU documents. In order to design a structured data set, 14 of the 27 ASAP MOU elements have been chosen which can be found in Memorandum of Understanding section of this document. The air carriers registered in the U.S. are divided into two categories for a structured qualitative study:

Case I – Legacy Carriers

Case II – Low Cost Carriers

The reason airlines have been classified into these categories as they both differ broadly from inflight services to annual operations. The core principle of the LCC was to shed down the additional operational costs such as stripping their business class, catering, and others to provide a marginal cost to the costumers. Whereas the legacy carriers usually have fixed costs in operating the flights and hence tend to have more than just the marginal costs.

Most of the legacy airlines use wide-body bigger airplanes as most of their flights are usually medium to long haul. But, the LCC business models tend to use the narrow-body aircrafts as they mostly operate short to medium haul flights (Holloway, 2012).

Hypothesis Statement

All U.S. Airlines have standardized Aviation Safety Action Programs which include all employee groups respectively.

As mentioned earlier, the ASAP information is considered confidential by the participant certificate holder. However, ASAP MOU is exempted by the FAA from confidentiality. Thus, we shall use MOU as a tool to perform comparative analysis among the ASAPs of the selected airlines.

Case I – Legacy Carriers

In this case, among the legacy carriers in the U.S., based on the annual operations, American Airlines and United airlines have been chosen for the study. The annual operations average was taken for 5 years between 2011 and 2015 (See Table 2). The data was retrieved from U.S. Department of Transportation website. Table 2 describes the comparison of annual operations among Delta, American and United Airlines.

Table 2 –

List of Legacy Carriers along with their respective average annual flights (2011-2015)

Airlines	Average Annual Flights
American Airlines	564,865
Delta Airlines	775,383
United Airlines	467,677

American Airlines ASAP

American Airlines was the first operator to have started ASAP with their pilots in the United States aviation history. As of October 2016, the American Airlines is a participant in the ASAP with (FAA, 2016):

- pilots,
- flight dispatchers,
- maintenance personnel and
- flight attendants.

Airline Statistics

Total number of aircrafts in service (2016): 928

Total number of maintenance personnel (2013): 16,800

Annual Operations Average (2011-2015): 564,865

MOU Elements. The following elements of MOU were extracted from MOU between American Airlines maintenance and engineering, FAA and Transport Workers Union (ASAP MOU American Airlines, 2009).

NOTE: the following elements of MOU have been listed in the Memorandum of Understanding section. For better presentation purposes, each of those elements have been shortened.

1. Type of operator: Part 121 Air Carrier.
2. Type of program: The M&E ASAP program, continuing program.
3. Renewal duration: every 2 years.
4. ERC acceptance for MOU: Accepted.

5. Objectives: prevent accidents and incidents.
6. Enforcement Incentive: offers an alternative to traditional FAA legal enforcement and Company disciplinary action.
7. Statement for evaluation of reports: Yes.
8.
    a. ASAP records keeper: ASAP Manager.
    b. Shared custody of ASAP reports: between the ERC members during an ongoing investigation is required for program administration.
9. FAA reporting period: as required.
10. Safety related tracking and procedures: Program Manager is responsible.
11. Acceptance of reports: Consensus of ERC.
12.
    a. ASAP Review Period: Quarterly review.
    b. Review responsibility: Program Manager.
13. Responsible for oversight:
    a. AA Vice President Safety,
    b. Security and Environmental,
    c. the FAA AMR CMO Office Manager; and
    d. the TWU AA System Coordinator.
14.
    a. Feedback: The Program Manager is responsible.

b. distributing information: ASAP hotline.

United Airlines

United Airlines is one of the legacy carriers and one of the major airlines in the United States. As of October 2016, United Airlines is a participant of ASAP in association with following employee groups (FAA, 2016):

- Dispatchers
- Flight Attendants
- Maintenance
- Pilot
- Ramp

Airline Statistics

Total number of aircrafts in service (2016): 721

Total number of inflight services personnel (2015): 26,000 (approx.)

Annual Operations Average (2011-2015): 467,677

MOU Elements. The following elements of MOU were extracted from MOU between United Airlines Inflight Services, FAA and Council Association of Flight Attendants. (United Airlines, 2010)

NOTE: the following elements of MOU have been listed in the Memorandum of Understanding section. For better presentation purposes, each of those elements have been shortened.

1. Type of operator: Part 121 Air Carrier.
2. Type of program: The Inflight Services ASAP (ISAP) program, continuing program.

3. Renewal duration: Every 2 years.
4. ERC acceptance for MOU: Accepted.
5. Objectives: Identify safety events and implement corrective measures.
6. Enforcement Incentive: Use lesser enforcement action or no enforcement action.
7. Statement for evaluation of reports: Yes.
8.
    a. ASAP records keeper: ISAP Manager.
    b. Shared custody of ASAP reports: Between the ERC members during an ongoing investigation is required for program administration.
9. FAA reporting period: not mentioned.
10. Safety related tracking and procedures: Program Manager is responsible.
11. Acceptance of reports: Consensus of ERC
12.
    a. ASAP Review Period: Quarterly and 12-month review.
    b. Review responsibility: ERC.
13. Responsible for Oversight:
    a. A representative from UNITED management,
    b. One representative from Association of Flight Attendants (AFA),

c. The FAA inspector assigned as the ISAP representative; and

d. The ISAP Manager.

14.

a. Feedback: The Program Manager is responsible.

b. Distributing information: United Flight Attendant Operation Manual, Flying Together (web portal).

Comparison

The data used for comparison of the ASAPs in Case I has been retrieved from the public official documents called MOUs. However, the focus employee group in each airline's MOU used for comparison is different. After several attempts to communicate with the company, only these two MOUs (i.e., Maintenance and Engineering ASAP MOU for American Airlines and In-flight Attendants ASAP MOU for United Airlines) could be retrieved.

The goal of the comparative study is to understand the differences between the ASAP programs among the certificate holders and not the employee groups. Hence these two MOUs are considered for comparison although they do not represent a common employee group. Elements 4 and 7 have been purposefully sidelined as they were focusing on common purposes without which the meaning of ASAP MOU has failed. Both elements 4 and 7 were considered unfruitful for the comparison as their existence was as common as document titles among the considered ASAP MOUs. Two Additional elements have been added to accommodate the replacement for 4 and 7. These elements are also the result of changes due to updates in FAA MOU generator:

a. Total number of employee participants.

b. Employee group in focus.

The following subsections of this section would discuss about the observations made and discussion based on Table 3 which lists out the MOU elements among American and United Airlines.

Table 3

Comparative analysis summary from ASAP MOUs of Legacy U.S. carriers.

ASAP MOU ELEMENTS	AMERICAN AIRLINES	UNITED AIRLINES
Type of operator	Part 121 air carrier. (Para 1.1)	Part 121 air carrier. (Para 1)
Type of program	Continuing program. (Para 1.1)	Continuing Program. (Para1)
Employee group in focus	Maintenance and Engineering. (Para 1.1)	Inflight Services. (Para1)
Number of employees under ASAP	16.800. (maintenance personnel) (2013)	13,470. (inflight personnel) (Para 1)
Renewal Duration	Every 2 years. (Para 5)	Every 2 years (Para 2.31)
Primary ASAP Objective	Prevent accidents and incidents by identifying safety concerns and implementing corrective action. (Para 1.2)	Identify safety events and implement corrective actions. (Para 2)
Reporter Incentives	FAA will not use the ASAP report in any subsequent enforcement action. (Para 2.5 b) Alternative to traditional FAA legal enforcement and Company disciplinary action. (Para 1.5)	FAA will not use the content of the ISAP report in any subsequent enforcement action. (Para 10.b) Use lesser enforcement action or no enforcement action. (Para 3)
ASAP records keeper	M&E ASAP Manager. (Para 1.1)	Inflight services ASAP Manager. (Para 2)
FAA reporting period	Quarterly. (Para 2.25)	Not mentioned.
Safety Information tracking	Program Manager. (Para 2.26)	Program Manager. (Para 15)
Acceptance of reports	Consensus of ERC. (Para 2.4)	Consensus of ERC. (Para 8)
Program Review Period	Quarterly only. (Para 2.25)	Quarterly and annually. (Para 9.a)
Review responsibility	Program Manager. (Para 2.25)	ERC (9.a)
Oversight Responsibility	a. AA Vice President Safety, b. Security and Environmental,	a. A representative from UNITED management, b. One representative from Association of

	c. the FAA AMR CMO Office Manager; and d. the TWU AA System Coordinator.	Flight Attendants (AFA), c. the FAA inspector assigned as the ISAP representative; and d. the ISAP Manager.
Feedback Responsibility	Program Manager (Para 2.23)	Program Manager (Para 12)
ASAP information distributing method	Letters, bulletins (alerts), posters, and newsletter articles. (Para 2.25)	United Flight Attendant Operation Manual, Flying Together Website (Para 13)

Observations. The following observations have been made based on Table 3:

Two ASAP participants United Airlines and American Airlines have been compared with respect to certain MOU elements. It has been observed that both the ASAP participants are part 121 operators and follow a continuing type of program.

While employee group in focus for both the airlines are different and United Airlines deals with approximately 9,200 more employees under its ASAP program. According to their ASAP MOUs, objectives and reporter incentives are much similar in both the airlines. Although there is a slight difference in the incentives section of the MOUs, both MOUs clearly state that “FAA will not use the ASAP report in any subsequent enforcement action”. In terms of record keeping and safety information tracking, ASAP manager takes responsibility in both of the airlines.

Review of the program takes place quarterly in case of American, whereas United additionally includes an annual review along with the quarterly reviews. The review responsibility in both the airlines is taken by different positions.

American specify information regarding reporting to FAA about their programs periodically in their MOUs. However, this information could not be retrieved from United's MOU. The consensus of the ERC is required to accept an ASAP report in both the airlines.

Responsible positions for safety oversight among the two airlines differs. It is also observed that the responsibility for feedback on the reports is taken by the program manager in both airlines. However, the safety information distributing is taken care by the operations manual and a web portal in United, while Letters, bulletins (alerts), posters, and newsletter articles. hold the key for information distribution in American Airlines.

Discussion. Based on the observations made above, it is evident that both of the ASAP participants, United Airlines and American Airlines differ in just two MOU elements and similar in the most of them. Objectives stated in both the MOUs show that they share a similar goal as the American's objective (prevent accidents and incidents) is just one of the results of United's objective (identify safety events and implement corrective actions).

Another significant finding has to be the difference between each airline's employee group participation in the ASAP. While United Airlines is participant in ASAP for Dispatchers, Flight Attendants, Maintenance Personnel, Pilots and Ramp Agents, American Airlines does not involve Ramp Agents for ASAP participation.

There is a slight difference in safety information distribution among the two carriers but both the airlines have designated safety manuals fulfilling the

purpose. Overall, both the airlines American and United have been visually similar in their respective approaches towards installation and functioning of the ASAP.

Case II – Low Cost Carriers

In this case, among the LCCs in the U.S., based on the annual operations, Frontier, Spirit and Virgin America Airlines have been chosen for the study. The annual operations average was taken for 5 years between 2011 and 2015 (See Table 4). The data was retrieved from U.S. Department of Transportation website. Table 4 describes the comparison of annual operations among Frontier Airlines, Jet Blue, Southwest Airlines, Spirit Airlines and Virgin America.

Table 4

List of LCCs along with their respective average annual flights (2011-2015)

Airlines	**Average Annual Flights**
Frontier Airlines	63,895
Jet Blue	165,902
Southwest Airlines	1,162,368
Spirit Airlines	67,392
Virgin America	52,352

Frontier Airlines ASAP

Frontier Airlines is a United States low cost carrier headquartered in Denver, Colorado, U.S.A. The carrier operates flights to 54 destinations throughout the United States and 5 international destinations. As of October 2016, the Frontier Airlines is a participant in the ASAP with (FAA, 2016):

- pilots,
- flight dispatchers,
- maintenance personnel and
- flight attendants.

Airline Statistics

Total number of aircrafts in service (2016): 60

Total number of pilots (2016): 1007

Annual Operations Average (2011-2015): 63,895

MOU Elements. The following elements of MOU were extracted from MOU between Frontier Airlines, FAA and Frontier ALPA Master Executive Council (MEC) through FAA's automated MOU generator (FAA, 2016).

NOTE: the following elements of MOU have been listed in the Memorandum of Understanding section of the document. For better presentation purposes, each of those elements have been shortened.

1. Type of operator: Part 121 Air Carrier.
2. Type of program: Pilot ASAP program, continuing program.
3. Renewal duration: every 2 years.
4. ERC acceptance for MOU: Not Signed.

5. Objectives: identify and correct potential safety hazards.
6. Enforcement Incentive: offers lesser enforcement action or no enforcement action.
7. Statement for evaluation of reports: Yes.
8.
    a. ASAP records keeper: ASAP Manager.
    b. Shared custody of ASAP reports: between the ERC members during an ongoing investigation is required for program administration.
9. FAA reporting period: quarterly (every 3 months).
10. Safety related tracking and procedures: Program Manager is responsible.
11. Acceptance of reports: Consensus of ERC.
    a. ASAP Review Period: 12-month review.
    b. Review responsibility: ERC.
12. Responsible for oversight:
    a. A representative from Frontier Airlines management,
    b. One representative from ALPA,
    c. the FAA inspector assigned as the ASAP representative; and
    d. the ASAP Manager.
13.
    a. Feedback: The ERC is responsible and
    b. distributing information: Frontier Airlines Newsletter

Spirit Airlines

Spirit Airlines, Inc. is an American low-cost carrier, headquartered in Miramar, Florida. Spirit operates scheduled flights throughout the United States and in the Caribbean, Mexico, Latin America, and South America. As of October 2016, the Spirit Airlines is a participant in the ASAP with (FAA, 2016):

- pilots,
- flight dispatchers,
- maintenance personnel

Airline Statistics

Total number of aircrafts in service (2016): 91

Total number of pilots (2016): 1453

Annual Operations Average (2011-2015): 67,392

MOU Elements. The following elements of MOU were extracted from MOU between Spirit Airlines, FAA and Spirit ALPA MEC through FAA's automated MOU generator (FAA, 2016).

NOTE: the following elements of MOU have been listed in the Memorandum of Understanding section. For better presentation purposes, each of those elements have been shortened.

1. Type of operator: Part 121 Air Carrier.
2. Type of program: Pilot ASAP program, continuing program.
3. Renewal duration: every 2 years.
4. ERC acceptance for MOU: Not Signed

5. Objectives: identify and correct potential safety hazards.
6. Enforcement Incentive: offers lesser enforcement action or no enforcement action.
7. Statement for evaluation of reports: Yes
8.
    a. ASAP records keeper: ASAP Manager.
    b. Shared custody of ASAP reports: between the ERC members during an ongoing investigation is required for program administration.
9. FAA reporting period: quarterly (every 3 months)
10. Safety related tracking and procedures: Program Manager is responsible.
11. Acceptance of reports: Consensus of ERC.
12.
    a. ASAP Review Period: 12-month review.
    b. Review responsibility: ERC.
13. Responsible for oversight:
    a. A representative from Spirit Airlines management,
    b. One representative from ALPA,
    c. the FAA inspector assigned as the ASAP representative; and
    d. the ASAP Manager.
14.

a. Feedback: The ERC is responsible.

b. distributing information: Spirit Airlines Newsletter.

Virgin America Airlines

Virgin America Inc. is a United States-based airline that began service on August 8, 2007. San Francisco International Airport is Virgin America's main hub, but the airline also has focus city hubs at Los Angeles International Airport and Dallas Love Field. As of October 2016, the Virgin America Airlines is a participant in the ASAP with (FAA, 2016):

- pilots,
- flight dispatchers,
- maintenance personnel

Airline Statistics

Total number of aircrafts in service (2016): 63

Total number of pilots (2016): 710

Annual Operations Average (2011-2015): 52,352

MOU Elements. The following elements of MOU were extracted from MOU between Virgin America Airlines, FAA and Virgin America ALPA MEC through FAA's automated MOU generator (FAA, 2016).

NOTE: the following elements of MOU have been listed in the Memorandum of Understanding section. For better presentation purposes, each of those elements have been shortened.

1. Type of operator: Part 121 Air Carrier.

2. Type of program: Pilot ASAP program, continuing program.
3. Renewal duration: every 2 years.
4. ERC acceptance for MOU: Not Signed.
5. Objectives: identify and correct potential safety hazards.
6. Enforcement Incentive: offers lesser enforcement action or no enforcement action.
7. Statement for evaluation of reports: Yes.
8.
    a. ASAP records keeper: ASAP Manager.
    b. Shared custody of ASAP reports: between the ERC members during an ongoing investigation is required for program administration.
9. FAA reporting period: quarterly (every 3 months).
10. Safety related tracking and procedures: Program Manager is responsible.
11. Acceptance of reports: Consensus of ERC
    a. ASAP Review Period: 12-month review.
    b. Review responsibility: ERC.
12. Responsible for oversight:
    a. A representative from Virgin America Airlines management,
    b. One representative from ALPA,

c. the FAA inspector assigned as the ASAP representative; and
d. the ASAP Manager.

13.

a. Feedback: The ERC is responsible.
b. distributing information: Virgin America Airlines Newsletter.

Comparison

The data used for comparison of the ASAPs in Case II has been retrieved from the FAA documents called MOUs. Again, there has been an effort to retrieve officially signed MOUs from the airlines, labor unions and the FAA. After many unsuccessful attempts, all of these unofficial MOUs were retrieved using FAA Automated MOU Generator (FAA, 2016). This automated generator creates a demonstration or continuing ASAP MOU that fully complies with FAA ASAP guidance, thereby expediting the FAA review and acceptance process.

However, the information used to retrieve MOU from the automated generator was provided by ASAP managers and Air Line Pilot Association website making these MOUs valid for comparative study. All of the MOUs used in Case II are hence having a common employee focus group which is pilots.

The following subsections of this section would discuss about the observations made and discussion based on Table 5 which lists out the MOU elements among Virgin America, Frontier and Spirit Airlines.

Table 5

Comparative analysis summary from ASAP MOUs of LCCs in the U.S.

ASAP MOU ELEMENTS	FRONTIER AIRLINES	SPIRIT AIRLINES	VIRGIN AMERICA
Type of operator	Part 121 air carrier	Part 121 air carrier	Part 121 air carrier
Type of program	Continuing program	Continuing program	Continuing program
Employee group in focus	Pilots	Pilots	Pilots
Number of employees under ASAP	1007	1453	710
Renewal Duration	Every 2 years	Every 2 years	Every 2 years
Primary ASAP Objective	identify and correct potential safety hazards.	identify safety events, and to implement corrective measures	to improve flight safety through pilot self-reporting, cooperative follow-up, and appropriate corrective action
Reporter Incentives	lesser enforcement action or no enforcement action,	lesser enforcement action or no enforcement action,	lesser enforcement action or no enforcement action,
ASAP records keeper	Program Manager	ERC	ERC
FAA reporting period	3 months	3 months	3 months
Safety Information tracking	ASAP Manager	ASAP Manager	ASAP Manager
Acceptance of reports	Consensus of ERC	Consensus of ERC	Consensus of ERC
Program Review Period	12months	12 months	12 months
Review responsibility	ERC	ERC	ERC
Oversight Responsibility	a. A representative from Frontier Airlines management , b. One representative from Air Line Pilots Association (ALPA), c. the FAA inspector assigned as the ASAP representative; and d. the ASAP Manager.	a. A representative from Spirit Airlines management , b. One representative from Air Line Pilots Association (ALPA), c. the FAA inspector assigned as the ASAP representative; and d. the ASAP Manager.	a. A representative from Virgin America Airlines management , b. One representative from Air Line Pilots Association (ALPA), c. the FAA inspector assigned as the ASAP representative; and d. the ASAP Manager.
Feedback Responsibility	ASAP Manager	ERC	ERC
ASAP information distributing method	Air Safety Newsletter, ALPA Safety Forums	Spirit Newsletter, ALPA Safety Forums	Virgin Safety Manual, ALPA Safety Forum

Observations. The following observations have been made based on Table 5: Three ASAP participants Frontier Airlines, Spirit Airlines and Virgin America have been compared with respect to certain MOU elements. It has been observed that all the three ASAP participants are part 121 operators and follow a continuing type of program.

While employee group in focus for all three airlines is pilots, Spirit Airlines has the highest number of pilots (1453) among the three under the participation of the ASAP. Virgin America on the other hand has the lowest number of pilots (710 pilots) as employees under the ASAP program among the three. As mentioned in their ASAP MOUs, all three participants differ in their objectives, but maintain a similar opinion on reporter incentives. In terms of record keeping, Frontier Airlines differs from other two as its ERC is responsible for record keeping, while the ASAP managers take responsibility in other two. However, for safety information tracking, respective ASAP managers take responsibility in all three airlines.

All three ASAP participants report to FAA about their programs once in every 3 months and the program is reviewed annually. The consensus of the ERC is required to accept an ASAP report in all the airlines and the ERC also has an additional responsibility of the program review in all the three participants.

The responsible positions for safety oversight among all the three airlines is similar. It can also be observed that the ALPA MEC is common for all the three as ALPA is a common pilot union for all the three LCCs. ASAP manager of Frontier Airlines has an additional responsibility for feedback on the reports,

whereas in Spirit Airlines and Virgin America, ERC takes this responsibility. ALPA also plays a major role in safety information distribution through its safety forums that involves all the three ASAP participants. In addition to that, all the three airlines have a periodic newsletter as another means of distributing safety information.

Discussion. Based on the observations made above, we have a similar finding in Case II compared to Case I. Here in Case II, the reporter incentives defined by all the three airlines is similar. With almost similar number of average annual operations (2011-2015), the three LCCs share similar aspects in almost all MOU elements. The only difference between each airline's employee group participation in the ASAP is that Frontier Airlines involves flight attendants in addition to pilots, dispatchers and maintenance personnel, while the other two airlines do not involve flight attendants in ASAP participation.

If we took a deeper look into the objectives, similar to Case I, all the objectives may not have similar wordings but they share a similar goal. The labor union involved in all the three airlines is represented by ALPA. This might be the very reason for such good number of similarities between the ASAPs. Another possible explanation could be that all the ASAP MOUs here are involving pilots.

CHAPTER 5

RESULTS

Table 6

List of ASAP participants distinguishing the employee groups participating in ASAP. (Source: FAA website)

Airline	**Dispatchers**	**Flight Attendant**	**Maintenance**	**Pilot**	**Ramp**
American Airlines	X	X	X	X	
United Airlines	X	X	X	X	X
Frontier Airlines	X	X	X	X	
Spirit Airlines	X		X	X	
Virgin America	X		X	X	

The comparative qualitative research has been implemented to compare ASAPs among the U.S. carriers. The hypothesis statement can be partially rejected considering the evidence retrieved from Table 6 which reveals that not all the airlines involve all of their employee groups in ASAP participation. From table 6, we can clearly make out that not all the airlines follow ASAP participation for the employee groups directly related to flight operations. United Airlines is the only legacy carrier from our study that implements ASAP for all its employee groups that are directly related to daily flight operations. It can be observed that LCCs such as Spirit and Virgin America do not involve their flight attendants and ramp agents in their ASAP.

Case I Result:

Among the legacy carriers United and American Airlines, a detailed analysis of their ASAP MOUs and its elements has revealed that both ASAP programs share similarities and slightly differ in a few MOU elements. Hence ASAP programs in this cases follow a similar approach according to their MOUs.

Case II Result:

Among the LCCs, Virgin America, Spirit and Frontier Airlines showed similar results compared to Case I. The detailed analysis of their MOUs have revealed that ASAP programs did not differ much as there was just one inconsistent MOU element among the three.

Table 7- *Comparative analysis summary from ASAP MOUs of U.S. Legacy Carriers and LCCs – Part 1*

ASAP MOU ELEMENTS	AMERICAN AIRLINES	UNITED AIRLINES	UNITED AIRLINES	FRONTIER AIRLINES	SPIRIT AIRLINES	VIRGIN AMERICA
Type of operator	Part 121 air carrier.	Part 121 air carrier.	Part 121 air carrier	Part 121 air carrier	Part 121 air carrier	Part 121 air carrier
Type of program	Continuing program.	Continuing Program.	Continuing Program	Continuing program	Continuing program	Continuing program
Employee group in focus	Maintenance and Engineering.	Inflight Services.	Inflight Services	Pilots	Pilots	Pilots
Number of employees under ASAP	16.800. (maintenance personnel) (2013)	13,470. (inflight personnel)	26,000 (inflight personnel)	1007 (pilots)	1453 (pilots)	710 (pilots)
Renewal Duration	Every 2 years.	Every 2 years.	Every 2 years	Every 2 years	Every 2 years	Every 2 years
Primary ASAP Objective	Prevent accidents and incidents by identifying safety concerns and implementing corrective action.	Identify safety events and implement corrective actions.	Identify safety events and implement corrective actions.	identify and correct potential safety hazards.	identify safety events, and to implement corrective measures	to improve flight safety through pilot self-reporting, cooperative follow-up, and appropriate corrective action
Reporter Incentives	FAA will not use the ASAP report in any subsequent enforcement action. Alternative to traditional FAA legal enforcement and Company disciplinary action.	FAA will not use the content of the ISAP report in any subsequent enforcement action. Use lesser enforcement action or no enforcement action.	Alternative to traditional FAA legal enforcement and Company disciplinary action	lesser enforcement action or no enforcement action,	lesser enforcement action or no enforcement action,	lesser enforcement action or no enforcement action,
ASAP records keeper	M&E ASAP Manager.	Inflight services ASAP Manager.	ISAP Manager	Program Manager	ERC	ERC
FAA reporting period	Quarterly.	Not mentioned.	Not Mentioned	3 months	3 months	3 months
Safety Information tracking	Program Manager.	Program Manager.	Program Manager	ASAP Manager	ASAP Manager	ASAP Manager
Acceptance of reports	Consensus of ERC.	Consensus of ERC.	Consensus of ERC	Consensus of ERC	Consensus of ERC	Consensus of ERC

Table 7 *Contd. Comparative analysis summary from ASAP MOUs of U.S. Legacy Carriers and LCCs – Part 2*

Program Review Period	Quarterly only.	Not mentioned.	Quarterly and 12 month review	12months	12 months	12 months
Review responsibility	Program Manager.	Not mentioned.	ERC	ERC	ERC	ERC
Oversight Responsibility	e. AA Vice President Safety, f. Security and Environmental, g. the FAA AMR CMO Office Manager; and h. the TWU AA System Coordinator.	e. A representative from UNITED management, f. One representative from Association of Flight Attendants (AFA), g. the FAA inspector assigned as the ISAP representative; and h. the ISAP Manager.	i. A representative from UNITED management, j. One representative from Association of Flight Attendants (AFA), k. the FAA inspector assigned as the ISAP representative; and l. the ISAP Manager.	e. A representative from Frontier Airlines management , f. One representative from Air Line Pilots Association (ALPA), g. the FAA inspector assigned as the ASAP representative; and h. the ASAP Manager.	e. A representative from Spirit Airlines management , f. One representative from Air Line Pilots Association (ALPA), g. the FAA inspector assigned as the ASAP representative; and h. the ASAP Manager.	e. A representative from Virgin America Airlines management , f. One representative from Air Line Pilots Association (ALPA), g. the FAA inspector assigned as the ASAP representative; and h. the ASAP Manager.
Feedback Responsibility	Program Manager	Program Manager	Program Manager	ASAP Manager	ERC	ERC
ASAP information distributing method	Letters, bulletins (alerts), posters, and newsletter articles.	United Flight Attendant Operation Manual, Flying Together Website.	United Flight Attendant Operation Manual.	Air Safety Newsletter, ALPA Safety Forums.	Spirit Newsletter, ALPA Safety Forums	Virgin Safety Manual, ALPA Safety Forum

However, Table 7 here gives us an overall comparison of the ASAP MOU elements among the U.S. carriers (both legacy and LCCs). It can be clearly observed that the MOU elements are similar on most of elements. However, in regards to ASAP participation and some differences in MOUs from Table 7, sufficient evidence suggests that the ASAP participants may not have a standardized approach towards the ASAPs.

CHAPTER 6

CONCLUSION

In the U.S. aviation industry, ASAPs has served its purpose in achieving safety goals set at the start of the program. This comparative study was an attempt to take a deeper dive into the program and its implementation among the U.S. Airlines. While the FAA provides guidelines for the installation of ASAP at a particular airline, it has been observed that it is up-to the airline of how the ASAP should be implemented at their organization. It is also found that an airline can have multiple ASAP programs installed within its organization involving various employee communities that have a direct effect on the daily flight operations.

Again, it has been found that at each airline, the number of employee groups involved in ASAP participation is different. The detailed analysis of ASAP MOUs has revealed that the legacy carriers such as American Airlines and United Airlines have a different approach in implementing ASAPs at their companies. However, the LCCs haven't shown much difference in their approach to implement ASAPs when their ASAP MOUs have been studied.

Overall comparison of the ASAP MOUs of both legacy and LCCs has shown significant difference among their airlines in implementing ASAPs at their organizations. Hence the hypothesis statement "All U.S. Airlines have standardized Aviation Safety Action Programs which include all employee groups respectively" can be rejected. This study has focused mainly on literature confining to safety reporting systems and their development in the U.S. Aviation Industry.

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APPENDIX A

DATA COLLECTED MAY-OCTOBER 2016

LIST OF KEY TERMS (FAA, 2016)

Administrative Action.

Under paragraph 205 of FAA Order 2150.3A, Compliance and Enforcement Program, administrative action is a means for disposing of violations or alleged violations that do not warrant the use of enforcement sanctions. The two types of administrative action are a warning notice and a letter of correction.

Air Carrier.

A person who undertakes directly, by lease, or other arrangement, to engage in air transportation.

Certificate Holder.

Refers to a person authorized to operate under 14 CFR Part 121, or who holds a certificate issued under 14 CFR Part 145.

Certificate Holding District Office (CHDO).

The Flight Standards District Office (FSDO) or Certificate Management Office (CMO) having overall responsibility for all FAA reporting requirements, technical administration requirements, and regulatory oversight of a certificate holder. Page 2 Par 1 11/15/02 AC 120-66B.

Consensus of the ERC.

Under ASAP, consensus of the ERC means the voluntary agreement of all representatives of the ERC to each decision required by the MOU.

Corrective Action.

For the purposes of ASAP, corrective action refers to any safety-related action determined necessary by the ERC based upon a review and analysis of the reports

submitted under an ASAP. Corrective action may involve joint or individual action by the parties to the ASAP MOU.

Enforcement-Related Incentive.

Refers to an assurance that lesser enforcement action will be used to address certain alleged violations of the regulations to encourage participation by certificate holder employees.

Event Review Committee (ERC).

A group comprised of a representative from each party to an ASAP MOU. The group reviews and analyzes reports submitted under an ASAP. The ERC may share and exchange information and identify actual or potential safety problems from the information contained in the reports. The ERC is usually comprised of a management representative from the certificate holder, a representative from the employee labor association (if applicable), and a specifically qualified FAA inspector from the CHDO.

Memorandum of Understanding (MOU).

Refers to the written agreement between two or more parties setting forth the purposes for, and terms of, an ASAP. m. Party/Parties. Refers to the certificate holder, the FAA, and any other person or entity (e.g., labor union or other industry or Government entity) that is a signatory to the MOU.

Safety-Related Report.

Refers to a written account of an event that involves an operational or maintenance issue related to aviation safety reported through an ASAP. Par 4 Page 3 AC 120-66B 11/15/02

Voluntary Disclosure Policy.

A policy under which regulated entities may voluntarily report apparent violations of the regulations and develop corrective action satisfactory to the FAA to preclude their recurrence. Certificate holders that satisfy the elements of the Voluntary Disclosure Policy receive a letter of correction in lieu of civil penalty action. Voluntary disclosure reporting procedures are outlined in the current version of AC 00-58, Voluntary Disclosure Reporting Program.

APPENDIX B

FUTURE RESEARCH AREAS

FUTURE RESEARCH AREAS

Aviation Safety Information Analysis and Sharing (ASIAS)

The Aviation Safety Information Analysis and Sharing (ASIAS) program partners with the Commercial Aviation Safety Team (CAST) and General Aviation Joint Steering Committee (GAJSC) to monitor known risk, evaluate the effectiveness of deployed mitigations, and detect emerging hazards. ASIAS began in 2007 and now has access to 185 data sources including voluntary provided safety data. There are currently 45 Part 121-member air carriers and 20 corporate operators participating in ASIAS. It continues to evolve but has matured to the point that the Federal Aviation Administration (FAA) and industry can now leverage voluntarily provided safety data representing 99 percent of U.S. air carrier commercial operations.

ASIAS has access to Flight Operational Quality Assurance (FOQA) programs from 28 Part 121 air carriers and four corporate operators and Aviation Safety Action Program (ASAP) data from flight crews, maintenance, and other employees from 44 Part 121 air carriers. ASIAS also accesses reports in the Air Traffic Safety Action Program (ATSAP), which provides air traffic controllers with a way to report potential safety hazards.

Air Traffic Safety Action Program (ATSAP)

ATSAP is an agreement between the FAA, the National Air Traffic Controllers Association (NATCA), and the National Association of Government Employees (NAGE) that fosters a voluntary, cooperative, non-punitive environment for FAA air traffic employees to openly report safety concerns. By Order, all personnel providing or directly supporting air traffic services are covered, including management. A related Confidential Information Sharing Program (CISP) integrates voluntary safety information self-

reported by pilots and air traffic controllers. This data-sharing program gives the FAA a more complete picture of the National Airspace System by collecting, assessing and reviewing safety events from the perspective of both pilots and air traffic control.

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DATA COLLECTED MAY-OCTOBER 2016

LIST OF DATABASES SEARCHED

1. ProQuest News & Newspapers
2. OCLC FirstSearch
3. EBSCOhost
4. Cambridge Journals Online
5. ProQuest
6. Directory of Open Access Journals
7. EBSCOhost EJS (Electronic Journals Service)
8. Emerald Insight
9. Britannica: Academic Edition
10. IngentaConnect
11. University of Chicago Press Journals
12. ASRS Database Online - Aviation Safety Reporting System
13. Aviation Accident Database - National Transportation Safety Board
14. Air Safety Investigation Resource – Databases
15. Web of Knowledge
16. Google Scholar
17. ProQuest Statistical Insight
18. PAO- Periodicals Archive Online
19. Academic Search Premier (EBSCOhost)
20. World Digital Library
21. MEDLINE
22. Periodicals Index Online
23. Ebrary
24. Science Direct
25. JSTOR
26. Scopus
27. Project MUSE - Premium Collection