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"AVIATION SAFETY AND SECURITY"

BY

ASHIK P.R

500028434

GUIDE NAME: PRASANTH G

DESIGNATION: FACULTY, SPEEDWINGS AVIATION ACADEMY

ORGANISATION: SPEEDWINGS AVIATION ACADEMY

THIS DISSERTATION REPORT SUBMITTED FOR THE PARTIAL FULFILLMENT OF THE PROJECT WHICH IS REQUIRED FOR EXECUTIVE BACHELOR OF BUSINESS ADMINISTRATION

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Signature:

Name of the Student: ASHIK P.R

Residential Address:Panambilly (H),Kottanellur P.O, Pin -680662

Thrissur District

Telephone/Mobile: +919061242075

e-mail: ashikpr9155@gmail.com

Date :19/10/2015

Place: Kerala

Declaration by the Guide

This is to certify that Mr. Ashik P R, a student of **BBA Aviation Operation**, Roll No. **500028434** of UPES has successfully completed this dissertation report on **"Aviation Safety and Security"** under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analysed by him and it has not been submitted in any other university or institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfilment for the award of degree of BBA.

Signature: Prasanth

SPEEDWINGS ACADEMY FOR AVIATION SERVICES KALOOR COCHIN-17

Name & Designation: Mr. Prasanth G, Faculty BBA

Address: 'Pushpakam', Perandoor Temple Road, Elamakkara P O, Cochin - 26

Mobile: 9567948321

E-mail: prasanth.gopinath90@gmail.com

Date: 19/10/2015

Place: Ernakulam

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Executive Summary / Abstract:

This project examines various issues relating to aviation safety and security. Since the tragic events of Sept. 11, many people use the terms "safety" and "security" a lot, especially as they relate to travel. Sometimes the two words are used synonymously. But there is a significant difference between the two words when it comes to air travel.

Aviation safetyrefers to the efforts that are taken to ensure airplanes are free from factors that may lead to injury or loss. Jet airplanes always have been safe - they have to be, or the manufacturers wouldn't be in business long. Commercial airlines and major manufacturers like Boeing Commercial Airplanesadhere to every safety regulation mandated by the regulatory agencies - and then some.

Aviation securityis only one component that may affect passenger safety. It is not so much related to the airplane itself, but rather to intelligence gathering, pre-boarding procedures and airport security personnel Aviation safety is a term encompassing the theory, investigation, and categorization of flight failures, and the prevention of such failures through regulation, education, and training. It can also be applied in the context of campaigns that inform the public as to the safety of air travel.

During the 1920s, the first laws were passed in the USA to regulate civil aviation. Of particular significance was the Air Commerce Act (1926) which required pilots and aircraft to be examined and licensed, for accidents to be properly investigated, and for the establishment of safety rules and navigation aids, under the Aeronautics Branch of the United States Department of Commerce.

Despite this, in 1926 and 1927 there were a total of 24 fatal commercial airline crashes, a further 16 in 1928, and 51 in 1929 (killing 61 people), which remains the worst year on record at an accident rate of about 1 for every 1,000,000 miles (1,600,000 km) flown. Based on the current numbers flying, this would equate to 7,000 fatal incidents per year.

The fatal incident rate has declined steadily ever since, and since 1997 the number of fatal air accidents has been no more than 1 for every 2,000,000,000 person-miles flown (e.g., 100 people flying a plane for 1,000 miles (1,600 km) counts as 100,000 person-miles, making it comparable with methods of transportation with different numbers of passengers, such as one person driving an automobile for 100,000 miles (160,000 km), which is also 100,000 person-miles), and thus one of the safest modes of transportation when measured by distance traveled.

The World Bank has published the reliable data of the frequency of passengers carried by Air Transport in the Year 2012 obtained from the International Civil Aviation Authority. The United States of America has the largest number of Commercial Air Transport Passengers. 756,617,000 cf. China the next largest with 318,475,924. The United States had an International Flight frequency of 9,560,451 in 2012. The Civil Aviation Authority, JAR and EASA have published that there is a fatal accident ratio of one per million flights. The main cause is Pilot in Command error.

Between 1990–2006, there were 1441 commuter and air taxi crashes in the U.S. of which 373 (26%) were fatal, resulting in 1063 deaths (142 occupational pilot deaths). A disproportionate number of all U.S. aircraft crashes occur in Alaska, largely as a result of severe weather conditions. Alaska accounted for 513 (36%) of the total U.S. crashes.

Another aspect of safety is protection from attack currently known as *Security* (as the ISO definition of safety encompasses non-intentional and intentional causes of harm or propertydamage). The terrorist attacks of 2001 are not counted as accidents. However, even if they were counted as accidents they would have added about 2 deaths per 2,000,000,000 person-miles. Two months later, American Airlines Flight 587 crashed in New York City, killing 256 people including 5 on the ground, causing 2001 to show a very high fatality rate. Even so, the rate that year including the attacks (estimated here to be about 4 deaths per 1,000,000,000 person-miles), is safe compared to some other forms of transport when measured by distance traveled.

Safety has improved from better aircraft design, engineering and maintenance, the evolution of navigation aids, and safety protocols and procedures.

CHAPTER 1
INTRODUCTION

Today aviation security is high on the list of priorities of air traveler, the government, and the international air community. In India, Airline security is handled by the Bureau of Civil Aviation Security (BCAS).It was initially set up as a cell in the directorate General of Civil Aviation (DGCA). However, it was reorganized into an independent department under the Ministry of Civil Aviation. The main responsibility of BCAS is to lay down standards and measurers in respect of security of civil flights at international and domestic airports in India. When aviation security did arise as a serious issue in the late 1960s, there was need to adopt an international framework for addressing acts of unlawful interference. The International Civil Aviation Organization (ICAO) assumed a leadership role in developing aviation security policies and measures at international level, and today the enhancement of global aviation security. Airport security refers to the techniques and methods used in protecting passengers, staff and aircraft which use the airports from accidental/malicious harm, crime and other threats.

Large numbers of people pass through airports every day. This presents potential targets for terrorism and other forms of crime because of the number of people located in a particular location.Similarly, the high concentration of people on large airliners, the potential high death rate with attacks on aircraft, and the ability to use a hijacked airplane as a lethal weapon may provide an alluring target for terrorism, whether or not they succeed due their high profile nature following the various attacks and attempts around the globe in recent years.

1.1 AIRPORT SECURITY

Airport security attempts to prevent any threats or potentially dangerous situations from arising or entering the country. If airport security does succeed in this, then the chances of any dangerous situations, illegal items or threats entering into both aircraft, country or airport are greatly reduced. As such, airport security serves several purposes: To protect the airport and country from any threatening events, to reassure the traveling public that they are safe and to protect the country and their people.

Australian Government regulations specify that everyone, including passengers, aircrew and airport workers, must go through a security screening point at Hobart Airport's Domestic and International Terminals before boarding a flight or moving into secure areas of terminals.Our focus is to provide efficient screening processes that show respect for all passengers, while at the same time assuring the highest level of security standards are maintained.

You are responsible for keeping track of your own possessions when you pass through the screening point. We suggest that you put your valuables, such as wallet, passport, jewellery and camera, in your bag before arriving at the screening point.If walk-through detector alarms go off during screening passengers will be subject to further screening before being cleared for travel. This may include the removal of various outer garments, including headwear or footwear, which can have a metal brace in the instep that activates alarms. If alarms continue to sound passengers may be asked to undergo a physical search.If, for religious or other personal reasons, passengers do not wish to undergo these screening processes in public, they may request that screening occurs in a private room.Explosive Trace Detection machines are in use at Hobart Airport. Passengers and baggage may be tested at check-ins or screening points at any time.

1.2 AVIATION SAFETY HAZARDS

1.2.1 FOREIGN OBJECT DEBRIS

Foreign object debris (FOD) includes items left in the aircraft structure during manufacture/repairs, debris on the runway and solids encountered in flight (e.g. hail and dust). Such items can damage engines and other parts of the aircraft. Air France Flight 4590 crashed after hitting a part that had fallen from another aircraft.

1.2.2 MISLEADING INFORMATION AND LACK OF INFORMATION

A pilot misinformed by a printed document (manual, map, etc.), reacting to a faulty instrument or indicator (in the cockpit or on the ground), or following inaccurate instructions or information from flight or ground control can lose spatial orientation, or make another mistake, and consequently lead to accidents or near misses.

1.2.3 LIGHTNING

Boeing studies showed that airliners are struck by lightning twice per year on average; aircraft withstand typical lightning strikes without damage.

The dangers of more powerful positive lightning were not understood until the destruction of a glider in 1999. It has since been suggested that positive lightning might have caused the crash of Pan AmFlight 214 in 1963. At that time, aircraft were not designed to withstand such strikes because their existence was unknown. The 1985 standard in force in the US at the time of the glider crash, Advisory Circular AC 20-53A, was replaced by Advisory Circular AC 20-53B in 2006. However, it is unclear whether adequate protection against positive lightning was incorporated.

The effects of typical lightning on traditional metal-covered aircraft are well understood and serious damage from a lightning strike on an airplane is rare. The Boeing 787 Dreamliner of which the exterior is carbon-fiber-reinforced polymer received no damage from a lightning strike during testing.

1.2.4 ICE AND SNOW

Ice and snow can be factors in airline accidents. In 2005, Southwest Airlines Flight 1248 slid off the end of a runway after landing in heavy snow conditions, killing one child on the ground.

Even a small amount of icing or coarse frost can greatly impair the ability of a wing to develop adequate lift, which is why regulations prohibit ice, snow or even frost on the wings or tail, prior to takeoff. Air Florida Flight 90 crashed on takeoff in 1982, as a result of ice/snow on its wings.

An accumulation of ice during flight can be catastrophic, as evidenced by the loss of control and subsequent crashes of American Eagle Flight 4184 in 1994, and Comair Flight 3272 in 1997. Both aircraft were turboprop airliners, with straight wings, which tend to be more susceptible to in-flight ice accumulation, than are swept-wing jet airliners.

Airlines and airports ensure that aircraft are properly de-iced before takeoff whenever the weather involves icing conditions. Modern airliners are designed to prevent ice buildup on wings, engines, and tails (empennage) by either routing heated air from jet engines through the leading edges of the wing, and in, or on slower aircraft, by use of inflatable rubber "boots" that expand to break off any accumulated ice.

Airline flight plans require airline dispatch offices to monitor the progress of weather along the routes of their flights, helping the pilots to avoid the worst of inflight icing conditions. Aircraft can also be equipped with an ice detector in order to warn pilots to leave unexpected ice accumulation areas, before the situation becomes critical.

1.2.5 ENGINE FAILURE

An engine may fail to function because of fuel starvation (e.g. British Airways Flight 38), fuel exhaustion (e.g. *Gimli Glider*), foreign object damage (e.g. US Airways Flight 1549), mechanical failure due to metal fatigue (e.g. Kegworth air disaster, El Al Flight 1862, China Airlines Flight 358), mechanical failure due to improper maintenance (e.g. American Airlines Flight 191), mechanical failure caused by an original manufacturing defect in the engine (e.g. Qantas Flight 32, United Airlines Flight 232, Delta Air Lines Flight 1288), and pilot error

In a multi-engine aircraft, failure of a single engine usually results in a precautionary landing being performed, for example landing at a diversion airport instead of continuing to the intended destination. Failure of a second engine (e.g. US Airways Flight 1549) or damage to other aircraft systems caused by an uncontained engine failure (e.g. United Airlines Flight 232) may, if an emergency landing is not possible, result in the aircraft crashing.

1.2.6 STRUCTURAL FAILURE OF THE AIRCRAFT

Examples of failure of aircraft structures caused by metal fatigue include the de Havilland Comet accidents (1950s) and Aloha Airlines Flight 243 (1988). Now that the subject is better understood, rigorous inspection and nondestructive testing procedures are in place.

Composite materials consist of layers of fibers embedded in a resin matrix. In some cases, especially when subjected to cyclic stress, the layers of the material separate from each other (delaminate) and lose strength. As the failure develops inside the material, nothing is shown on the surface; instrument methods (often ultrasound-based) have to be used to detect such a material failure. In the 1940s several Yakovlev Yak-9s experienced delamination of plywood in their construction.

1.2.7 STALLING

Stalling an aircraft (increasing the angle of attack to a point at which the wings fail to produce enough lift) is dangerous and can result in a crash if the pilot fails to make a timely correction.

Devices to warn the pilot when the aircraft's speed is decreasing close to the stall speed include stall warning horns (now standard on virtually all powered aircraft), stick shakers, and voice warnings. Most stalls are a result of the pilot allowing the airspeed to be too slow for the particular weight and configuration at the time. Stall speed is higher when ice or frost has attached to the wings and/or tail stabilizer.The more severe the icing, the higher the stall speed, not only because smooth airflow over the wings becomes increasingly more difficult, but also because of the added weight of the accumulated ice.

Crashes caused by a full stall of the airfoils include:

- British European Airways Flight 548 (1972)
- United Airlines Flight 553 (1972)
- Aeroflot Flight 7425 (1985)
- Arrow Air Flight 1285 (1985)
- Northwest Airlines Flight 255 (1987)
- The Paul Wellstone crash (2002)
- Turkish Airlines Flight 1951 crash (2009)
- Colgan Air Flight 3407 (2009)
- Air France Flight 447 (2009)

Safety regulations control aircraft materials and the requirements for automated fire safety systems. Usually these requirements take the form of required tests. The tests measure flammability of materials and toxicity of smoke. When the tests fail, it is on a prototype in an engineering laboratory rather than in an aircraft.

Fire and its toxic smoke have been the cause of accidents. An electrical fire on Air Canada Flight 797 in 1983 caused the deaths of 23 of the 46 passengers, resulting in the introduction of floor level lighting to assist people to evacuate a smoke-filled aircraft. In 1985, a fire on the runway caused the loss of 55 lives, 48 from the effects of incapacitating and subsequently lethal toxic gas and smoke in the British Airtours Flight 28M accident which raised serious concerns relating to survivability – something that had not been studied in such detail. The swift incursion of the fire into the fuselage and the layout of the aircraft impaired passengers' ability to evacuate, with areas such as the forward galley area becoming a bottle-neck for escaping passengers, with some dying very close to the exits. Much research into evacuation and cabin and seating layouts was carried out at Cranfield Institute to try to measure what makes a good evacuation route, which led to the seat layout by Overwing exits being changed by mandate and the examination of evacuation requirements relating to the design of galley areas. The use of smoke hoods or misting systems were also examined although both were rejected.

South African Airways Flight 295 was lost in the Indian Ocean in 1987 after an in-flight fire in the cargo hold could not be suppressed by the crew. The cargo holds of most airliners are now equipped with automated halon fire extinguishing systems to combat a fire that might occur in the baggage holds. In May 1996, ValuJet Flight 592 crashed into the Florida Everglades a few minutes after takeoff because of a fire in the forward cargo hold. All 110 people on board were killed.

1.2.8 BIRD STRIKE

Bird strike is an aviation term for a collision between a bird and an aircraft. Fatal accidents have been caused by both engine failure following bird ingestion and bird strikes breaking cockpit windshields.

Jet engines have to be designed to withstand the ingestion of birds of a specified weight and number and to not lose more than a specified amount of thrust. The weight and numbers of birds that can be ingested without hazarding the safe flight of the aircraft are related to the engine intake area. The hazards of ingesting birds beyond the "designed-for" limit were shown on US Airways Flight 1549 when the aircraft struck Canada geese.

The outcome of an ingestion event and whether it causes an accident be it on a small fast plane, such as military jet fighters, or a large transport, depends on the number and weight of birds and where they strike the fan blade span or the nose cone. Core damage usually results with impacts near the blade root or on the nose cone.

The highest risk of a bird strike occurs during takeoff and landing in the vicinity of airports, and during low-level flying by military aircraft, crop dusters and helicopters for example. Some airports use active countermeasures, ranging from a person with a shotgun through recorded sounds of predators to employing falconers. Poisonous grass can be planted that is not palatable to birds, nor to insects that attract insectivorous birds. Passive countermeasures involve sensible land-use management, avoiding conditions attracting flocks of birds to the area (e.g. landfills). Another tactic found effective is to let the grass at the airfield grow taller (approximately 12 inches (30 cm)) as some species of birds won't land if they cannot see one another.

1.3 HUMAN FACTORS

The airplane is a Boeing 720 testing a form of jet fuel, known as "antimisting kerosene", which formed a difficult-to-ignite gel when agitated violently, as in a crash.

Human factors, including pilot error, are another potential set of factors, and currently the factor most commonly found in aviation accidents. Much progress in applying human factors analysis to improving aviation safety was made around the time of World War II by such pioneers as Paul Fitts and Alphonse Chapanis. However, there has been progress in safety throughout the history of aviation, such as the development of the pilot's checklist in 1937. CRM, or Crew Resource Management, is a technique that makes use of the experience and knowledge of the complete flight crew to avoid dependence on just one crew member.

Pilot error and improper communication are often factors in the collision of aircraft. This can take place in the air (1978 Pacific Southwest AirlinesFlight 182) (TCAS) or on the ground (1977 Tenerife disaster) (RAAS). The barriers to effective communication can involve both internal and external factors. The ability of the flight crew to maintain situation awareness is a critical human factor in air safety. Human factors training is available to general aviation pilots and called single pilot resource management training.

Failure of the pilots to properly monitor the flight instruments caused the crash of Eastern Air Lines Flight 401 in 1972. Controlled flight into terrain (CFIT), and error during take-off and landing can have catastrophic consequences, for example causing the crash of Prinair Flight 191 on landing, also in 1972.

Another human factors that affect the aviation safety is the attitude when communication. The appropriateness modal that juniors speak up and the leaders absorb the information and accept inputs can help to build a safety communicate environment.

Human factors incidents are not limited to errors by pilots. Failure to close a cargo door properly on Turkish Airlines Flight 981 in 1974 caused the loss of the aircraft – however, design of the cargo door latch was also a major factor in the accident. In the case of Japan Airlines Flight 123, improper repair of previous damage led to explosive decompression of the cabin, which in turn destroyed the vertical stabilizer and damaged all four hydraulic systems which powered all the flight controls.

1.3.1CONTROLLED FLIGHT INTO TERRAIN

Controlled flight into terrain (CFIT) is a class of accidents in which an aircraft is flown under control into terrain or man-made structures. CFIT accidents typically result from pilot error or of navigational system error. Failure to protect ILS critical areas can also cause CFIT accidentsIn December 1995, American Airlines Flight 965 tracked off course while approaching Cali, Colombia and hit a mountainside despite a terrain awareness and warning system (TAWS) terrain warning in the cockpit and desperate pilot attempt to gain altitude after the warning. Crew position awareness and monitoring of navigational systems are essential to the prevention of CFIT accidents. As of February 2008, over 40,000 aircraft had enhanced TAWS installed, and they had flown over 800 million hours without a CFIT accident.

Another anti-CFIT tool is the Minimum Safe Altitude Warning (MSAW) system which monitors the altitudes transmitted by aircraft transponders and compares that with the system's defined minimum safe altitudes for a given area. When the system determines the aircraft is lower, or might soon be lower, than the minimum safe altitude, the air traffic controller receives an acoustic and visual warning and then alerts the pilot that his aircraft is too low.

1.3.2 ELECTROMAGNETIC INTERFERENCE

The use of certain electronic equipment is partially or entirely prohibited as it might interfere with aircraft operation, such as causing compass deviations. Use of some types of personal electronic devices is prohibited when an aircraft is below 10,000', taking off, or landing. Use of a mobile phone is prohibited on most flights because in-flight usage creates problems with ground-based cells.

1.3.3GROUND DAMAGE

Various ground support equipment operate in close proximity to the fuselage and wings to service the aircraft and occasionally cause accidental damage in the form of scratches in the paint or small dents in the skin. However, because aircraft structures (including the outer skin) play such a critical role in the safe operation of a flight, all damage is inspected, measured, and possibly tested to ensure that any damage is within safe tolerances.

An example problem was the depressurization incident on Alaska Airlines Flight 536 in 2005. During ground services a baggage handler hit the side of the aircraft with a tug towing a train of baggage carts. This damaged the metal skin of the aircraft. This damage was not reported and the plane departed. Climbing through 26,000 feet (7,900 m) the damaged section of the skin gave way under the difference in pressure between the inside of the aircraft and the outside air. The cabin depressurized explosively necessitating a rapid descent to denser (breathable) air and an emergency landing. Post landing examination of the fuselage revealed a 12 in (30 cm) hole on the right side of the airplane.

Runway safety

Types of runway safety incidents include:

- Runway excursion – an incident involving only a single aircraft making an inappropriate exit from the runway.
- Runway overruns – a specific type of excursion where the aircraft does not stop before the end of the runway (e.g., Air France Flight 358).
- Runway incursion – incorrect presence of a vehicle, person, or another aircraft on the runway (e.g., Tenerife airport disaster).
- Runway confusion – crew misidentification the runway for landing or take-off

Terrorism

Aircrew are normally trained to handle hijack situation.Since the September 11, 2001 attacks, stricter airport and airline security measures are in place to prevent terrorism, such as security checkpoints and locking the cockpit doors during flight.

Deliberate aircrew action

Although most air crews are screened for psychological fitness, some have taken suicidal actions. In the case of EgyptAir Flight 990, it appears that the first officer deliberately crashed into the Atlantic Ocean while the captain was away from his station in 1999 off Nantucket, Massachusetts.

In 1982, Japan Airlines Flight 350 crashed while on approach to the Tokyo Haneda Airport, killing 24 of the 174 on board. The official investigation found the mentally ill captain had attempted suicide by placing the inboard engines into reverse thrust, while the aircraft was close to the runway. The first officer did not have enough time to countermand before the aircraft stalled and crashed.

In 1997, SilkAir Flight 185 suddenly went into a high dive from its cruising altitude. The speed of the dive was so high that the aircraft began to break apart before it finally crashed near Palembang, Sumatra. After three years of investigation, the Indonesian authorities declared that the cause of the accident could not be determined. However, the US NTSB concluded that deliberate suicide by the captain was the only reasonable explanation.

Airport design

Airport design and location can have a large impact on aviation safety, especially since some airports such as Chicago Midway International Airport were originally built for propeller planes and many airports are in congested areas where it is difficult to meet newer safety standards. For instance, the FAA issued rules in 1999 calling for a runway safety area, usually extending 500 feet (150 m) to each side and 1,000 feet (300 m) beyond the end of a runway. This is intended to cover ninety percent of the cases of an aircraft leaving the runway by providing a buffer space free of obstacles. Many older airports do not meet this standard. One method of substituting for the 1,000 feet (300 m) at the end of a runway for airports in congested areas is to install an engineered materials arrestor system (EMAS). These systems are usually made of a lightweight, crushable concrete that absorbs the energy of the aircraft to bring it to a rapid stop. As of 2008, they have stopped three aircraft at JFK Airport.

1.4 ACCIDENTS AND INCIDENTS

1.4.1 STATISTICS

According to the 2014 ICAO safety report, the total number of plane accidents in 2013 was 90 world-wide. Only 9 of these accidents were *fatal accidents*, that is, accidents involving fatalities.

The Global Fatal Accident Review of the Civil Aviation Authority gives a total number of 0.6 fatal accidents per one million flights for the ten-year period 2002 to 2011. When expressed as per million hours flown, this number is 0.4. The corresponding number of fatalities is 22.0 fatalities per one million flights or 12.7 when expressed as per million hours flown. The total number of fatalities in 2013 was 173, which is the smallest number of fatalities since 2000, even though the total number of departures in 2013 was with 32.1 million as high as never before. This corresponds to 5.39 fatalities per one million departures in 2013. The following chart shows the development of the rate of fatal and non-fatal accidents in recent years.

TABLE (A)

Airplane accident statistics (world-wide)

Year	Number of accidents per one million departures
2009	4.1
2010	4.2
2011	4.2
2012	3.2
2013	2.8

Not all phases of flight are equally prone to accidents. Most accidents (55%) occur during landing or take-off. Only 10% occur when the aircraft is en route.

TABLE (B)

Accidents by phase of flight (2013)

Phase	Percentage of accidents that occur in this phase
Landing	43
Approach	18
Take-off	12
En route	10
Standing	9
Taxi	8

1.4.2COMPARISON TO OTHER MODES OF TRAVEL

There are three main ways in which risk of fatality of a certain mode of travel can be measured: Deaths per billion typical journeys taken, deaths per billion hours travelled, or deaths per billion kilometers traveled. The following table displays these statistics for 1990–2000. Note that aviation safety does not include the transportation to the airport.

1.4.3AIR SAFETY INVESTIGATORS

These individuals are trained and authorized to conduct aviation accident and incident investigations for the government organizations responsible for aviation safety. They possess specialized expertise and training in specific fields, such as aircraft structures, air traffic control, flight recorders and human factors. They may be employed by governments, manufacturers or unions and perform fact-finding, analyses, and report writing as part of their duties.

CHAPTER 2
LITERATURE REVIEW

2.1 SECURITY MEASURES

Various types of security checks conducted at the airport:

1. Screening of Hand Baggage

2. Security Check Point

3. Metal Detectors

4. If the passenger is found with any substance that is not permitted to be carried, he/she maybe subjected to the Interrogation by the security forces.

5. A detection dog or sniffer dog is trained to and works ath using its senses(almost always the sense of smell) to detect substances such as explosives, illegal drugs, or blood.this dog is usually used to check bags however; it can be used to sniff humans as well.

6. Passport & Photo id checks: Before reaching the security area, the passpors& valid government issued photo ids of all the passengers are checked thoroughly. passengers are requested to cooperate with the security staff as these checks are conducted for their own benefit.

7. Display at terminals: At various points inside the airport adequate displays of ds and don'ts are put up to create awareness about security among the passengers. Also, a lot of times passengers tend to carry items that are not permitted in their hand luggage. The security forces do not make exceptions for passengers by allowing them to carry these items.

2.2 SECURITY MEASURES FOR PASSENGER AND THEIR BAGGAGE

Usually baggage comes into two types: check-in and cabin baggage.

Pre-board screening

"The application of technical or other means which are intended to identify and/or detect weapons, explosives or other dangerous devices which may be used to commit an act of unlawful interference."

Pre-board screening of passengers is to be carried out prior to aircraft boarding. It includes:-

- Manual or hand search of passengers and cabin baggage
- Walk through metal detector or handheld metal detector
- X-ray of cabin baggage
- Explosive detection system / Explosive detection dogs

Passengers and their cabin baggage are considered to be "sterile" in that they are not carrying any items which could cause a threat to the aircraft.

Screening options

The design of a passenger's terminal building is one of the major factors which determine how and at which point the final screening of passengers and their baggage will be carried out. The 3 designs are:-

- Boarding gate plan
- Holding area plan
- Concourse plan

These are department on space available, passenger volumes, availability of equipment's and manpower resources and national policy on aviation security.

Screening of staff entering and protection of sterile areas

A sterile area is an area after the final screening of passengers and their cabin baggage has been completed. Sterile areas are to be clearly separated from non-sterile area. Mixing of screened and unscreened persons is not allowed in sterile areas.

Screening of hold baggage.

Locations for screening hold baggage vary depending on the risk assessment of an airport. However, as a guide, hold baggage can be screened:

- At the point of entry into a terminal building
- Inside the terminal, prior to check-in
- At check-in
- After check-in

- **AT THE POINT OF ENTRY INTO A TERMINAL BUILDING**

Advantages:

The advantage of screening at the point of entry to the terminal is that the hold baggage can be screened and cleared in presence of the passenger and the passengers is immediately available should any piece of their baggage require physical inspection.

Disadvantage:

If terminal is normal, it will equip man many entrances to terminal inorder to carry out screening, and to ensure that entrance is only possible via checkpoints.

- **INSIDE TERMINAL, PRIOR TO CHECK-IN**

Advantages:

As with the first option, the hold baggage can be screened and cleared in the presence of the passengers and the passengers is immediately available should any piece of their baggage require physical inspection.

Disadvantage:

A large check-in concourses is needed to which only ticketed passengers allowed.

- **AT CHECK-IN**

Advantage:

Screening is also done in the presence of passengers and passengers are available for physical inspection of their baggage.

Disadvantage:

A large check-in area is required to house the screening equipment and the check-in time may be long.

- AFTER CHECK-IN
-

Advantage:

The option provides for better passenger experience. It also mwans that more time is available to do screening using centralized screening equipment with fewer reasoures.it provide greater access to useable space and there is no need for seals. This option provides for handling large volumes.

Disadvantages:

Challenge of reuniting passenger and bag if something suspicious is found. Also, the hold baggage screening system has to be integrated into the BHS which can be costly and complex.

Automated Hold Baggage Screening Systems

As a result of ICAO's decisions that 100% hold baggage screening is mandatory. Many airports use automated baggage screening system as they help speed up the screening of hold baggage without compromising the effectiveness of screening.

The five levels of screening are:

Level 1: this level uses automated explosive detection system(EDS), X-ray, reject bags which that have dark/dense parts inside or through atomic number analysis, or based on shapes.

Level 2: the bag image taken at level 1 is viewed by a trained x-ray operator who is allowed a short period of time to examine the image and to be determine whether or not there may be any item in the bag requiring further screening .

Level 3: the bag will be examined by EDS. At this stage it is still possible to determine that the bag is "innocent" in which case it can be diverted to baggage makeup.

Level 4: the bag is reunited with the passenger and a physical search is conducted.

Level 5: the bag is removed to a remote location where explosive ordnance and disposal renders it safe.

2.3 PROHIBITED ITEMS IN PASSENGERS HAND BAGGAGE

To minimize the time and the hassle during the security checks, we advise that all passengers observe the list of prohibited items which will be confiscated and not returnable if discovered in your hand luggage:

1. ALL types of pistols, shot guns, rifles, air guns, imitation / toy pistols and other items which are defined as firearms in the Arms Act 1960.
2. ALL types of knives, kris, choppers and other cutting utensils, such as scissors, spears, tridents, blowpipes, darts, chisels, saws, arrows, sickles, swords and other sharp objects.
3. ALL types of ammunitions, fire crackers and explosive items.
4. ALL types of clubs, golf / hockey sticks and walking sticks (except for blind and physically weak passengers).
5. Any sharp objects with a point or blade such as cutters, razor blades, household cutleries or hiking poles.

2.4 SECURITY MEASURES FOR CARGO, MAIL AND CATERING

It is believed that as the security for passengers and their baggage improves, terrorist will begin to look for the "weakest link" in the AVSEC chain

2.4.1 Security measures for Air Cargo

As aviation security for passengers and their baggage become more efficient, air cargo will become more attractive as a target. The industry has recently been making steps to improve the security of air cargo and this emphasis is now properly in place.ICAO Annex 17 standard 4.6.1 says that contracting states shall ensure that appropriate security controls, including screening, where practicable, are applied to cargo and mail prior to their being loaded unto an aircraft engaged in passengers commercial air transport operations.

The term air cargo includes normal freight, consolidations, transshipment, unaccompanied courier items, postal mail, diplomatic mail, company stores and accompanied baggage.

2.4.2 Security Measures for Mail

Mail is another category of goods that gets transported via airlines.Although mail threats may be somewhat less serious than those posed by cargo,mail could still possibly be infiltrated and to commit acts of unlawful interference against the aviation industry.ICAO requires that states screen all mail destined to be carried on passenger aircraft. Due to the legalities regarding the transportation of mail and possible operational or technological constraints, the appropriate airport authority is required to work with the designated postal authority in order to secure the mail

2.4.3 Security Measures for Catering

Catering supplies and aircraft operator's stores and supplies can provide a means for perpetrators to conduct acts of unlawful interference by introducing weapons ,explosive devices or other prohibited items onto the aircraft.The security measures applied to catering supplies or stores are meant to prevent the infiltration onto a flight of any articles that could be used to carry out an act of unlawful interference against an airline.

CHAPTER 3

RESEARCH DESIGN, METHODOLOGY AND PLAN:

3.1 AIRPORT SECURITY BY COUNTRY

a. CANADA

All restrictions involving airport security are determined by Transport Canada and are enforced by the Canadian Air Transport Security Authority (CATSA). Since the September 11, 2001 attacks, as well as the Air India bombing in 1985 and other incidents, airport security has tightened in Canada in order to prevent any attacks in Canadian Airspace.

CATSA uses x-ray machines to verify the contents of all carry-ons as well as metal detectors, explosive trace detection (ETD) equipment and random physical searches of passengers at the pre-board screening points. X-ray machines, CTX machines, high-resolution x-rays and ETDs are also used to scan checked bags. All checked baggage is always x-rayed at all major commercial airports.

CATSA also completed the first phase of its Restricted Area Identity Card (RAIC) program in January 2007. This program replaces the old Airport Restricted Area Passes issued to airport employees after security checks by the Canadian Security Intelligence Service, the Royal Canadian Mounted Police (RCMP) and Transport Canada with new cards (issued after the same checks are conducted) that contain biometric information (fingerprints and iris scans) belonging to the person issued the RAIC.

b. EUROPEAN UNION

Regulation (EC) No 300/2008of the European Parliament and of the Council establishes common rules in the European Union to protect civil aviation against acts of unlawful interference. The regulation's provisions apply to all airports or parts of airports located in an EU country that are not used exclusively for military purposes. The provisions also apply to all operators, including air carriers, providing services at the aforementioned airports. It also applies to all entities located inside or outside airport premises providing services to airports. The standards of regulation 300/2008 are implemented by Commission Regulation (EU) No 185/2010.

The regulation no 2320/2002 from 2002 introduced the requirement to have security checks for all passenger flights, also domestic. Some EU countries had no checks for domestic flights until around 2005 (introducing full security checks took some time since terminals might need expansion).

c. FINLAND

Passenger, luggage and freight security checking and security guard duties are outsourced to contractors. General public security is the responsibility of the Finnish Police, which has an airport unit at Helsinki Airport. The airport unit has a criminal investigation, a canine and a TEPO (terrorist and bomb) squad, and a PTR (police, customs and border guard) intelligence component. Furthermore, units of the Finnish Border Guard units at airports often arrest wanted individuals or fugitives at the border, and the Finnish Customs seizes e.g. weapons, false documents or explosives in addition to wanted individuals.

d. SPAIN

Airport security in Spain is provided by police forces, as well as private security guards. The PolicíaNacional provides general security as well as passport (in international airports) and documentation checking. In Catalonia and Basque Country, the Mossosd'Esquadra and the Ertzaintza, respectively, have replaced the PolicíaNacional except for documentation functions. The Guardia Civil handles the security and customs checking, often aided by private security guards. Local police provide security and traffic control outside the airport building.

Security measures are controlled by the state owned company Aena, and are bound to European Commission Regulations, as in other European Union countries.

e. SWEDEN

Airport security is handled by security guards provided by the airport itself, with police assistance if needed. Airport fire fighters are also security guards. The Swedish Transport

Agency decides the rules for the check, based on international regulations. Airport are generally defined by law as "protected objects", which give guards extra authority, like demanding identity documents and search people's belongings. Sweden has traditionally seen itself as a low-crime country with little need for security checks. Sweden introduced security checks for international departures when international regulations demanded that around the 1970s/1980s. In September 2001 there was a decision to introduce security checks also for domestic flights. This took a few years to implement as domestic airports and terminals were not prepared with room for this.

f. UNITED KINGDOM

FIGURE (B)

The row of concrete security barriers makes close approach by vehicles difficult.

The department for Transport (DFT) is the authority for airport security in the United Kingdom. In September 2004, with the Home Office, DFT started an initiative called the "Multi Agency Threat and Risk Assessment" (MATRA), which was piloted at five of the United Kingdom's major airports — Heathrow, Birmingham, East Midlands Airport, Newcastle and Glasgow. Following successful trials, the scheme has now been rolled out across all 44 airports.

Since the September 11 attacks in New York, the United Kingdom has been assessed as a high risk country due to its support of the United States both in its invasion of Afghanistan and Iraq.

From January 7, 2000, travelers are no longer limited to a single piece of carry-on luggage at most of the UK's major airports Currently, hand luggage is not limited by size or weight by the DFT, although most airlines do impose their own rules.

The UK trialed a controversial new method of screening passengers to further improve airport security using backscatter X-ray machines that provide a 360-degree view of a person, as well as "see" under clothes, right down to the skin and bones they are no longer used and were replaced by millimeter wave scanners which shows any hidden items while not showing the body of the passenger.

g. HONG KONG

FIGURE (C)

Airport Security Unit on patrol in the Hong Kong International Airport.

The Hong Kong International Airport is secured by the Hong Kong Police Force and Aviation Security Company (AVSECO). Within the police force, the Airport District is responsible for the safety and security of the airport region. Airport Security Units are deployed around the airport and are armed with H&K MP5 A3 sub-machine guns and Glock 17pistols. The security of the restricted area is the responsibility of the police and AVSECO.

While the airport is under the control of the Airport Authority Hong Kong (AAHK), the security power has been delegated to the AVSECO staffs. All persons and baggages carried by them must be X-Rayed and checked at the security screening points of the AVSECO (with a few exceptions at the Tenant Restricted Area).

h. INDIA

India stepped up its airport security after the 1999 Kandahar hijacking. The Central Industrial Security Force, a paramilitary organization is in charge of airport security under the regulatory frame work of the Bureau of Civil Aviation Security(Ministry of Civil Aviation). CISF formed an Airport Security Group to protect Indian airports. Every airport has now been given an APSU (Airport Security Unit), a trained unit to counter unlawful interference with civil aviation. Apart from the CISF, every domestic airline has an security group who looks after the aircraft security.

Terrorist threats and narcotics are the main threats in Indian airports. Another problem that some airports face is the proliferation of slums around the airport boundaries in places like Mumbai. Before boarding, additional searching of hand luggage is likely. Moreover, other than this, the CISF has many other duties in context of Aviation Security. The cargo security/ screening is done by the Regulated Agents or Airlines/ Airports own security staff who are tested and certified by the Bureau of Civil Aviation Security (BCAS), an aviation security Regulator.

i. SINGAPORE

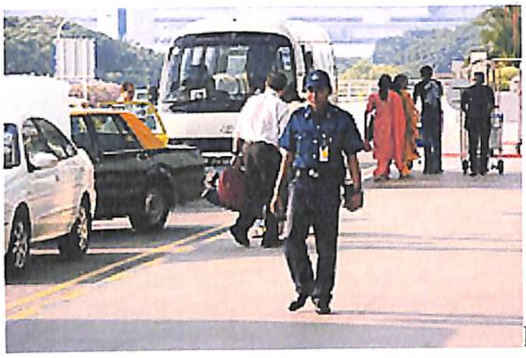

FIGURE (D)

An arêtes auxiliarypolice officer outside the Departure Hall of Terminal 2,

Singapore Changing Airport.

Security for the country's two international passenger airports comes under the purview of the Airport Police Division of the Singapore Police Force, although resources are concentrated at Singapore Changi Airport where scheduled passenger traffic dominates. Seletar Airport, which specializes in handling non-scheduled and training flights, is seen as posing less of a security issue. Since the September 11, 2001 attacks, and the naming of Changi Airport as a terrorism target by the Jemaah Islamiyah, the airport's security has been stepped up.

Roving patrol teams of two soldiers and a police officer armed with automatic weapons patrol the terminals at random. Departing passengers are checked at the entrance of the gate rather than after immigration clearance unlike Hong Kong International Airport. This security measure is easily noticed by the presence of X-ray machines and metal detectors at every gate, which is not normally seen at other airports.

Assisting the state organizations, are the security services provided by the ground handlers, namely that of the Certis CISCO, Singapore Airport Terminal Services'sSATS Security Services, and the Aetos Security Management Private Limited, formed from a merger of the

Changi International Airport Services's airport security unit and that of other companies to become a single island-wide auxiliary police company. These officers' duties include screening luggage and controlling movement into restricted areas.

List of unacceptable items

- Firearms
- Knives
- Scissors (with blades more than 6 cm). Blades that are shorter than 6 cm are always acceptable.
- Ammunition - all ammunition must be unloaded from the gun and is not allowed to be fired.
- Hammers
- Crow bars

Lifetime prohibited items (cabin/checked in)

- Fireworks and fire extinguishers
- Gunpowders and smoke flares
- Controlled drugs, and contraband drugs
- Vehicle airbags
- Liquid bleach
- Torch lighters
- Aerosols which might be more flammable (unless it is urgent)
- Hand grenades

UNITED STATES

FIGURE (E)

Airport security stations at Seattle–Tacoma International Airport.

Delta Security stickers on the back of a passport.

Prior to the 1970s American airports had minimal security arrangements to prevent aircraft hijackings. Measures were introduced starting in the late 1960s after several high-profile hijackings.

Sky marshals were introduced in 1970, but there were insufficient numbers to protect every flight and hijackings continued to take place. On November 10, 1972 a trio of hijackers threatened to fly Southern Airways Flight 49 into a nuclear reactor at Oak Ridge National Laboratory. As a direct response to this incident, the Federal Aviation Administration required that all airlines begin screening passengers and their carry-on baggage by January 5, 1973. This screening was generally contracted to private security companies. Private companies would bid on these contracts. The airline that had operational control of the departure concourse controlled by a given checkpoint would hold that contract. Although an airline would control the operation of a checkpoint, oversight authority was held by the FAA. C.F.R. Title 14 restrictions did not permit a relevant airport authority to exercise any oversight over checkpoint operations.

3.2 WAYS OF ASSURING ONBOARD SAFETY AND SECURITY:

- All our aircraft have reinforced flight-deck doors and linked CCTV equipment

- We deploy a range of overt and covert protective measures, including Behavioral Detection, to maximise security

- We operate a self-test programme to ensure the robustness of our security

- We conduct joint audits and inspections with our regulators

- We are members of the Department for Transport's Aviation Security Compliance Forum

- Our pilots are selected and trained to the highest standards

- All our aeroplanes are maintained and developed by a dedicated and professional team of Engineers who are renowned for their excellence

- Virgin Atlantic legendary cabin crew are not just there to provide great service. They are trained to attend to medical situations and emergencies. With on board medical kits, defibrillators as well as communication links to doctors on the ground, they can take the best care of you.

- Our Airport Operations staff are carefully recruited and trained to industry high standards

- Operational Safety & Security assessments are carried out on our Aerodromes of operation

You can rest assured that we always have the most current and accurate data to make informed judgments when it comes to assessing security threats and safety risks. We will never operate a flight unless we believe it is safe to do so.We also enjoy excellent relationships with governments, regulators, air traffic service providers, law enforcement organizations and safety and security agencies worldwide, working with them to ensure the integrity of aviation safety and security.As a passenger you can also play a part in contributing to our work to maximize safety. We rely on you to contribute to a safe and secure environment on board by ensuring that your behavior is appropriate, as we will not tolerate behavior that disrupts your fellow customers' enjoyment of their flight. Most of all we expect you to observe the safety briefings, be familiar with the safety cards and the location of exits, and to follow the instructions of the crew.

CHAPTER 4
FINDINGS AND ANALYSIS:

4.1 THREATS TO THE AVIATION INDUSTRY

Commercial aviation has been threatened by terrorism for decades now. From the first hijackings and bombings in the late 1960s to last month's attempt against the UPS and FedEx cargo aircraft, the threat has remained constant. As we have discussed for many years, jihadists have long had a fixation with attacking aircraft. When security measures were put in place to protect against Bojinka-style attacks in the 1990s — attacks that involved modular explosive devices smuggled onto planes and left aboard — the jihadists adapted and conducted 9/11-style attacks. When security measures were put in place to counter 9/11-style attacks, the jihadists quickly responded by going to onboard suicide attacks with explosive devices concealed in shoes. When that tactic was discovered and shoes began to be screened, they switched to devices containing camouflaged liquid explosives. When that plot failed and security measures were altered to restrict the quantity of liquids that people could take aboard aircraft, we saw the jihadists alter the paradigm once more and attempt the underwear-bomb attack last Christmas.

In a special edition of Inspire magazine released last weekend, al Qaeda in the Arabian Peninsula (AQAP) noted that, due to the increased passenger screening implemented after the Christmas Day 2009 attempt, the group's operational planners decided to employ explosive devices sent via air cargo (we have written specifically about the vulnerability of air cargo to terrorist attacks).

Finally, it is also important to understand that the threat does not emanate just from jihadists like al Qaeda and its regional franchises. Over the past several decades, aircraft have been attacked by a number of different actors, including North Korean intelligence officers, Sikh, Palestinian and Hezbollah militants and mentally disturbed individuals like the Unabomber, among others.

Insider Threat: The insider threat can come in the form of an ex-employee, current employee, contracted worker, or partner. Because they carry inside knowledge of the industry, an insider threat's true underlying motive and unpredictability can be frightening. Internal threats are capable of exploitation, tampering, fraud, espionage, theft, and sabotage. Insider threat blog

Cyber Attack: With society's increasing reliability on technology, cyber security must be a high priority. Cyber threats to computer systems on the ground and at the airport can cause flight delays, loss of power, system failures, and a breakdown in communication between networks. Attacks to aircrafts in the sky can mean disruptions to navigations systems, losing on-board aircraft control, and no communication with the ground. Cyber attacks are inexpensive to carry out, but are able to cause a broad range of disruptions.

Laser Illumination: Laser pointers used to disorient and temporarily blind pilots in the cockpit has risen drastically compared to previous years. The U.S. Federal Aviation Administration (FAA) reported 3,894 laser illumination incidents in 2014 in the United States as compared to 283 in 2005. Last year, there were 73 laser incidents at PHX airport (Phoenix, AZ), 74 at PDX airport (Portland, OR), 75 at LAS airport (Las Vegas, NV), and the highest being 107 incidents at LAX airport (Los Angeles, CA).

Just last week 11 commercial airliners and 1 military aircraft reported lasers pointed at them at EWR airport in Newark, NJ. Laser pointers are dangerous devices that can obscure a pilot's vision, put passenger lives at risk, and endanger civilian lives on the ground.

Surface-to-air Missile (SAM): Also known as a ground-to-air missile (GTAM), this weapon is designed to take down aircrafts and other missiles in the sky. This also includes man-portable air-defense systems (MANPADS) which are handheld versions of this dangerous weaponry. These missiles pose a serious threat to air travel and can bring down an aircraft with one shot if in the wrong hands. Just over one year ago, Malaysia Airlines Flight 17 was tragically taken down over Ukraine with a surface-to-air missile.

4.2 THREATS THAT COMMERCIAL AIRLINES FACE

1. Sabotage in airport

2. Sabotage in aircraft by way of bomb

3. Air terrorism/terrorism at airport

4. Hijacking of aircraft

5. Attack by criminals

Threat in the civil aviation industry has been changed from hijacking of aircrafts to sabotage. Likewise terrorism and sabotage are sometimes interlinked. The person with criminal motives usually does air terrorism by sabotaging the airport or the aircrafts If one could do criminal activities in the airport, then there are a weak links in the airport security. Terrorist usually attacks aircrafts due to political, social and other criminal motives. Their objectives are to cause disruptions or physical damages. Terrorists usually use explosives like bombs to carry out their task.

Air traffic computer systems are the most vulnerable to be sabotaged. Computer operation systems usually have a weak authentication and are easier to penetrate. System that has weak access controls tends to be poorly configured and as such easily misused as soon as anyone gains the initial access to the systems. Safety vulnerabilities are also rampant, due to the usage of improper software and hardware. Effective security equipments with proper security systems will help eliminate criminal activities and prevent espionage. To prevent unauthorized entry, we must have proper access control systems. We must further ensure that identification passes are been issued to only authorize personnel.

Hijackers use the human life to bargain something that they may want to achieve. They prefer to "Transfer the threats" to countries that are less developed and unsafe."Transfer of threats" means, the hijackers may redirect the flight from the country of origin to a safer place to accomplish. The objectives of terrorists are usually for publicity, to demand the release of their compatriots or for political changes in their countries and assassination.The National Aviation Security Programme (NASP) gives us the information on the terrorists "threat models" (likely target of the unlawful acts), and tells us how they usually carry out their attacks. Terrorism may not be totally eradicated, but with proper screening procedures and having restrictions for items to be carried onboard the flight can help to deduce the unlawful acts.ICAO Annex 17 prescribe the list of items allowed to be carried by passenger onboard the aircraft.

4.3 OBJECTIVES OF ICAO

The objective of the ICAO is to ensure the aviation industry developed in a safe and orderly manner. ICAO sets the following guidelines:

a) It is responsibility of each state to establish a national civil aviation security programme and must have the objective to act against any unlawful interference and sabotage.

b) To develop, implement and maintain comprehensive flexible and effective national programme.

c) Security standard for departure area which includes pre-flight boarding gate (holding area) baggage and cargo security screening.

d) To establish security measures at airport terminal buildings and aircraft parking areas (Airport Staff Identification and protection of documents).

e) To take security measure airport in flights.

f) Security standard on each type of security device used in the airport.

g) Aviation security training scope.

h) Management's response to unlawful interference and threat.

i) Communication and exchange of information and report.

The European Civil Aviation Organization (ECAC), which has members from most European countries, also works closely with the ICAO to promote coordination and develop better air transportation systems in the Europe.

Items that are permitted can be carried as cargo but they must be properly packed. Our prime consideration must always be safety. Leaks from item like batteries, wax or thermometers can help disastrous. It is advised that you are not allowed to take toxic or radio active action materials on board.

4.4 CLASSIFIED DANGEROUS GOODS

1. Weapons: Firearms, ammunition, gunpowder, mace, tear gas or pepper spray. Firearms and Ammunition will not be allowed by the passenger to carry onboard the aircraft.

However, unloaded firearms may be transported in checked baggage if declared to the agent at check in and packed in a suitable container. Handguns must be in a locked container. Boxed small arms ammunition for personal use may be transported in checked luggage. Amounts may vary depending on the airline.

2. Dry ice (4 pounds or less) for packing perishables may be carried on board an aircraft provided the package is vented.

3. Electric wheelchairs must be transported in accordance with airline requirements. The battery may need to be disconnected, removed, and the terminals insulated to prevent short circuits.

4. Fireworks, Signal flares, sparklers or other explosives

5. Flammable Liquids or Solids Fuel, paints, lighter refills, matches

6. Household items Drain cleaners and solvents

7. Pressure containers: Spray cans, butane fuel, scuba tanks, propane tanks, CO2 cartridges, self-inflating rafts

8. Other Hazardous Materials: Dry ice, gasoline-powered tools, wet-cell batteries, camping equipment with fuel, radioactive materials (except limited quantities), poisons, infectious substances.

9. Personal care items containing hazardous materials (e.g., flammable perfume, aerosols) totaling no more than 70 ounces may be carried on board. Contents of each container may not exceed 16 fluid ounces.

CHAPTER 5
INTERPRETATION OF RESULTS:

5.1 FUNCTIONS OF THE DIRECTORATE OF AVIATION SAFETY

1. Monitor the Aerodrome operations and detect the safety hazards and point out to the ATM Directorate.and the other concerned Directorates.
2. Monitor the Air Navigation operations and detect the safety hazards and point out to the ATM Directorate and the other concerned Directorates.
3. Monitor the Aerodrome design activities of the Planning and Engineering Directorates and detect the non-compliances of regulations and point out to the concerned Directorates.
4. Guide the various departments for SMS documentation.
5. Assist all the Directorates to establish the Safety Management System, throughout the organization, including the education and training.
6. Coordinate the safety matters of AAI with DGCA, ICAO and other stake holders.
7. Promote the safety of aerodromes and air navigation services.
8. Present the safety reports to the Safety Review Board (SRB) and implement the directions, given on safety matters, by SRB.
9. Detect the weaknesses in the functions and the practices in the activities of all departments of AAI which may effect the safety of the system(s).
10. Develop the new tools and methods of audit and inspections and mitigation procedures.
11. Implement effective safety programmes in all areas of operations and passenger facilities with a view to provide safe environment for aircraft operations and passengers at all AAI airports.
12. Carry out annual audit of all AAI airports, civil enclaves and other facilities with the objective of identifying operational and system deficiencies, hazards and trends at ground level.
13. To monitor that air traffic services, communication, navigational and landing aids, rescue and fire fighting services at AAI aerodromes are provided and maintained

inconformity with ICAO standards and recommended practices and civil aviation requirements issued from time to time.

14. Recommend appropriate accident/incident preventive actions to senior management.

15. Promote and develop activities that increase knowledge and safety awareness amongst all department personnel of AAI and to the extent possible amongst all personnel of other departments working at the Airport.

5.2 AAI SAFETY POLICY, COMMITMENT AND OBJECTIVES

SAFETY POLICY

The ICAO document 9859 chapter 12 lays down the requirement of issuing a Safety Policy by the service providers and establishment of Safety Management System (SMS) based upon the policy. The guidelines for Safety policy and SMS framework are also issued by ICAO document {ICAO Regional Workshop on SMS and State Safety Programme (SSP) Implementation}.

The Airports Authority of India states its safety policy as below:

Establishment: AAI shall conceive, design, develop and effect changes to the Aerodromes, CNS systems, ATS systems, airspace and air traffic management and procedures involving all the stake holders for safe Air Navigation in the sky and for safe aerodrome operations.

Safety Plans: AAI shall make its country wide Safety Plans, and revise periodically throughout all its operational activities for enhancement of safety.

Safety Management System: AAI shall establish SMS - the safety levels of airspace and all aerodromes, identify hazards and lay down methods of risk assessments, risk mitigation, safety measurements, reporting, monitoring and reviewing and shall endeavour to maintain the safety levels of all aerodromes, ATS and safety standards of CNS facilities even if the traffic grows.

Safety reviews: AAI shall carry out safety reviews regularly at the specified periods of the ATS and Aerodrome operations, CNS standards involving the management at station level, region level and corporate level.

Responsibilities and accountabilities: AAI shall involve all its wings (Engg., CNS, Operations, ATM, etc.) by documenting explicit safety responsibilities and shall evolve a procedure of accountabilities from top management to the line managers.

Safety culture: It shall also involve the other stake holders, the regulator in the safety promotion in the sky and ground operations by practicing the laid down procedures leading to a safety culture.

COMMITMENT

Safety Priority: AAI is committed to the aviation safety in the country as desired by ICAO Chicago Convention Article No. 44 and as required by DGCA India. It regards the safety its First Priority in the aviation business and shall treat the safety matters on top priority over the other matters.

Safety Sharing: AAI is committed to share the safety matters, awareness, practices with the stake holders and international community.

Resources: AAI is committed to provide adequate material resources including human resources and for training, repair maintenance and upgrading the systems in a systematic and timely manner.

Universal Commitment: AAI is committed to work in coordination with international aviation community for the Global mission-

"One World-One Sky-One Mission : SAFETY "

OBJECTIVES

Excellent ATM performance: To achieve the excellent performance of ATM procedures, unit functions and the Air traffic controllers. AGL operations, repair and maintenance.Excellent response to search and rescue and excellent coordination.

Safe aerodrome operations: To establish and maintain the aerodrome safety levels by re-dressing the issues; Bird menace, FOD, runway operations, efficient handling of flights, helicopter handling, Safety in apron operations: Passenger Handling, ramp and Equipment, aircraft movements, push-backs, and cargo operations: loading / offloading, Apron safety and cargo security.

Airport security and safety integration.

Efficient performance of fire safety services: Fitness of staff, Equipments and training, repair maintenance and performance of vehicles, excellent emergency response.

Failure-free ATS system: Standby systems, preventive maintenance of landlines, other equipments and radars, intercoms, AMSS, upgrade in the technology, etc.

Failure-free and standard CNS facilities: Noise free standard communication channels, standby systems.

5.3 CARGO SECURITY

Threats facing aviation security may not be in the form of terrorist attacks only. Cargo areas are also attractive target and as such they are also vulnerable to attacks. Cargo thefts and Criminal attacks are very common in the Airline industry.

Several cases were reported on the said matter. On April 1994 in Malaysia, at Subang Airport Airbus, gold bars worth about US $300,000.00 were found missing from the flight. On August 1994, 1.8 million RM were stolen from the Subang Airport Strong Room. On 24 Jun 1998, at Lago International Airport, aircraft was robbed before it took off.

Three-quarter of the space occupied in the passenger airline is cargo. If cargo can be taken out, similarly, explosives can be planted in the aircraft using cargo. Therefore, the aviation security must also show serious concern about Cargo areas.

5.4GUARDING AND SEARCHING ACCESS CONTROL AREAS

We must ensure all vehicles together with their content are effectively searched. All authorized staff/personnel are issued with identification passes and with proper access control systems. In Singapore, identification passes are issued different colors and in accordance to their areas.

The security and physical layouts for the warehouse are equally important. We must have procedural policy of the warehouse must be closely monitored. Whenever the warehouses are not been used, the roller shutter must be down at all time. Proper surveillance cameras with access control systems help to minimize theft and eliminate undesirable behavior. In November 1994, it was recommended that all cargo agents at CAC to comply with the six crime preventive measures for handling vulnerable cargo and all warehouse are inspected half yearly by the Airport Police.

1. All items of high value to be stored in the Security Cage or Room with locks and Keys and only authorized personnel are allowed to gain access to the said place.
2. A supervisor or Senior Storekeeper supervises the loading and unloading of the vulnerable goods.
3. Stock Checks and Physical Inspection of vulnerable cargo must be done daily during changing of duty or shift.
4. Install a CCTV system inside the Security Cage or Room to monitor and record movements of all persons entering or leaving the room.
5. Enclosed vehicle to be use to convey vulnerable cargo to and from the freight terminal.
6. All field staff involved in the cargo movements must be is in uniform for easy identification of unauthorized personnel.

Whatever systems and procedure they adopt, the cargo always becomes vulnerable when system breakdown. Proper physical structure and procedural control against theft and effective screening will help eliminate criminal activities.

CHAPTER 6

CONCLUSION AND SCOPE FOR FUTURE WORK:

Prioritizing airport security has resulted in rapid developments in security technology and significantly increased security funding, and has led to addressing issues long considered a concern by many members of the travelling public. Protecting against unknown future threats is an imperfect science and as such the future of airport security will always be an unknown entity .Concerns for the safe ,secure and efficient travel of passengers and cargo domestically and internationally will always be a top priority for the civil aviation system.

Planning for security should be an integral part of any design project undertaken at an airport. The most efficient and cost-effective method of instituting security measures in any facility or operation is through advance planning and continuous monitoring throughout the project. Typically there are numerous intended access points through fencing or other barriers for both vehicles and pedestrians. Access points through buiding or walls are usually doors; guard stations or electronic means or controls may be also used to control security. It ensures that efforts to make the system as secure as possible will continue to be held in top priority, by all levels of government , as well as airport management ,for the foreseeable future.

Airport security refers to the techniques and methods used in protecting passengers, staff and aircraft which use the airports from accidental / malicious harm, crime and other threats . Large numbers of people pass through airportseveryday , this presents potential targets for terrorism and other forms of crime because of the number of people located in a particular location. While safety is the state in which the risk of harm to person or of property damage is reduced to and maintained at or below an acceptable level through a continuing process of hazard identification and risk management .Aviation security is another component of ensuring the safety of passengers .It rests on a careful mix of intelligence information ,procedures, technology, and security personnel

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APPENDIX

Abbreviations

AAI Airport authority of india
ADL Alternative Dispute Resolution
ANSP Air Navigation Service Providers
ATC Air Traffic Control
ATRP Air Transport Regulation Panel
DGCA Director General Of Civil Aviation
GACA General Authority Of Civil Aviation
IATA International Air Transport Association
ICAO International Civil Aviation Organization
TSA Transportation Security Administration
UNWTO United Nations World Tourism Organization
ECACEuropean Civil Aviation Organization
SMS Safety Management System
NASP National Aviation Security Programme
BCAS Bureau of Civil Aviation Security
AAHK Airport Authority Hong Kong
MATRA Multi Agency Threat and Risk Assessment
DFT The department for Transport
RAIC Restricted Area Identity Card
ETD Explosive trace detection
CATSA Canadian Air Transport Security Authority
EDS Explosive detection system
EMAS Engineered materials arrestor system
MSAW Minimum Safe Altitude Warning
TAWS Terrain awareness and warning system
CFIT Controlled flight into terrain
FOD Foreign object debris